

# ELECTRIC RAILWAY JOURNAL

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1923

*Best Wishes!*  
for a long, smooth run—  
and PROSPERITY — on  
schedule time ~

*Barron & Collier*  
INCORPORATED



## Collier Service





## A Happy New Year

"Joe," said the Vice-President, "without being unmindful of conditions beyond our shores, this great country of ours has many reasons to celebrate the advent of a Happy New Year. Business generally is very good. There is practically no unemployment. Our own Industry is convalescing; much brighter and happier days are in store for the Electric Railway Industry in this country. The resolutions we drew up and adopted last year have permeated throughout our organization. All we need do is to follow through and do even a better job this year."

"You are absolutely right, Boss," said Joe smiling. "Our manufacturing friends and, in fact, all wide-awake business men are helping to inform the people regarding the necessity and value that progressive and adequate street car service is to them."

"That's true, Joe. The national advertising of

the Westinghouse Electric & Manufacturing Company alone has been a big factor in this work. All that this Industry of ours needs now is for every management to get abreast of the times and follow the lead and activity established by the progressive men in the Industry. Transportation service requirements have changed. The automobile and good roads have changed peoples' habits and expectations in transport service. None can afford to still think about schedules and service as they did ten years ago; if they do they are asleep at the switch—harmful not only to their own company but to the rest of the Industry."

"No argument on that question, Boss. The manufacturers have done their part on equipment, too. With the safety car and the light weight, double truck cars equipped with Westinghouse motors and cabinet control, the kind of service people want can be provided. We know because we have done it."



Westinghouse Electric & Manufacturing Company  
East Pittsburgh, Pa.



# Westinghouse



# ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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## What the Subscribers Think of the Journal

WE HAVE been telling you a few things in this column about ourselves. Perhaps it would be just as pertinent and interesting to know what others think about us. The following are some comments taken from letters written to us in response to an invitation to make any suggestions which the subscriber thought would improve the paper.

### An Established Necessity

Have been reading the *Journal* for fifteen years or more. Consider it the best magazine published. It is an established necessity to most railway men.

L. W. H., *General Manager.*

### All That a Publication Should Be

Nearly all articles are interesting and good. I consider the *Journal* in its present form all that an electric railroad publication should be.

H. N. L., *Commissioner.*

### Highly Organized Publication

I read the *Journal* with a great deal of interest. I consider it a very highly organized publication and have nothing but commendation for it.

B. L. D., *Engineer.*

### Keeps Him in Touch with All Phases

I cannot suggest any changes in your *Journal* that would better its usefulness so far as I am concerned. It ably keeps me in touch with all phases of electric traction.

W. H., *General Foreman Shops.*

### Covers the Field Broadly and Thoroughly

I always read the *Journal* every week, skipping over contents and carefully reading those articles from which I wish to secure more information. It is a regular part of my routine. You have always covered the field broadly and thoroughly, and I have nothing to suggest that would make it of more value to me.

E. D., *General Manager.*



## Westinghouse Traction Brake Co. Products

### BRAKES FOR EVERY CLASS OF SERVICE

**Schedule SM-3 (Straight Air)**—For single cars in light, slow-speed city service.

**Schedule SME (Semi-Automatic)**—For single cars or two car trains in city service.

**Schedule AMM (Combined Automatic and Straight Air)**—For single cars or short multiple-unit trains in heavy city, suburban or interurban service.

**Schedule AMU (Automatic)**—For long trains in high-speed interurban elevated or subway service.

**Schedule AMUE (Electro-Pneumatic)**—For trains of any length in rapid transit, elevated or subway lines.

**Variable Load Brake**—For trains of any length on elevated or subway systems. Same as AMUE, plus features for varying brake cylinder pressure so as to obtain uniform retardation on empty, partially loaded, or fully loaded trains.

### AIR COMPRESSORS

**For Traction Service**—DH "Bungalow" type, 10 to 25 cu. ft. displacement; DF type, 15 to 38 cu. ft. displacement; other types to meet special requirements.

**Industrial Service**—All types and sizes from 11 to 550 cu. ft. displacement; a.c. or d.c. motor; recommended for power stations, car barns, shops, yards, etc.

### "TIGHT-LOCK" AUTOMATIC COUPLERS

Car and Air, or Car, Air and Electric Couplers for all classes of traction service.

### "WABCO" PACKING CUPS

For air brake cylinders, door control engine cylinders, etc.

**Air Brake Hose, Couplings and Fittings**

**Car Signal Equipment**

**Air Whistles**

**Air Cut-out Cocks**

**Air Gages**

**Brake and Operating Air Valves**

**Automatic Slack Adjusters**

**Air Strainers**

### AN AUTOMOTIVE AIR BRAKE

A new development providing better braking facilities for the safe and efficient operation of Motor Buses, Trucks, Touring Cars, Trackless Trolley Cars and Rail Motor Vehicles.



# Your Requirements for 1923

**P**ROMINENT among your requirements for 1923 will be the right kind of equipment to enable you to take full advantage of the opportunities for profitable operation that the New Year offers.

Westinghouse Traction Brake products represent a line of equipment that is essential to successful railway operation—equipment of known quality which will meet your highest requirements in every detail.

Consult the list on this page, check off the items which will help you to realize your plans for better service and increased earnings, then have us send one of our representatives to talk the matter over.

**Westinghouse Traction Brake Company**  
General Offices and Works: Wilmerding, Pa.

#### OFFICES:

Boston, Mass.  
Chicago, Ill.  
Columbus, O.  
Denver, Colo.  
Houston, Tex.

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St. Paul, Minn.

New York  
Pittsburgh  
Washington  
Seattle  
San Francisco



# WESTINGHOUSE TRACTION BRAKES





O-B Type BC Trolley Frog (Patented)

Bottom view of pan at left

Made right—or left—hand (ten degrees only) for all sizes and styles of wire

# O-B Type BC Trolley Frog

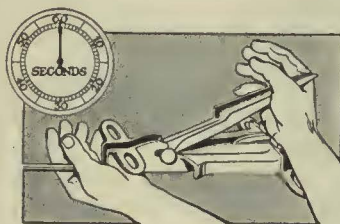
## Saves wear on main line wire

One large railway found that O-B Type BC Trolley Frog could be set more than six feet farther back—that is, closer to the switch point—than the frog which it replaced. That feature is the big reason for O-B BC Frog.

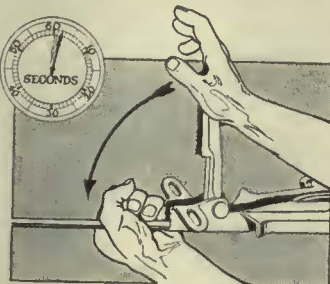
It means much less wear on the trolley wire because it means a shorter distance for the wheel to drag before it picks up the turnout wire. Pan construction makes it possible. Trolley wheels ride through on their grooves — at no time does the flange of the wheel touch the pan.

O-B Type BC Trolley Frogs are made right—or left—hand in ten degrees only. Service has demonstrated that this one angle takes care of all conditions and does it well.

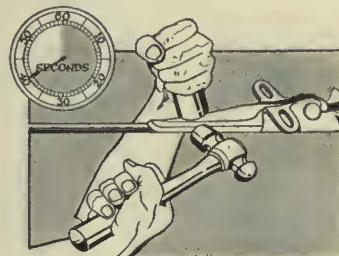
O-B Type BC Frogs are fitted with bronze cam tips which clip minutes from installation time and add weeks to service life. The illustrations below show how easy it is to install O-B Cam Tips.



Slip tip under hooks—



Turn over and down on the wire—



Clinch the tips and the job is done.

The **Ohio** **Brass** Co.  
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France  
Products: Trolley Material, Rail Bands, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators



# *Insurance plus Marsh & McLennan Service*

OTHER THINGS BEING EQUAL—Marsh & McLennan would not be carrying the insurance for a great number of the largest public utilities in America.

The public is no more interested in where you buy your insurance than they are interested in where you buy your rails or cars or other equipment.

Marsh & McLennan solicit your insurance solely because they can render you a service that will decrease your insurance costs.

On one large Eastern Corporation, for example, we were able to reduce the insurance rate from \$17.50 per thousand to \$4.30 per thousand. Why not buy your insurance where you can buy the most for your money?

We will be glad to outline this service to business executives who are interested in reducing insurance costs.

# MARSH & MCLENNAN

175 W. Jackson Blvd. Chicago, Ill.

Minneapolis  
New York  
Detroit

Denver  
Duluth  
Columbus

San Francisco  
Seattle  
Cleveland

Winnipeg  
Montreal  
London





## Trained Eyes and Steel Ties

**I**N the course of experience an Engineer develops unconsciously a faculty of measuring the strength of material with his eye—of checking without calculation by his visual preception the correctness of any construction—always when faced with this test Steel Twin Ties get the nod of approval.

**T**HEY'RE big enough for the work they have to do—140 pounds of steel—156 square inches of bearing per track foot and this at no greater cost than wood ties in ballast—in many localities at a large first cost savings over wood ties in concrete.

*See them in your 1923 construction*

THE INTERNATIONAL STEEL TIE CO.  
Cleveland

# Steel Twin Tie Track



# *Bates Steel Poles*

*used in the*

## *Windsor Trollibus Installation*

Bates Steel Poles were selected as the most economical and satisfactory method of overhead construction for trackless trolleys operated in Windsor, Ontario under the control of the Hydro Electric Power Commission.

Two separate routes are operated through residence sections of the city and besides the economy and permanence of Bates Poles their good appearance was an important consideration. Notice the convenient and attractive mounting of street lighting brackets.

Bates Steel Poles have many advantages to appeal to engineers planning new or replacement construction. Our engineering staff is at your service with a large fund of practical data.

**B**ates **E**xpanded **S**teel **T**russ **C**o.

208 South La Salle Street, Chicago, U. S. A.



**BATES** *ONE PIECE* **POLES**  
**EXPANDED**  
**STEEL**



# Keystone Car Specialties



- Air Sanders
- Air Valves
- Golden Glow Headlights
- Illuminated Destination Signs
- Steel Gear Cases
- Safety Car Lighting Fixtures
- Motormen's Seats
- Faraday Car Signals
- Trolley Catchers
- Shelby Trolley Poles
- Samson Cordage
- International Fare Registers
- Fare Register Fittings
- Cord Connectors
- Rotary Gongs
- Standard Trolley Harps
- Standard Trolley Wheels
- Automatic Door Signals
- Trailer Connectors

SERVICE is the middle name of this time-established institution behind Keystone Car Specialties—the Electric SERVICE Supplies Company of Philadelphia and Chicago. This SERVICE is a complete SERVICE, too. The name means more than complete car equipment; it means complete transmission line specialties, lightning protective apparatus, motor-repair machinery and tools, rail bonds and track equipment, overhead material and third rail contact material.



## ELECTRIC SERVICE SUPPLIES CO.

*Manufacturer of Railway Material  
and Electrical Supplies*

PHILADELPHIA, 17th and Cambria Sts.

NEW YORK, 50 Church St.

CHICAGO, Monadnock Block

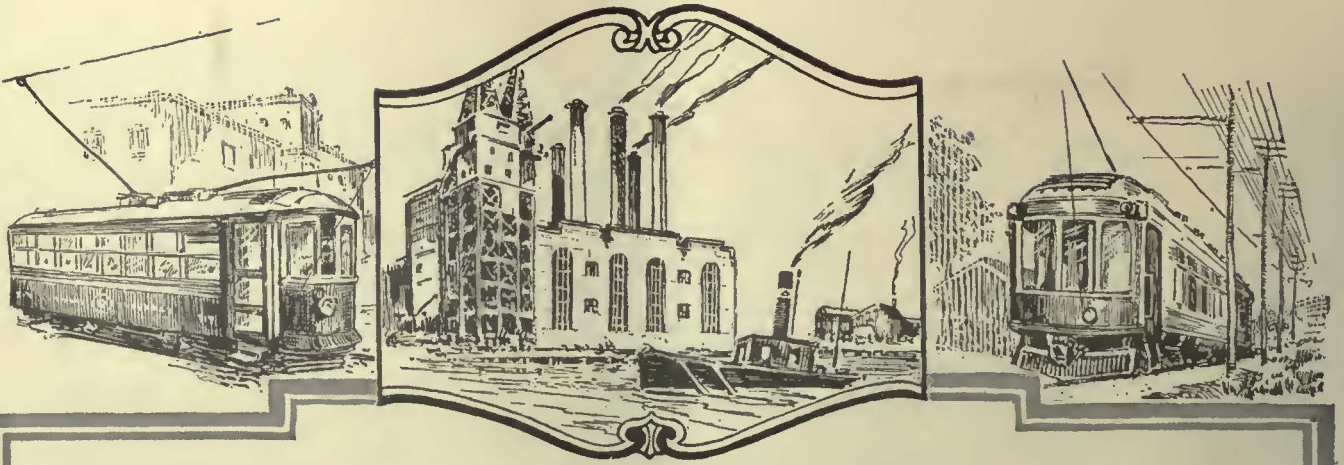
Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors:

Lyman Tube & Supply Co., Ltd., Montreal, Toronto







# Trackless Trolleys

*Mention trackless trolleys in any group of street railway men and immediately they divide into two camps.*

↙

**One camp holds** that a trackless trolley is only a temporary thing—it can't last.

↘

**The other says** it is here to stay and that it will keep on growing.

↓

This discussion means nothing to us because that's not our job. Time, alone, will decide whether the trackless trolley will go or come.

The fact remains that there are *some* trackless trolleys operating. And there may be more coming. Those that are *here* must be operated efficiently and lubricated correctly.

So we want to use this space to tell those who are now running trackless trolleys, and those who may later operate them, that TEXACO understands the lubrication of the trackless trolley in every detail.

Now, the trackless trolley presents some differences from regular street railway lubrication. We have studied those differences and can supply tested TEXACO Lubricants for any and all parts of a trackless trolley system.

We have gone into the different types of motors, transmissions and reduction gears, axles, and the smaller parts on which the suc-

cessful operation and good service so often depend.

To the trackless trolley operator we offer the same high-class lubricants, which are now successfully operating over hundreds of millions of car miles on "regular service."

We offer to them, also, high-grade, carefully selected lubricants which are keeping down wear and tear and promoting efficiency in the power plants and sub-stations of many of the best properties in the country.

We offer to them too, the free and full use of our Lubrication Engineering Advisory Service and we place at their disposal our extensive and well co-ordinated shipping facilities.

These are the things that have pushed TEXACO to the forefront in the lubrication of street railways.

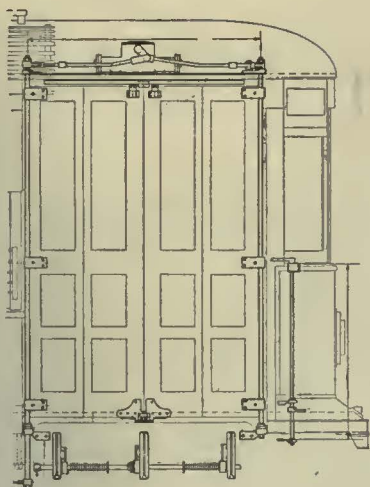
*When do you want us to give you an example of the Co-operation Service and quality of lubricants that will keep TEXACO Lubricants on your road?*



**THE TEXAS COMPANY**  
 DEPT. R-J · 17 BATTERY PLACE · NEW YORK CITY  
 HOUSTON · CHICAGO · NEW YORK  
 OFFICES IN PRINCIPAL CITIES







## *Inside or Out!*

### No Half-Way Business About It

Accident reduction in recent years has been chiefly among that class of cases known as the "boarding and alighting" kind. And more responsible for the improvement than any other single thing, has been the enclosed platform where doors and steps are interlocked with starting signals or control. This means that when the car is started there are no passengers left in dangerous positions, half way on or off the car.

National Pneumatic Devices have consistently lead the way and filled the bill in this development. They are widely used because on purely economic ground alone they save their cost in damage claims.

### NATIONAL PNEUMATIC

- Door and Step Control
- Motorman's Signal Lights
- Door and Step Operating Mechanism
- Safety Interlocking Door Control
- Multiple Unit Door Control

### National Pneumatic Company, Inc.

*Originator and Manufacturer*

50 Church St., New York      McCormick Bldg., Chicago  
 Works: Rahway, N. J.

*Manufactured in Canada by*  
 Dominion Wheel & Foundries, Ltd.  
 Toronto, Ont.

# Use Joint Boosters and Forget

## *Reclamation vs. Reconstruction*

Are you worrying about the thousands which must be spent for track reconstruction on your property next spring, because the joints are bad?

## The Dayton Joint Booster

will, in nine cases out of ten, provide the remedy and postpone this large outlay of money for reconstruction for several years.

The track pictured here was considered beyond repair, but was reclaimed with Dayton Joint Boosters for less than one year's interest on the cost of new work. And there was no interruption to traffic.

Can you afford to pass by an opportunity of this kind, when the Booster costs only four dollars and fifty cents?



# DAYTON



# About Low Joints For Years To Come—Place Your Order Now



## No Single Installation Has Ever Required Replacement

The greatest wear of all—on ties, on rails and on rolling stock—comes at the rail joints.

Right here the principle of resiliency obtains its greatest justification.

For in the Dayton Resilient Joint Booster fallen joints may be permanently built up, in old track, at an initial expense, only slightly greater than the expense of making temporary repairs, with shims.

The Dayton Resilient Joint Booster is

simply a section of the Dayton Mechanical Joint Tie, strengthened throughout for the exceptional service to which it is adapted.

It permits the use of concrete under the Booster and provides for a shock absorber in the Booster itself, which saves the concrete from breaking up under the hammer blows of traffic; moreover, it can be installed without any interruption to traffic. Send an order for a small number and become a Booster.

---

*Resilient*  
**JOINT BOOSTER**

---

**THE DAYTON  
MECHANICAL TIE CO.**

707 Commercial Building, Dayton, Ohio

Canadian Representative  
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



**AI BRAKE HANDLES:** Bronze.....  
**AIR BRAKE HANDLES:** Malleable Iron.....  
**CAR TRIMMINGS:**  
 Conductor Signal Bells.....  
 Door Sheaves and Tracks.....  
 Motorman's Seats.....  
 Patent Door Locks.....  
 Platform Foot Gongs.....  
 Reglets Rod Fittings.....  
 Stationary Register Pulleys, Single.....  
 Stationary Register Pulleys, Double.....  
 Swinging Register Pulleys.....  
**CASTINGS:** Special Attention Given to All Classes...  
 Aluminum.....  
 Brass.....  
 Bronze.....  
 Cast Steel.....  
 Grey Iron.....  
 Malleable Iron.....  
 White Metal.....  
 Zinc.....  
**CONNECTORS:** Two-Way, Three-Way, Four-Way  
**CONTROLLER HANDLES:**  
 Bronze, operating.....  
 Bronze, reversing.....  
 Malleable Iron, operating.....  
 Malleable Iron, operating, adj. type.....  
 Malleable Iron, operating, with bronze or steel bushings.....  
 Malleable Iron, reversing.....  
 Malleable Iron, reversing, adj. type.....  
 Malleable Iron, reversing, with bronze or steel bushings.....  
**CONTROLLER PARTS:**  
 Contact Fingers, operating.....  
 Contact Fingers, reversing.....  
 Contact Segment Tips.....  
 Contact Segments.....  
 Contact Washers.....  
 Controller Finger Tips.....  
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 Armature Machine, Columbia Pat'd.....  
 Armature Buggies.....  
 Armature Lead Flattening Rolls.....  
 Armature Shaft Straightener.....  
 Armature Winding Stands.....  
 Axle Straightener.....  
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 Banding and Heading Machines.....  
 Bearing Boring Machines.....  
 Car Hoists.....  
 Car Replacers.....  
 Coil Taping Machines.....  
 Coil Winding Machines.....  
 Pinion Pullers, any type.....  
 Pinion Pullers, Repair Parts.....  
 Pit Jack, Pneumatic.....  
 Signal or Target Switches.....  
 Tension Stands.....  
**MOTOR SUSPENSION BARS.**  
**MOTOR AND TRUCK SPRING CAP CASTINGS.**  
**PLOW TERMINALS.**  
**POWER STATION:** Special attention given to the Manufacture of Standard Boiler and Stoker Grate Bars also Ash and Coal Down-take Pipes; or other types of Castings used in Power Stations.  
**RAILWAY MOTOR PARTS:**  
 Armature Bearing Shells: Malleable Iron.....  
 Armature Bearing Shells: Semi-Steel.....  
 Armature Bearings: Bronze.....  
 Axle Bearing Shells: Malleable Iron.....  
 Axle Bearing Shells: Semi-Steel.....  
 Axle Bearings: Bronze, With or Without Babbit Lining; Base, Lead or Tin.....  
 Armature Colls.....  
 Armature Shafts.....  
 Bolts, Special for Motors and Trucks.....  
 Brushholder Parts.....  
 Brushholders, Complete.....  
 Commutators, All Types.....  
 Dowel Pins for Armature and Axle Bearings.....  
 Field Coil Terminals.....  
 Field Colls.....  
 Gear Cases: Malleable Iron.....  
 Gear Cases: Sheet Steel, Welded or Riveted.....  
 Motor Covers.....  
 Pinion Nuts.....  
 Thrust Collars.....  
**RATCHET BRAKE HANDLES:** Bronze.....  
 Ratchet Brake Handles: Malleable Iron.....  
**THIRD RAIL SHOE BEAM:** Repair Parts.....  
**THIRD RAIL SHOE BEAMS.**  
**TROLLEY CONTACT WASHERS.**  
**TROLLEY HARPS.**  
**TROLLEY POLES.**  
**TROLLEY WHEELS, COLUMBIA.**  
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**TRUCK PARTS:**  
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 Brake Rigging for All Types of Brakes.....  
 Brakes, for Maximum Tractor Trucks, Columbia Patented.....  
 Coupling Pins.....  
 Equalizers.....  
 Gusset Plates.....  
 Journal Box Covers.....  
 Journal Box Shims.....  
 Journal Boxes.....  
 Journal Brass Wedges.....  
 Journal Brasses.....  
 Journal Check Plates.....  
 Turnbuckles.....



# “Columbia Service”

*It means this list—  
and more!*

For your convenience we append this list of the more common products of Columbia Shops, products for which repeat orders are constantly being received from scores of satisfied railway customers.

As an actual fact “Columbia Service” embraces a much wider scope. We are being called upon constantly to produce special parts to our customers’ own drawings and specifications. Many companies have learned the lesson that such work can be done better and more economically in Columbia’s shops. Why? Because we have equipment suited to the work, and men accustomed to developing new ideas.

*Talk it over with our representative*

**The Columbia Machine Works  
and Malleable Iron Company**  
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

- A. A. Green, Sales Mgr., Brooklyn, N. Y.
- E. Keller, Brooklyn, N. Y.
- F. C. Hedley, Brooklyn, N. Y.
- J. L. Whittaker, 141 Milk St., Boston, Mass.
- E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
- F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.





*Universal Rotary Track Grinder*

## Spare the Grinder—Spoil the Rail

And it's like that other old proverb about saving at the spigot—the rail and special work allowed to deteriorate at a constantly accelerating pace, involving an earlier expenditure of thousands of dollars per mile for renewal—all to spare a few dollars maintenance expense

for track grinding when trouble first appears.

Begin now, a program of reasonable care of your track. Weld and grind every defective place and every sign of corrugation, and thereby prolong the life of track for many years.



*Reciprocating Track Grinder*



*Atlas Rail Grinder*

### UNIVERSAL Rotary Track Grinder

An improved equipment with every refinement for fastest, most efficient and complete track grinding work. Tilting grinding wheel reaches every part of the rail head. Large rubber-tired derail wheels permit easy removal for passing cars.

### RECIPROCATING Track Grinder

For removing all trace of corrugations from straight and curved track it has no equal. Most economical because the grinding blocks adapt themselves to the shape of the original rail head, and avoid unnecessary grinding and waste of metal.

### ATLAS Rail Grinder

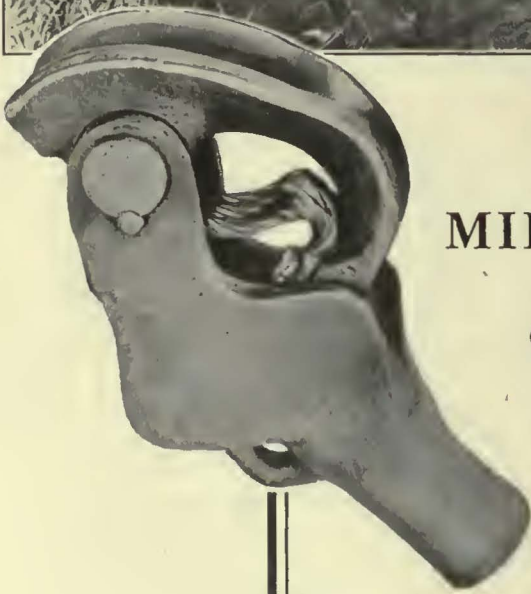
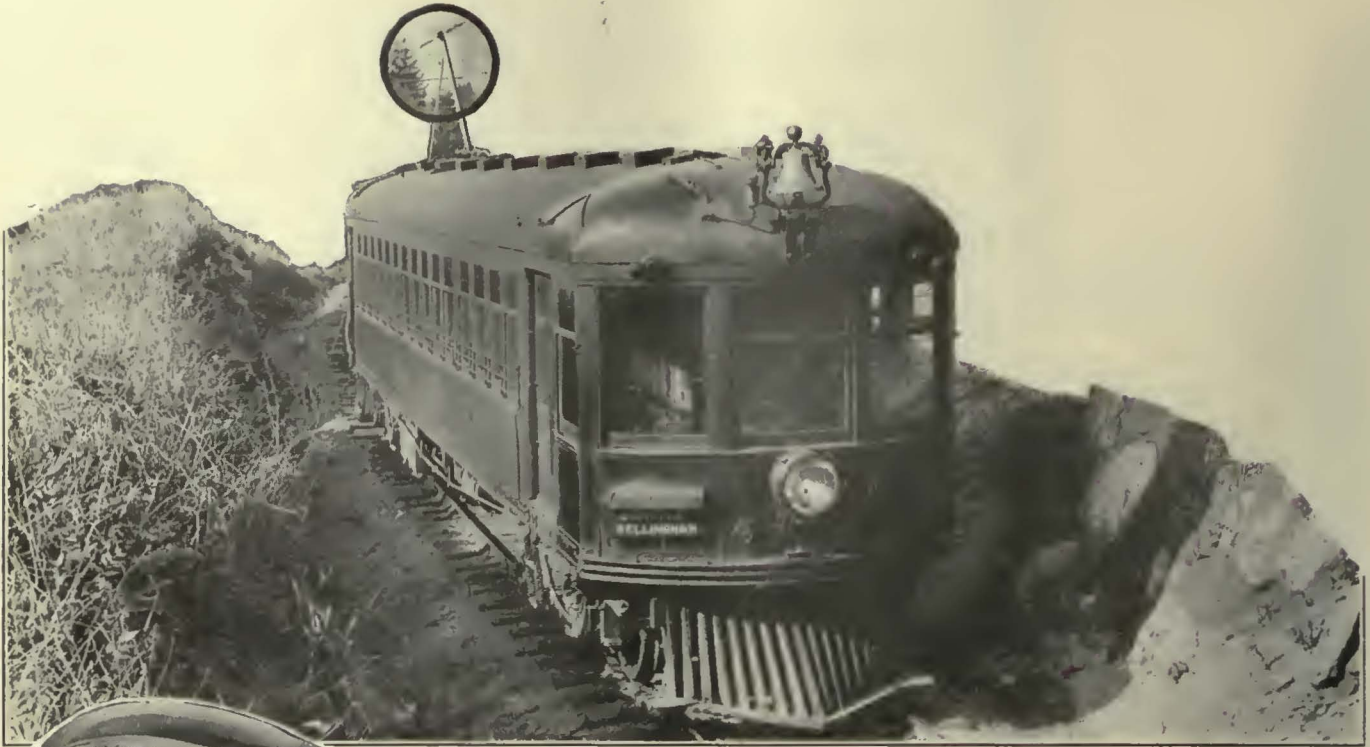
An efficient rotary grinder, high-speed and light-weight, suitable for removing surplus metal after building up joints or special work. Its low cost will prove attractive.

*Write for descriptive catalogue*

**Railway Track-work Co.**  
3132-48 E. Thompson St.,  
Philadelphia, Pa.

**AGENTS:**

Chas. N. Wood Co., Boston  
Electrical Engineering & Mfg. Co., Pittsburgh  
Atlas Railway Supply Co., Chicago  
P. W. Wood, New Orleans  
Equipment & Engineering Co., London, England



—on these big fast cars!

## MILLER TROLLEY SHOES

Patented

Give Service Equivalent to Pantagraphs

So writes an official of the Pacific Northwest Traction Company, who operates these Bellingham—Seattle electric fliers. "The service given is very much the same as the ordinary pantagraph of the slide type," he says. And below are some other points mentioned in the same letter.

### What They Say After Three Years Experience

1. Miller Trolley Shoes "gives much better and more constant contact.
2. Are "much easier on motors."
3. "More satisfactory so far as the headlight is concerned."
4. Answering the question—are they more economical than trolley wheels—"yes."

*Try Them on Your Own Cars*

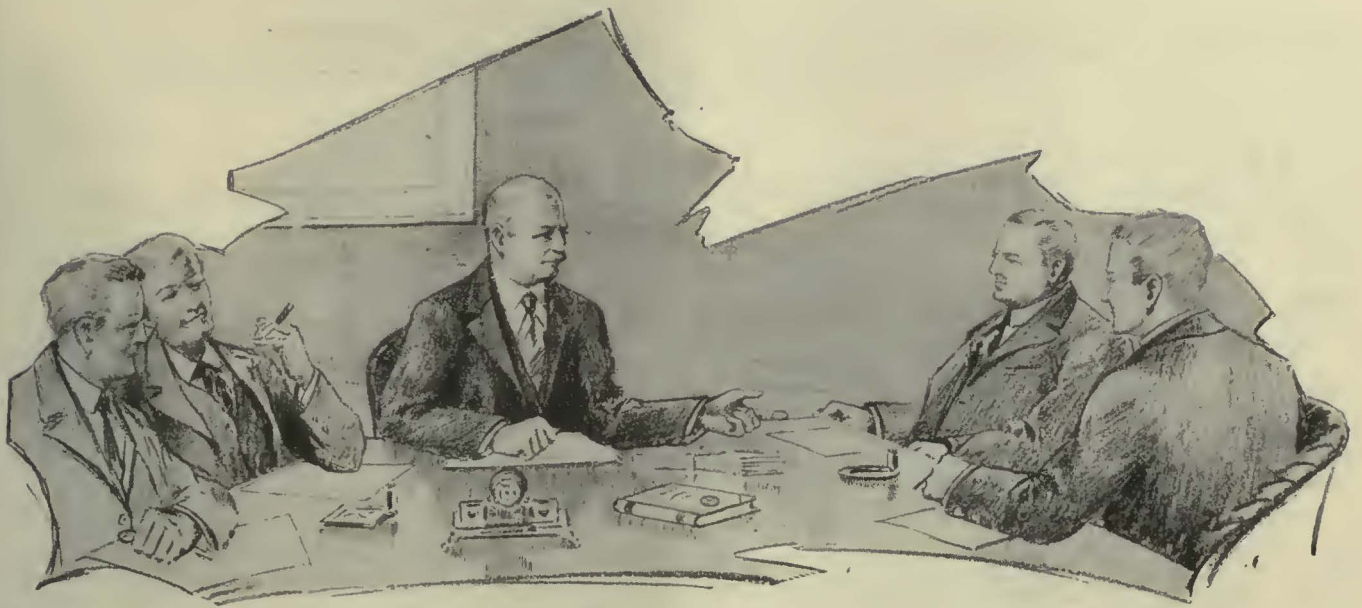
**MILLER TROLLEY SHOE CO.**

Boston-21, Mass.

*Western Representative:*

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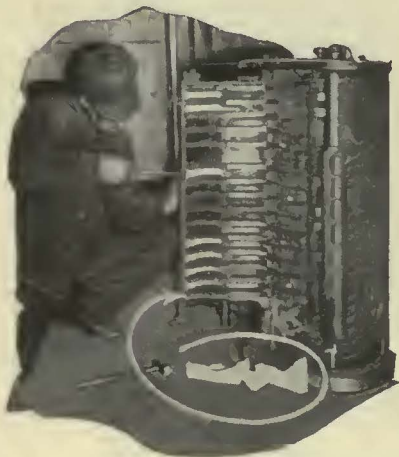
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# ELECTRIC RAILWAY JOURNAL

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Number 27

## Good Merchandising as Important as Economical Operation

A GOOD MERCHANT, when congestion of purchasers at the counter becomes noticeable, puts on another clerk, and another and another, as needed to handle sales as rapidly as they come. That same merchandising principle applies to the street railway business. If the sale of transportation were properly handled, more cars would be put on a line just as rapidly as the space in them was bought. In other words, the best merchandising would be always to have room for all passengers who presented themselves.

To do this, without running into car miles operated at a loss, requires comprehensive knowledge of the general riding characteristics of a line, coupled with some means of promptly sensing the detail fluctuations in the passenger traffic that take place from day to day. These two aspects of the scheduling of cars are what have been worked out with fine success (as measured by increased net revenue) in Brooklyn, as related in the leading article this week. A traffic check now and then gives the general characteristics of each Brooklyn surface line. The daily graphs showing early this morning the results of yesterday's operation give the information from which to direct more or fewer seats per hour, in order to have on hand when and where wanted all the rides that will be bought, but not any wasteful surplus.

Many railway managements make quite a point of avoiding any unnecessary car mileage, but overlook the importance of the other aspect of always having enough service. The latter is about equally important with the former in making profits. These managements are good at saving but poor at merchandising. They are good economizers but poor spenders—poor “gamblers” on expenditures to increase riding. The experience of Brooklyn has furnished a striking example of how more service will bring more patronage. A blanket increase of 1 per cent or more in number of car miles called for on a timetable for a line has promptly resulted in such an improvement in riding that it was but a comparatively short time until another increase in service seemed warranted from a loading standpoint and desirable from a merchandising standpoint. For example, on the Graham Avenue line, a 2.8 per cent increase in car mileage in August, 1922, as compared to July, 1922, resulted in 1.7 per cent increase in revenue; 1.2 per cent additional increase in service in September over August resulted in 1.6 per cent increase in revenue; 2.1 per cent service increase in October over September brought 2.1 per cent increase in revenue. In another case a 9.2 per cent service increase brought 11 per cent revenue increase; and the following month 4.8 per cent additional increase produced 8 per cent more revenue. Compared with the corresponding month of the previous year this was a 13.7 per cent increase in service and a 19 per cent increase in revenue. These two examples are cited because the increased

revenue was traceable directly to the better service, there being no other contributing causes.

This cycle has happened repeatedly in Brooklyn in the last three years and has resulted in several cases in increasing the earnings of a line in the three-year period by 40 or 50 per cent, when it was thought that all the business available was being handled before. Other companies have experienced the same thing. The installation of safety cars on more frequent headway than was operated with larger cars has furnished this same experience in many cities all over the United States. Up to certain limits, the patronage in the street railway business does respond to more service. And often these limits are much higher than was thought before the service increases were made. Of course, this is the way to improve the net earnings. The more passengers at a small profit per passenger, the better the net.

On the other hand, the value of putting the cars where the traffic is, spacing them properly, and avoiding waste mileage is demonstrated by the Brooklyn experience in 1921, when, as compared to the year 1920, the car mileage that was operated was 10 per cent less, but between 7 and 8 per cent more passengers were carried without overcrowding.

## What Is Arithmetic Between Friends?

SHOULD estimates be made of the deficit which will result from the establishment of a 5-cent fare on the Seattle Municipal Railway, and if the loss appears to be considerable, should this fact deter the City Council from ordering such a fare? The *Post-Intelligencer* of that city evidently thinks that in these matters mathematics are a pretty poor substitute for politics. In an editorial in its issue of Dec. 4 it says, in part:

Council proceedings in recent weeks do not give encouragement for the future regarding this 5-cent fare question, which every one but the honorable legislators thought settled at the last election. When it was finally agreed by competent authority that all legal impediments to reducing the rate had been cleared away there seemed no further bar to progress.

Then up bobs one scheme and another, each based on reams of solemn arithmetic concerning the probable financial return of a 5-cent fare plus ordinary transfers or a nickel fare plus transfers at 2 cents or a nickel straight and tokens in quantity at a reduced rate plus the transfer privilege.

The finance and public utilities committees of the Council meet next Thursday morning at 10. It would be a fine move if representatives of the people who wish Seattle to grow and prosper, and its working people given relief from extortion, should gather at the meeting and tell the lawmakers what they think of the Fitzgerald ordinance and the obstructive tactics delaying its adoption.

It must be a satisfaction to the taxpayers of Seattle to realize that some members at least of the Council are



thinking of arithmetic. It is one thing for a City Council to order a low fare on a privately owned property, whose stockholders are few and possibly non-residents in considerable part. It is another matter when the resulting deficit has to be paid by the city as a whole. It is no wonder that one Councilman demanded more time to study his estimates of what would happen if the 5-cent fare was adopted and for another to present figures showing "the dire results of reduction in varying amounts."

The recent incident at Seattle illustrates one of the great dangers of municipal ownership and operation of business enterprises. Whatever may be said by the politicians before the undertaking is begun about the profits which will result from municipal direction, it is pretty safe to say that after the enterprise is under way there will be continuous demands for unprofitable extensions and lower fares, and it will take a brave mayor and council to resist these demands.

The newspaper whose opinion has just been quoted follows the practice of printing at the head of its editorial page each day a text suggested by a different local clergyman. The text to guide the readers of the paper on the day in which this editorial appeared will be considered by some to be very appropriate. It was: "Be not deceived: evil communications corrupt good manners." And if the famous apostle who wrote these words were living in the present day the chances are that he would have added that very often they corrupt politics as well.

### The Index Furnishes the Key for Much Valuable Information

IN HIS presidential address at the convention of the Union Internationale de Tramways at Brussels last October, M. de Burlet pointed out that the electric railway industry has no trade secrets like most of the manufacturing industries. Each discoverer of a better way of accomplishing a certain result is glad to give the information which he has to all other companies because there is no commercial rivalry for business between them.

This is as true in America as in Europe and it is largely for this reason and for the conditions which grow out of it that the *Electric Railway Journal* has always made a feature of its volume index. The editors realize that many of the problems which come up as new on some railway properties actually have been successfully solved in the past by others and that the method followed has been described in previous issues of this paper. Hence they have made an effort to make each volume index as complete as possible and to include it with the last number of each half year, so that every subscriber will be sure to have his copy of the index as soon as the volume is completed. This makes binding more easy, and a larger number of the subscribers of this paper are finding it is worth while to bind their copies each half year.

The index for this volume contains between 3,000 and 4,000 entries or cross references, and a continuous policy of treatment is assured by the fact that the same indexer has done the work for a number of years. A feature is the list of key words by which the entries to any topic sought can easily be found. The index as printed represents to the publishers probably a higher cost per page than any article which has appeared in the paper, but if it accomplishes its purpose this expense is considered well worth while.

### New Norfolk & Western Locomotives Add Notably to Road's Electric Equipment

IN JUSTICE to the Norfolk & Western Railway electrification, as much publicity should be given to the ways in which mechanical defects in the early locomotives were overcome as was given to the existence of those defects. The mechanical parts of the original locomotives were built along steam locomotive lines utilizing the best information available at the time. However, there was lacking previous experience with electric locomotives in such extremely severe service. The result was a straining of the underframes with consequent bearing and other troubles, and in due course the frames went to the scrap heap, where they have served as a constantly unpleasant reminder of now happily bygone days. Stouter frames replaced the weaker ones, with excellent mechanical results but with an unpleasant effect on maintenance figures while this was taking place. A point that is sometimes overlooked, however, is that the dozen machines kept an enormous tonnage moving right through war time and were rebuilt without detriment to the service. The troubles which were encountered were not due to the electrical system used, but to the unprecedented severity of the traffic.

Four new locomotives have recently been ordered and will soon be under construction. They embody all of the mechanical lessons taught by experience with the first machines, and also the results of experience with recent enormous steam locomotives used in similar service. The side frames will be heavy vanadium steel castings, with steel cross members of corresponding strength. Each half unit will have a rigid wheelbase as long as the curvature of the track will permit; in other words, the articulated joint will be used only between units. The twin-motor drive has also been abandoned in favor of the single-motor drive, with two jackshafts per unit.

A number of interesting electrical changes also have been made in the new design, the most notable being the use of a synchronous rather than an induction phase converter. This puts into the system what was lacking before, a piece of apparatus which permits correction of the motor power factor. Oil-cooled transformers form another improvement.

The new machines have a one-hour rating of 4,000 hp. an enormous concentration of motive power. This is, to be sure, less than that of the experimental single-phase-three-phase locomotive built for the Pennsylvania Railroad six years ago, shown at the Atlantic City convention of the steam railroad associations in 1917 and heralded as the most powerful locomotive ever built. The N. & W. machines will, however, be the most powerful in regular service. The two types of locomotives are comparable in several particulars. The Pennsylvania machine, for example, has a synchronous converter, like the N. & W. It has twin-motor drive through a jackshaft to three driving axles, whereas the new N. & W. machines have single-motor drive to two driving axles. The rigid wheelbase includes these three axles as compared with four drivers on the N. & W. machines. And there are two articulated trucks to the Pennsylvania locomotive, a plan also abandoned on the newer N. & W. locomotive as compared with the earlier one. An illustrated account of the Pennsylvania locomotive appeared in the issue of this paper for June 9, 1917, page 1048. References to articles on the earlier N. & W. locomotives will be found in one on the new machines appearing in this issue.



## Fitting Service to Traffic in Brooklyn

How the Data Developed by the Transportation Department of the Brooklyn Surface Lines Are Used to Follow the Trend of Service Requirements and Adjust Schedules Accordingly so That Losses May Be Avoided, but, More Important, so That as Much Service as Will Be Purchased Is Always Available

BY A. L. HODGES

Assistant Treasurer and Assistant Secretary Brooklyn (N. Y.) City Railroad

THE successful building up of revenue and the conservation of its expenditure must be based on a close study of service requirements and the cost of producing them. This study must be a continuous one, for in every cosmopolitan city there is an ever-changing riding habit. This is particularly noticeable in Brooklyn, where the population at the present time is increasing at a very rapid rate as indicated by the new building operations carried on during the calendar year 1922, which, it is said, will considerably exceed \$200,000,000. This figure, it is claimed, far exceeds that for any other community.

In order to keep pace with these ever-changing conditions the transportation department must keep its hand on the pulse of the car rider, so to speak. It must gather, compile and analyze its own information as to operating costs and service required. To do this effectively the transportation officials must avail themselves of "up-to-the-minute" information in advance of the formal figures furnished by the accounting department. They must not be forced to wait for figures furnished by other departments, which, as a rule, are fifteen to thirty days behind the actual operation.

One of the essential phases of electric railway operation is to furnish the proper transportation facilities at the time and place required by the car rider; not only fitting the schedules to the habits of these riders but also providing sufficient service to attract additional business. No one ever tells the transportation department how many people are going to ride on any given line, or the time they intend to use the service. So it is up to the railway to outguess the car riders and always to have ample service to attract the business, not drive it away with overcrowding.

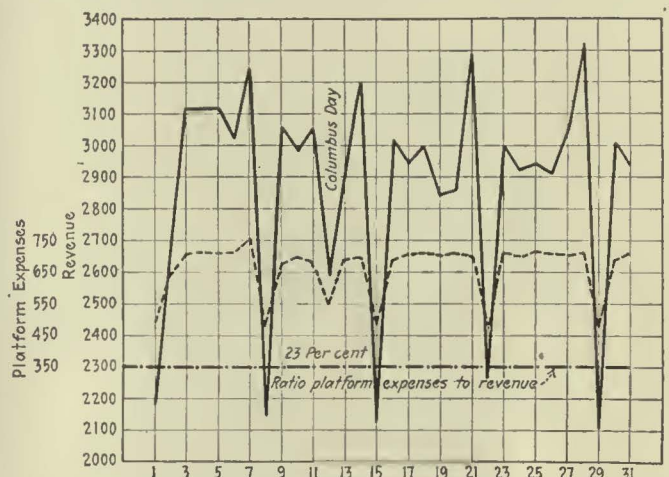
This is not so different from any other industry or business which sells direct to the consumer. The merchant must display his merchandise in sufficient quantities to meet the demand, and when his stock runs low he must replenish it promptly or lose trade and profit. With the railway companies, it is about the same. They must plan not only the transportation they expect to sell each day, but the service must be such as to anticipate the growth of traffic so that new riders may be provided for and new friends made.

Further than this, it must be borne in mind that if the operating schedule is not fitted to the service requirements it develops high operating cost with its resultant waste.

The operation of the Brooklyn surface lines during the past three years has demonstrated to us more than ever what a tremendously important thing the keeping of schedules adjusted to the ever-changing traffic requirement is. To show what the application of these principles will accomplish, one needs but glance at the reports of the Brooklyn surface companies for the fiscal year ended June 30, 1922. Here it is seen that a large deficit for the previous year was turned into a substan-

tial surplus by June 30, this year. In fact, the directors of the Brooklyn City Railroad on Nov. 8, 1922, declared a division of surplus earnings among its stockholders amounting to 20 cents per share, par value \$10. At the same time the directors suspended the collection of a second fare on the Flatbush Avenue line, thus sharing the company's prosperity with the car riders by relieving them of this additional charge.

The ability to turn a deficit into a profit is attributable in very large part directly to the close



MONTHLY GRAPHIC INDEX CHART MADE FOR EACH LINE AND BROUGHT UP TO DATE DAILY. EXPENSES AND REVENUE ARE IN DOLLARS

attention given to the development of efficient service on each line, thereby avoiding waste and attracting business to the cars.

The platform cost, which is a fairly constant part of the total operating cost, is used in determining the proper ratio between operating costs and gross revenue for the purposes of the transportation department.

If this operating ratio drops below a predetermined point it may mean that insufficient service is being operated and in that case a revision of the schedule is immediately effected, relieving any excessive loading of cars. By a like token, if the operating ratio barometer rises above a predetermined point the service is promptly indicated to be more than the line requires, due perhaps to changes in industrial conditions or seasonal changes. A closer study of the line may reveal that a complete readjustment of the schedule can be made to advantage. Thus, the value of a scheme that immediately calls attention to over or under service is readily seen, the corresponding change in service requirements being then promptly made before any loss accumulates.

The method by which the management keeps its hand on the operating costs of each of the sixty-eight routes comprising the Brooklyn surface lines is predicated on graphically analyzing the conductors' daily revenue







service on a basis that will make a profit, a complete survey of operation is continuously carried on. The object of this undertaking is to ascertain where the patrons are located, their riding habits and the distance they travel. This learned, the next step is to adjust the service to their needs. In doing this some novel methods have been developed and are now being regularly used in addition to those that are in more or less general application throughout the country. Under the general scheme of handling conductors' remittances at the carhouse, a record is kept by lines (Fig. 1), showing the amount of each conductor's turn-in. Inasmuch as the ticket fares under the scheme of fare collection used are counted as cash, the cash turn-in takes into consideration all of the revenue from passengers carried on the line. This record sheet had been developed to give a summary of the day cards for the convenience of the accounting department in checking off the contents of the different bags when taken out of the carhouse safes the following morning.

HOW OPERATING DATA ARE RECORDED

The next step is to get the information not only to the transportation department but to the management by 9 o'clock in the morning of the following day. This is being done by having each of the several depot masters telephone this information during the early morning hours to the office of the superintendent of transportation, where the night clerk tabulates it on a special form (Fig. 2.). The depot master, when reporting his route receipts, also reports the corresponding timetable or platform cost for each line, which takes into consideration extra service, overtime on account of delays, etc. It is but a simple matter then for this clerk to foot up the columns, first by depots, then as a whole, add the corresponding depot figures and totals from the duplicate records of a year ago and deliver this tabulation to the operating officials and the management. This tabulation then gives the operating officials access to the two most essential figures with which they are concerned—receipts and platform costs. Actual checking with the final figures for passenger revenue furnished by the accounting department has indicated that these preliminary figures are within 1 per cent of being correct, which is sufficiently accurate for the purposes.

Upon receipt of these forms showing the individual route receipts and platform costs for the previous day in the general manager's office, they are transferred to individual monthly graphic route charts, sample of which is illustrated on page 1001. It takes but a few minutes for a clerk to transfer the figures to these route charts, so that shortly after the opening of the office there is available an actual picture record of the performance for the previous day, together with the platform cost of producing it. At the end of each fifteen-day period the percentage of timetable cost to the passenger receipts is calculated for the period and is likewise shown on the route charts.

As shown on the chart reproduced, this percentage is 23, which indicates the ratio of platform cost to gross receipts for the period and enables the management at a glance to determine whether the line is going ahead or falling back. If the latter is the case the management can then focus its attention on lines needing an adjustment of service. In this case it will be noticed the ratio of 23 per cent obtained during the entire month.

Of course there are certain conditions which are reflected in the charts each day, such as interruptions to headway, etc., which shows the necessity for closer ap-

plication by the supervisory forces. Any irregularities with respect to fare collection are also readily discernible, indicating when a concentration of the special service force on any route is desirable.

Coincident with the plotting of the platform expense, these costs are scrutinized in comparison with the schedule allowances, to determine their correctness. Thus a check can be made of the operation of any unauthorized service or the failure of any division to operate the schedule as provided.

A recapitulation of a schedule is shown in the form reproduced as Fig. 5. This shows the number of cars, number of trips, platform cost, number of runs, and headway—all of these figures being compared with pre-

ceding schedule showing increases or decreases in service proposed. The running time between various time points is also shown, as well as changes in running time during the different hours of operation. The graphic index charts are then compared with these recapitulations as to earnings and cost of operation, and any extraordinary events or any circumstances that could tend to divert traffic are at once noticeable and the reasons therefor can be noted on the chart, which altogether forms a very complete daily log of the operation of each line. A study of these daily index graphs and a comparison with those of the preceding day, month or corresponding month of a previous year will tell whether the traffic

No. of Cars		Prop.	Prev.	Inc.	Dec.
		57	58		1
No. of Trips		956	834	122	
Platform Cost		12186	12101	85	
Runs, 10 hrs. or over					
Runs,		72	71	1	

Headway		TIME POINTS		6:00 to 7:00	7:00 to 12:00	12:00 to 6:00
Prop.	Prev.					
4:13 am	4:18 am					
4:33 " 10	4:53 " 10					
5:00 " 7	5:00 " 7					
5:24 " 6	5:24 " 6	Long Island City				
5:24 " 6	6:00 " 4	Depot	3	3	3	
5:34 " 5	6:00 " 5	Depot	4	4	4	
5:50 " 3 1/2	6:00 " 3 1/2	Depot	4	4	4	
6:14 " 2 1/2	6:30 " 2	Depot	4	3	3	
6:50 " 1 1/2	9:15 " 3	Depot	4	3	3	
9:00 " 2	9:45 " 3	Depot	7	6	6	
10:00 " 2 1/2	9:45 " 2 1/2	Depot	10	9	9	
12:00 PM	5:30 " 1:30	Depot	3	3	3	
3:00 " 2 1/2	6:00 " 2 1/2	Depot	5	5	5	
4:10 " 1 1/2	6:17 " 3	Depot	6	6	5	
5:30 " 1 1/2	1:10 " 5					
6:00 " 2 1/2	1:30 " 6	Total	51	47	45	
11:30 " 5	12:00 " 7 1/2					
12:00 " 7 1/2	12:00 " 10					
12:30 am	10:00 " 17					
12:45 " 10	12:00 " 20					
1:02 " 17						
1:02 " 20						
						17

FIG. 5—RECAPITULATION OF A SCHEDULE

over any line is changing and the degree of such change. With personal knowledge and observation of conditions surrounding each line, it is then possible to prepare a fairly accurate prospectus for future guidance.

Should the study of these graphic charts indicate that the schedule does not fill the requirements of efficient or economical operation, a study of traffic conditions on that particular line is undertaken by making an actual check out on the line. A squad of experienced passenger traffic checkers is maintained for this purpose. These men work under the supervision of the timetable department. While they are available for special checks, they ordinarily operate on a fixed schedule so that an observation check of each line is furnished the transportation department every eighth day. This check will develop any sudden change in the riding habits along a certain route and is also one of the

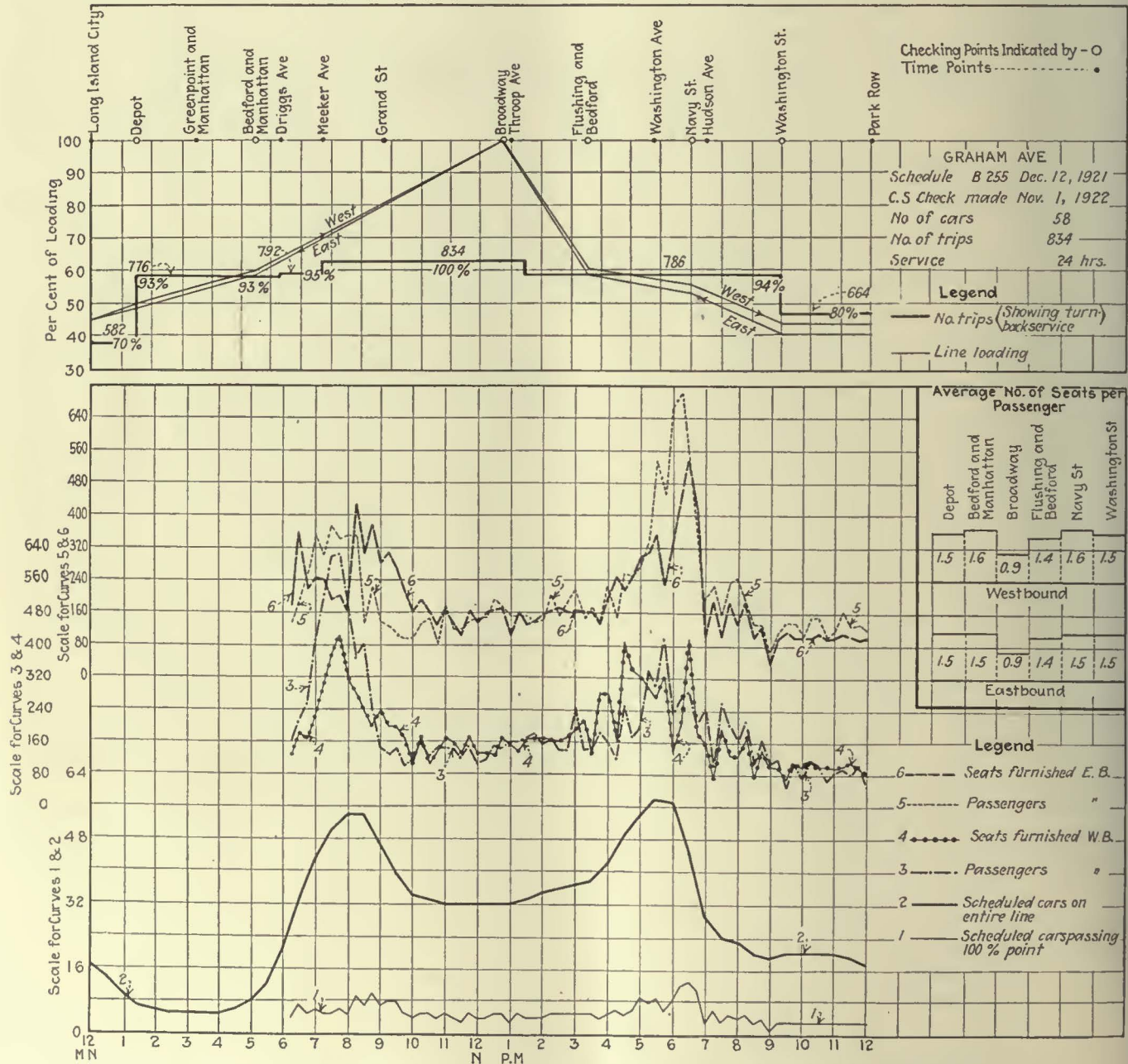


factors in determining the necessity for a closer check and a schedule revision.

When any one of these preliminary reports, graphic charts or service checks develops a condition requiring adjustment of schedule the next step is a cross-section check, so to speak, of the line. The schedule running time of the line under observation is divided into approximately five-minute periods from the initial point to the destination, and a traffic checker, trained in this work, is stationed on the street at each of these points to note the actual number of passengers on the cars passing in each direction. These data are entered on the form shown in Fig. 3. For this purpose the regular passenger traffic checkers are used. They work in shifts covering the entire day's operation.

These checks serve as a basis for the determination of whether or not the schedules fit the traffic over the line. All the information collected by each checker is first tabulated by fifteen-minute periods on a special passenger record form shown in Fig. 4. This form in

addition to the total number of passengers on the car indicates the number of seats furnished, the number of cars called for by the schedule, the actual number of cars operated on the line as well as calculated figures showing the average number of passengers per car at the checking point. The different items are then totaled for the checking period to determine the maximum loading point on the line as well as the falling off in number of passengers to be handled at the various other checking points. These figures are subsequently tabulated by checking points to determine the relationship that exists between each of these points and the maximum loading point. This relationship is plotted on a curve to indicate how the traffic builds up to the 100 per cent load point. Corresponding to this traffic curve, the number of trips furnished by the timetable in effect when the check was made is shown on the same graphic chart. This trip curve shows the points between which short-line service has been established, the number of trips furnished between cut-back points in percentage



MANNER OF GRAPHING CROSS-SECTION CHECK OF A LINE TOGETHER WITH OTHER DATA FOR PURPOSES OF STUDYING THE FITTING OF SERVICE TO TRAFFIC. THE CHECK PICTURED HERE SHOWED LOADING THAT NEEDED CORRECTION



of the maximum service on the line, and the amount of service between such short line points. The next step is graphically to survey and analyze the operation of the schedule for each hour of the day, divided into fifteen-minute periods, at the maximum point.

**HOW THE TRAFFIC CHECK IS GRAPHED**

Thus the actual number of cars passing this point in the direction of heaviest riding for the entire period of the check is plotted as indicated by Curve 1 in the large charts on this and the opposite page. This curve shows whether or not the operating department is moving the cars as scheduled at this point.

Above this curve is plotted the actual number of cars on the entire line at each hour of the day; that is, the number called for by the schedule in effect at the time the check is made. This is plotted in thirty-minute periods and is shown as Curve 2.

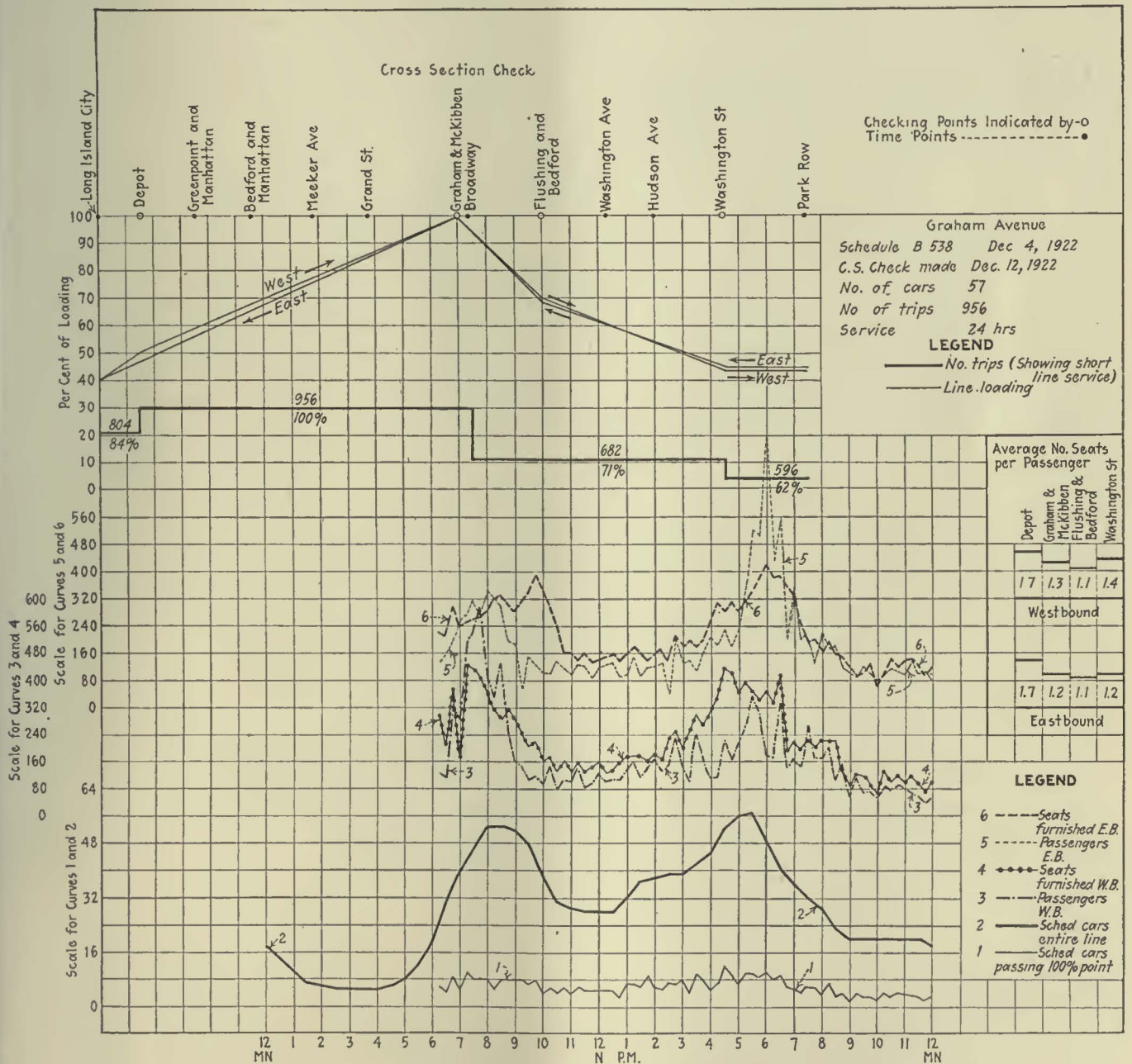
Following this the actual number of passengers carried in each direction past the maximum point is shown

graphically by fifteen-minute periods, and this is compared with the adequacy of the schedule in terms of seats furnished. The results of these studies are shown in Curves 3 and 4, respectively, for one direction, and similar information is shown in Curves 5 and 6, respectively, for the opposite direction.

There is also shown on these charts a graphic study of the average number of seats per passenger furnished past the various checking points during the period of the check.

After the preparation of the chart, the data are then ready for the attention of the management. Careful consideration is given to how the service furnished fits the particular needs of the line in question. Such a study may show the need of an entirely new schedule so as to place more service at this or that point to take care of short riders, or it may indicate that closer observation and application by the supervisory force are necessary.

The two charts that are reproduced herewith are both



GRAPH OF CROSS-SECTION CHECK MADE TO DETERMINE WHAT HAD BEEN ACCOMPLISHED BY NEW SCHEDULE PUT IN AS RESULT OF STUDY OF GRAPH ON OPPOSITE PAGE



for the same line, the one on page 1004 showing that considerable alteration of schedules was necessary to fit properly the service to the traffic requirements. The second chart was drawn from data obtained by a check made to show the results accomplished after introduction of a new schedule. Analysis of this chart (page 1005) shows considerable improvement in placing the service to meet more nearly the traffic demands. The chart shows the results obtaining after a week's operation of the new schedule and indicates that the new schedule has not altogether met requirements and that further adjustment of the service is necessary.

Our schedule department compiles on an average of 300 timetables a year and it usually requires about fifteen days from the time the cross-section check is made to place a new schedule in effect. In cases of extreme emergency, however, a new schedule can be arranged on a temporary basis in a few hours by "patching" the existing timetable.

Graphic studies are always made of new schedules before they are placed in operation. This really means laying out the schedule in picture form for the entire period of operation, in most cases twenty-four hours. A sample of such a graphic timetable was reproduced in *Electric Railway Journal* for Sept. 24, 1921, page 499, in connection with an earlier article on some phases of our traffic studies. This chart shows the movement of each car from the time it pulls out of the depot until it pulls in. Any non-productive time allowances are readily noticeable as well as any errors in the scheduling and one is enabled quickly to see whether or not the proper headways or spacing of the cars has been provided.

In this connection it is well to state that in Brooklyn these graphic analyses have developed the fact that much short line service could be operated without inconvenience to the through rider and the graphic preparation of the schedules has enabled the management to fit in the short line service so as to space the cars properly between all points. It has also insured the schedule going to the operating force in the proper form.

By means of the graphic timetable it is also possible to lay out for even spacing the headways of two or more routes that come together over a trunk line reaching the center of the city and eliminate unnecessary bunching of cars in the congested districts as well as on the individual lines. It has been said of the Borough of Brooklyn that it is "the bedroom of Manhattan." A glance at the rush-hour riding as pictured in the charts—in the morning toward New York and in the evening in the opposite direction—shows the basis for this statement.

#### TYPE OF EQUIPMENT MUST BE CONSIDERED

Of course in figuring these schedules the type of car used must of necessity be given considerable attention. Like many other cities, Brooklyn has its share of cars of various types. Some are standard single-truck safety cars, some are double-truck one-man, others are one-man, two-man, double-truck, some with cross seats and others with longitudinal seats, and besides these classes there is the center-entrance type of car, with center-entrance trailers. For rush-hour scheduling, car capacity, irrespective of type, is figured on the basis of one standee for each 1½ sq.ft. of floor space in the aisles, except on the longitudinal-seat cars, where 9 in. of knee room is deducted for the seated passengers. A seat width of

17 in. per passenger is the basis used in calculating the seating capacity of cars with longitudinal seats.

In addition to the daily graphic records of receipts and platform cost, a monthly tabulation is maintained showing by routes the total monthly receipts, platform cost, passengers carried, mileage operated and receipts per car-mile. Comparisons are also carried in separate columns with the month of the previous year. These figures are not those furnished by the accounting department, but are predicated on the monthly totals of the figures worked up each day by the transportation department. By this means the transportation department and the management can have available within a very few days after the close of the month nearly accurate statistics showing what the transportation department has actually accomplished in the way of handling traffic, with the cost thereof. This gives a monthly check on the conditions surrounding the operation of each line over a period of several years and any fluctuation in earnings or the cost of securing such earnings is readily discernible.

When the figures are received from the accounting department, showing the actual receipts and total operating costs for each line, the cost figure is proportioned among the various lines, on a mileage basis, taking into consideration the various types of units run, whether single-truck, one-man, two-man, double-truck cars or double-truck, one-man cars, etc. This gives a revised unit figure for use in estimating expenses in advance of actual figures. Naturally the ratio of expenses between these types of cars varies on different properties and each management must prepare its own ratios as to the car-mile cost of each unit used.

This unit cost or yard stick having been determined for each type of equipment in use on the individual line, then the actual operating expenses for each line may be ascertained by multiplying the mileage operated by each type of equipment used on the line by this unit cost, which gives a fairly accurate allocation of the operating expense to the respective lines. This enables the management readily to ascertain which of the lines operated are adding red or black to the balance sheet, and should a line not meet its operating expenses, action can be taken immediately to secure the desired results without permitting any unnecessary accumulation of loss.

The complicated duties of the transportation department of any railway, large or small, makes any effort to simplify this labor quite worth while. The procedure followed in Brooklyn and the results obtained therefrom have been pointed out for whatever help they may be to other properties in getting more effective use of the cars.

The management of the Brooklyn street car systems is likewise guided by similar data and charts which are used in checking other departments of the organization, particularly the maintenance departments. These are not only of great value in connection with formulating the budget requirements, but also assist in securing more efficient operation with reduction of costs.

According to a statement issued by the United States Department of Commerce, the Midi Railroad in France is making rapid progress with its electrification work. It was expected that the Pau-Tarbes line would be completely electrified by Jan. 1, 1923, that the system will be extended to Montrejeau by March, and that during the summer of 1923 the Dax-Toulouse line will be electrified.



## Moving a 740-Foot Steel Bridge

This Structure, Weighing 1,000 Tons and Reaching a Maximum Height of 152 Feet, Was Moved 75 Feet Down Stream by the Pittsburgh Railways in Order that Continuous Service Might Be Provided During the Construction of a New Concrete Highway and Railway Bridge

**M**ANY people have gazed in wonder at the spectacle of a building being moved around the block, sometimes with the home life or business going on as usual in transit. It is not an unusual occurrence for a small bridge to be shifted in position, and occasionally a story appears of the moving of large structures. The moving of the Jack's Run Bridge at Pittsburgh proved to be a matter of considerable public interest locally as well as one of engineering importance.

This bridge is a steel viaduct 740 ft. long and has a maximum height of 152 ft. above Jack's Run, a stream at the bottom of a ravine which forms the line between the city of Pittsburgh and Bellevue Borough. The steel structure comprises fourteen spans, varying from 30 to 96 ft. in length, of Warren type trusses 8 ft. deep with two lines of intermediate stringers and supported on masonry pedestals and with masonry abutments at each end. The deck carries a two-track roadway for vehicular traffic with a double line of street car tracks and two sidewalks.

The Jack's Run bridge was erected in 1893 by the Schultz Bridge & Iron Company of Pittsburgh, for the Jack's Run Bridge Company, a corporation whose stock at that time was owned by the same interests that controlled the Federal Street & Pleasant Valley Passenger Railway. This road operated from Pittsburgh into the boroughs of Bellevue and Avalon and later to Ben Avon and Emsworth and furnished the original electric car service to those communities.

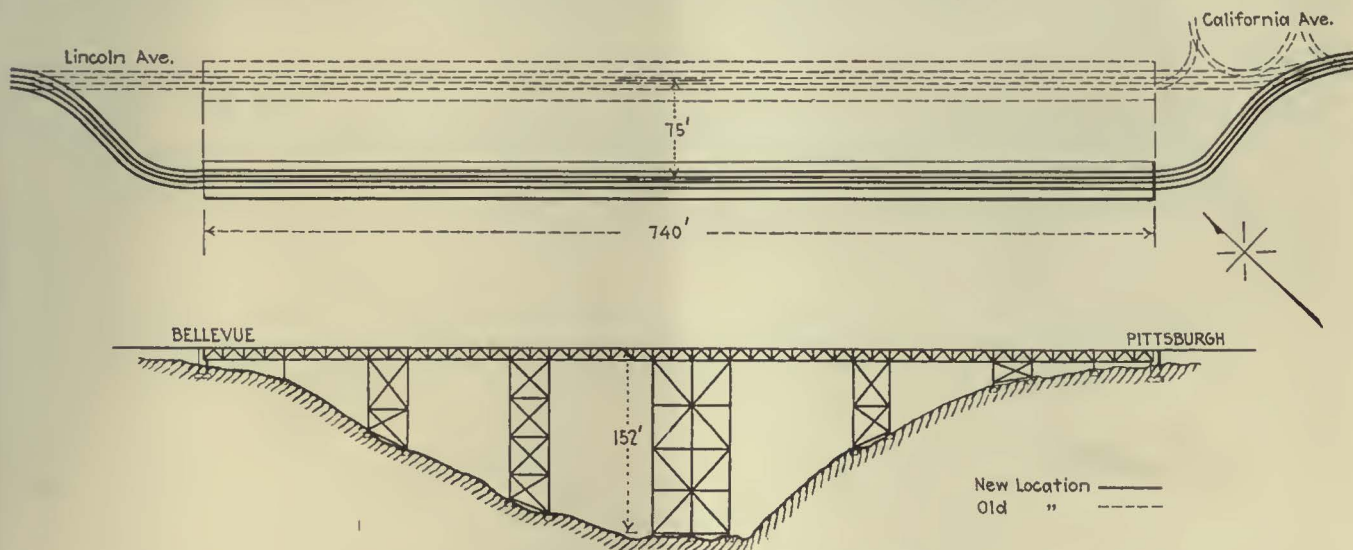
The bridge connected California Avenue, Pittsburgh, with Lincoln Avenue, Bellevue, over the ravine mentioned and at the time of its construction was con-



DURING THE MOVING CAR SERVICE WAS INTERRUPTED. BUT PASSENGERS WALKED ACROSS TO TRANSFER FROM ONE LINE TO THE OTHER

as the Lincoln Highway, leading west from Pittsburgh, crosses this bridge. This, together with the largely increased population of the suburban districts to the west, had resulted in a volume of vehicular traffic entirely too heavy for the capacity and strength of the structure.

It was therefore considered necessary either to make extensive repairs to the old bridge to strengthen it or entirely to replace it by a new structure. As the bridge is now owned by Allegheny County, the county commissioners decided to replace the bridge by a reinforced



OLD AND NEW LOCATIONS OF JACK'S RUN BRIDGE

sidered the largest steel structure then in use for electric railway purposes. It was also used by all classes of vehicular traffic and foot passengers. Tolls were collected until it was taken over by the County of Allegheny in 1917 and then made free to all traffic except electric cars.

The principal through local highway route, as well

concrete arch viaduct having a width of 60 ft. To do this required the immediate dismantling of the old bridge, and the receivers of the Pittsburgh Railways Company were requested to cease operation of cars over the bridge on or before Dec. 1. They were also informed that it would be at least a year before traffic could be resumed using the new bridge.



The commissioners proposed to erect over the ravine a foot-bridge for temporary use by persons desiring communication between the districts at each end of the bridge. They also proposed that electric railway passengers be carried to each end of this structure and there transfer on foot across the ravine by the foot-bridge and that through car service be provided by use of an alternative car line passing West View Park over a route several miles longer.

Investigation on the part of the receivers indicated that more than 4,000,000 passengers annually were carried on the cars passing over Jack's Run Bridge and that it would be impossible to furnish at each end of the bridge terminal facilities properly to accommodate them. It would also be most unsatisfactory to ask all passengers to walk across a temporary foot-bridge for at least twelve months extending over two winter periods. The alternative West View route requires from twenty to thirty minutes longer between Pittsburgh and the Bellevue district and it was deemed to be impracticable.

Consideration was then given to the possibility of moving the bridge down stream a sufficient distance to permit the construction of the new bridge without interference. Estimates secured from contractors as to the cost of certain reinforcements to the old bridge and for moving it laterally to a temporary location indicated the feasibility of this plan and at a not unreasonable cost.

A contract was made by the receivers of the Pittsburgh Railways Company with the county commissioners whereby the former undertook the work and assumed the cost, toward which the commissioners paid an



THIS VIEW LOOKING TOWARD THE BELLEVUE SIDE WAS TAKEN AT NOON ON NOV. 25 AFTER THE BRIDGE HAD BEEN MOVED ABOUT 35 FT. THE OLD ABUTMENTS AND CERTAIN RUNWAYS AND JACK SETTINGS ARE CLEARLY SEEN

amount estimated to be about the cost of the temporary foot-bridge originally proposed by them.

It was decided to move the bridge 75 ft. down stream to a parallel location and then to dismantle it after the completion of the new arched viaduct. The engineers decided to construct concrete pier supports for the temporary position and timber crib abutments at each end with double timber bents as supports for the ends of end trusses. The timber cribs were of No. 2 crossties, laced together, well doweled and filled with slag and stone.

The work of placing the runways and foundations was commenced on Oct. 25. During this work various reinforcements were placed in the floor system, and tower members and new tracks and overhead lines were constructed from the original tracks on California Avenue and on Lincoln Avenue at each end, over the new approaches to the timber abutments.

Crossovers were placed on the main tracks on the streets at each end of the bridge, whereby cars would transfer passengers during the moving of the structure. Platforms were erected in such position that foot passengers could continuously traverse the bridge sidewalks during the progress of the bridge to its new location.

Steel beams were clamped to the capstones at the base of each pair of columns and rested on 4-in. steel rollers. Under these were steel runways in pairs—one on each side of the column bases. It was decided that the use of jacks would insure a more uniform movement of each part of the bridge than could be secured by the use of cables and hoisting engines, and accordingly single screwjacks were placed at the back of each pair of columns.

Street traffic was discontinued and actual moving was begun at 7:30 a.m. on Nov. 25 and completed at 10 p.m. the same day. Special attention was given to



THIS VIEW LOOKING TOWARD THE PITTSBURGH SIDE WAS TAKEN ON NOV. 21 AND SHOWS THE HIGHEST TOWER, NEW TIMBER ABUTMENTS, PEDESTALS, RUNWAYS, ETC.



moving all parts of the bridge laterally at a uniform rate. The operators of the jacks each gave five turns to their jacks on whistle signals from a hoisting engine. The engineers had sights fixed on the floor over each pair of towers and line stakes at the bases of the columns by means of which constant observations were taken and any variations were distinguishable and corrected.

The runways proved so level and accurately set and blocked that not all the jacks were necessary and at times twelve men were moving the entire structure, comprising a weight of more than 1,000 tons.

On completion of the movement at 10 p.m., the column bases were locked up on the pedestals, and electric car traffic was resumed on the morning of Nov 26. Inspection of the trusses and their supports on the columns showed that the movement had been so uniform as not to crack the paint nor disturb the dust on the steel work at truss ends at any points.

The Bell Telephone Company had several hundred pair of wires in five cables carried in steel conduits underneath the bridge floor and connecting at each end to terra-cotta conduits. These cables were cut into at each end and sufficient loop cable added to cover the dis-

tance the bridge was to be moved. As the movement of the bridge progressed the extra loop cable straightened out and uninterrupted service was maintained.

The new bridge will have a total length of 770 ft. and a width of 60 ft., including a 38-ft. roadway. There will be one 320-ft. two-ribbed arch span over the ravine with six 20-ft. spans at each end, a 120-ft. abutment at the Pittsburgh end and a 60-ft. abutment at the railway end. The construction will be reinforced concrete arches.

The work of moving the steel bridge was planned and carried out under the direction of W. C. Boyd, chief engineer for the receivers of the Pittsburgh Railways, and J. C. Godfrey, of R. W. Hunt & Company, and J. K. Martin of Bellevue as consulting engineers and V. R. Covell, county engineer. The contractors were F. Wilsman, Sr., on the masonry and John Eichleay, Jr., Company of Pittsburgh on the moving of the structure.

The County of Allegheny will contract for the new bridge, proposals for which will be advertised within a few weeks. The plans are being prepared and the construction will be supervised by N. S. Sprague, consulting engineer, Pittsburgh, Pa.

## New York Railways Tries Turnstile Car

**New One-Man Pay-as-You-Leave Turnstile Car Placed in Service by New York Railways Designed to Load and Unload Passengers at Both Ends—Has Provision for Limiting Number of Passengers at One Time**

A NEW type of one-man pay-as-you-leave turnstile car has been developed by the engineers of the New York Railways and was placed in service on its Lexington Avenue line Dec. 18. The car used is one of the company's standard closed cars, 42 ft. long, 7 ft. 4½ in. wide and having a seating capacity of thirty-eight inside the car body. The car, before its last remodeling, was a converted pay-as-you-enter car. The platforms are 6 ft. 6½ in. long and originally had double folding doors. In the remodeling the length of the platform was not changed, but the door openings, steps and method of operation were changed to meet the new conditions.

The noteworthy feature of the equipment which is now being tried is in the use of a turnstile at either end of the car, so arranged that it can slide from one opening to the other on the same platform to provide for double-end operation. Through the use of the pay-as-you-leave turnstile, similar in design to those used in the New York subway, both ends of the car are used for loading and unloading passengers and for collecting fares. These turnstiles are of a double-acting type, which permit entrance to the car without obstruction, but which require the placing of a 5-cent piece in the slot of the coin box in order to unlock the turnstile for exit. The turnstiles have four arms, which are wooden at the top with screened pipe barriers underneath.

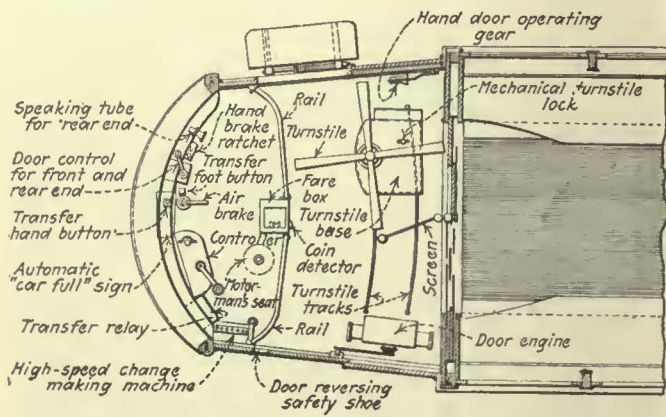
### FEATURES OF NEW EQUIPMENT INSTALLED

An accompanying drawing shows the platform layout and location of the equipment used. As originally designed these cars had sliding doors at the bulkhead. These consist of two doors sliding into pockets on either side, with the opening in the center. These doors have been left as originally used, but only one-half is used



SLIDING DOORS AND FOLDING STEPS PROVIDE FOR ENTRANCE AND EXIT





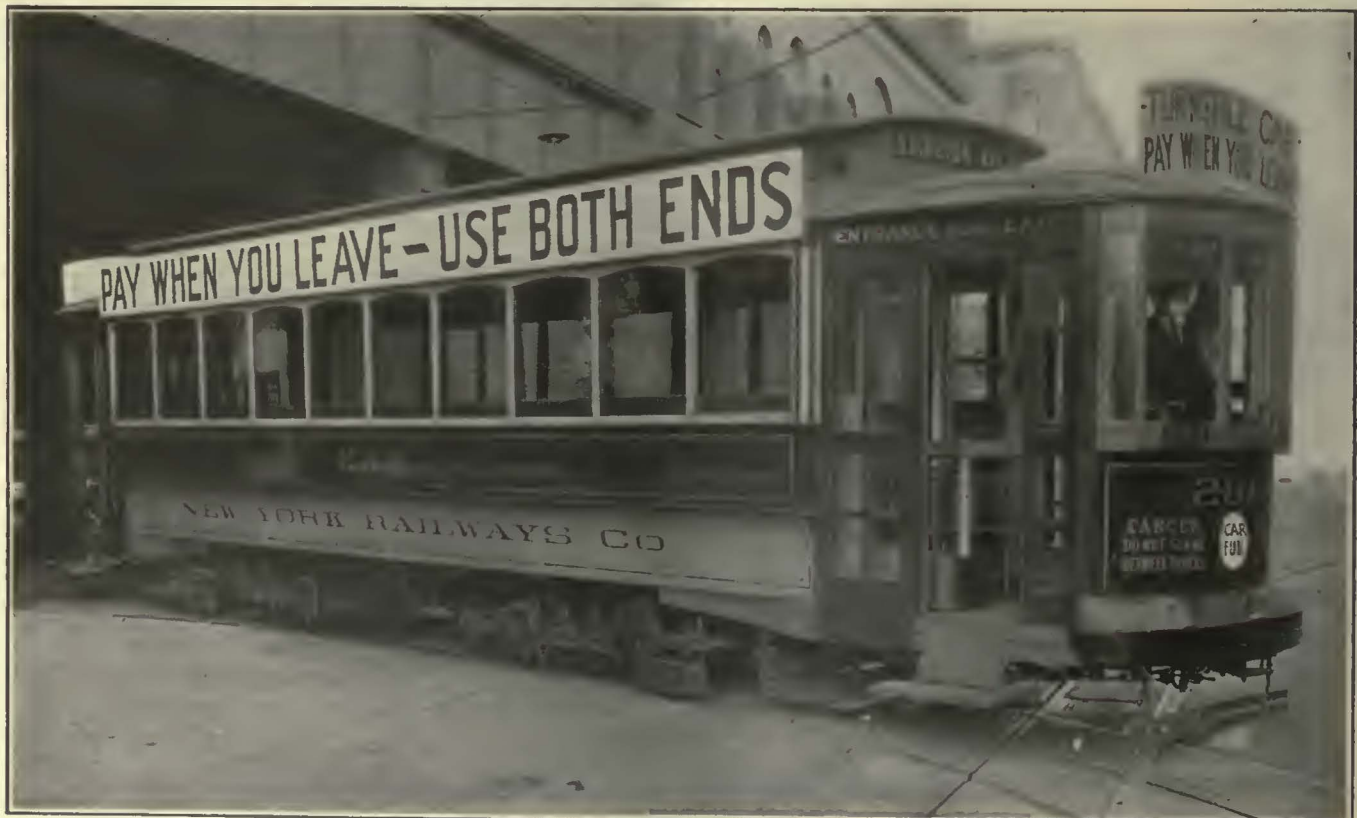
at a time, the other half closing up to a screened railing, which directs the passengers through the turnstile as desired. The position of the turnstile at each end is at the side of the door opening being used and the passengers after passing through the turnstile enter the car or leave, as the case may be, through the bulkhead doors at the opposite side of the car. When the direction of operation is changed and it is desired to use the doors at the other side of the platform the turnstile is unlocked from its position by the raising of a lever and it can then be pushed to the other side, its movement being guided by two depressed tracks. It is locked in position as desired. The screen which extends from the center of the bulkhead door opening to the inside end of the turnstile arm rotates about a stanchion on the center line of the car at the bulkhead. This railing and screen are changed to the required position by lifting the stanchion at the end of the turnstile and replacing it in another socket.

The folding doors which were originally on the car have been replaced by sliding doors and the openings

are closed off to give space for the entrance and exit of but one passenger at a time. The opening door slides on the inside toward the bulkhead. When operated by one man the door and step at the operator's right are hand operated, the rear door on the same side being electro-pneumatically operated. The door which has the door engine operation is provided with a safety shoe for reversing the door in case it should strike an obstruction. Its operation is controlled through a push button at the right of the operator. The door engines used are of a standard type made by the National Pneumatic Company and are installed on the platform floor next to the bulkhead. In order that the operator can see conditions at the rear of the car, a mirror is located on the right-hand front side, and he views the steps of the rear door through this mirror. Another mirror is located immediately in front of him and just above his head so that he can watch conditions inside the car without turning around.

The coin box, which releases the turnstile for exit of passengers, is located on the center line of the car just to the right of the motorman and railings extend from the front edge of this fare box to the door openings on either side of the platform. These serve to guide the passengers and also to prevent interference with the operator. In order to assist in making change a high-speed change-making machine is used, which is installed at the operator's left hand. The fare box is locked, but the operator can gain access to the money for change by unlocking the fare box and removing the coins as desired.

The fare boxes are provided with coin detectors which magnify the coins through a lens, after they have been deposited, so that they can be viewed and seen distinctly through half the length of the car. This is a safety measure intended to prevent the use of slugs to operate the turnstile.



WHEN THE CAPACITY OF THE CAR HAS BEEN REACHED A "CAR FULL" SIGN IS ILLUMINATED ON THE DASH. THE PICTURE SHOWS HOW PATRONS WERE ADVISED OF THE NEW PAYMENT SYSTEM IN AN INESCAPABLE MANNER





A FREE PASSAGE IS ASSURED FOR THE EXIT OF PASSENGERS

Whenever a transfer is tendered for fare, the operator pushes either a hand button or foot button which rings a gong and registers the transfer on a transfer register installed inside the car body over the bulkhead opening. The pushing of the transfer button also operates a transfer relay and this relay remains in its raised position until the turnstile has been operated to allow the passenger to leave the car. It then drops and is in position so that the operator can record another transfer if desired.

Another interesting feature of this equipment lies in the provision made for limiting the total number of passengers on the car at one time. This is accomplished through a totalizing mechanism which is operated through the two turnstiles. The arms of this totalizing equipment move in one direction for each entering passenger and in the opposite direction as passengers leave, so that the combined number of passengers on the car at a given time is shown by the totalizer. When the capacity of the car has been reached a "Car Full" sign on each dasher is illuminated and the turnstiles are locked so that no more passengers can enter the car. Furthermore, the electro-pneumatic door-operating equipment is so designed that the motorman cannot open the door to receive additional passengers and thus to overload the car. The depositing of a fare in the fare box or the ringing up of a transfer, however, releases the turnstile and provides for opening the door.

An emergency cord runs throughout the length of the car and has drops on each platform to provide for cutting off power and the emergency application of the brakes by passengers in case this is necessary. This equipment is the same as has been used on the pay-as-you-enter cars in New York for several years.

For the convenience of the operator in announcing stops and so that his voice may readily reach the rear platform, a speaking tube is provided so that he can talk into this and the sound will be readily heard at the rear.

Rather extended precautions have been taken to advise the traveling public as to the operation of this car and the method of entrance and exit. The exterior of the car is decorated with several large signs to explain that both ends can be used for entrance and that the fare is paid on leaving. Inside the car at the center is a sign which reads: "Passengers Are Requested to Deposit Fare in Slot When Leaving Car. Change Can Be Obtained from Motorman. Present Transfers to Motorman." At either end of the car, just inside the bulkhead, is a sign which reads: "Exit and Entrance at Both Ends of Car."

Officials of the railway have found that a considerable portion of the present car-operating schedule time is consumed in the loading and unloading of passengers, and it is expected that through the use of both ends of the car for both entrance and exit the time at stops can be materially reduced. The provision also for limiting the maximum number of passengers on the car at one time should provide for efficient and comfortable traveling.

### Lubrication Requirements for Railway Gears and Pinions

IN A RECENT summary of the lubrication requirements of electric railway gears and pinions the Texas Company\* gives the prime requisites of such a lubricant as:

1. It should not harden nor contain any residual matter that is of a non-lubricating character.
2. It should possess marked adhesive properties in order not to drip or flow excessively under abnormal temperature rise nor be thrown off by the action of centrifugal force, or rubbed off under operation.
3. It should be of sufficient body to withstand the excessively high pressure at the point of contact of the teeth, and thereby prevent actual metal to metal friction occurring, whatever the season of the year.
4. It should be entirely free from acids or alkalis which would have a tendency to cause a certain amount of pitting on the highly polished metallic surfaces.
5. It should not be abnormally affected by heat or reacted upon by water, acid or alkali.
6. It should not tend to hold in suspension dirt and particles of worn metal, to produce an abrasive effect.

Other factors that should be considered in making this selection of the lubricant are: Ease of application; the amount required for the initial lubrication and for subsequent applications and the length of time it will efficiently lubricate without renewal.

A lubricant that will meet all of the foregoing requirements will without a doubt increase the life of gearing to a considerable extent and reduce the labor charges and other costs incidental to the maintenance of this type of equipment.

It is very important to have the viscosity of the lubricant approximately the same throughout the year. To meet this requirement with widely differing temperatures it may be necessary to use special grades of lubricants in accordance with the season and the temperature of operation.

\*An extended article on this subject is published in the November issue of *Lubrication*.



# 4,000-Hp. Electric Locomotives for N. & W.

Four Double-Unit Locomotives Are Under Construction for the Norfolk & Western Railway's Elkhorn Grade and Electrified Extension — They Will Supplement Twelve Lighter Machines Commissioned in 1915

A BRIEF note in the issue of this paper for Oct. 28, 1922, page 732, directed attention to an order placed by the Norfolk & Western Railway with the Westinghouse Electric & Manufacturing Company and the American Locomotive Company for four double-unit electric locomotives to supplement the present equipment of twelve placed in service in 1915. The designs were prepared by the firm of Gibbs & Hill, consulting engineers, in collaboration with the engineers of the railway company. These machines will have a total weight of approximately 400 tons, the weight on drivers being about 71,000 lb. per axle. They will have about 30 per cent more capacity than the earlier locomotives; that is, 3,300 hp. continuous rating, or 4,000 hp. for one hour. They will be operable at 14 m.p.h. and 28 m.p.h., with a continuous tractive effort at the lower speed of 90,000 lb. With full line voltage and frequency, normal transformer connections and eight-pole motor connections, the one-hour rating will be 108,000 lb., the starting tractive effort for five minutes 168,000 lb. and the momentary starting tractive effort with the four-pole motor connection with 85 to 95 per cent trolley voltage 110,000 lb.

### HANDLE FREIGHT TRAFFIC SATISFACTORILY

The twelve present Norfolk & Western electrics, in their nearly eight years of service, have shown their ability to handle satisfactorily an enormous freight traffic averaging 75,000 tons in twenty-four hours, which would have required thirty or more Mallet steam locomotives. The earlier machines and the other details of the electrification were covered at length in articles in this paper for March 20, 1915, page 581; June 5, 1915,

page 1058; April 1, 1916, page 644; and Aug. 24, 1918, page 322.\*

The new locomotives are for supplementary service to provide for the additional locomotive mileage which will be operated when the extension of the electric zone to Wilcoe and Farm and beyond to the westward are opened up.

Each complete locomotive will contain four 1,000-hp. motors of the three-phase induction type with wound rotors placed directly above a jackshaft to which they will be geared at a ratio of 21 to 100. The earlier machines, it will be remembered, had twin motors, geared to the same jackshaft. The driving wheels, of which there will be eight per half unit, will be 62 in. in diameter.

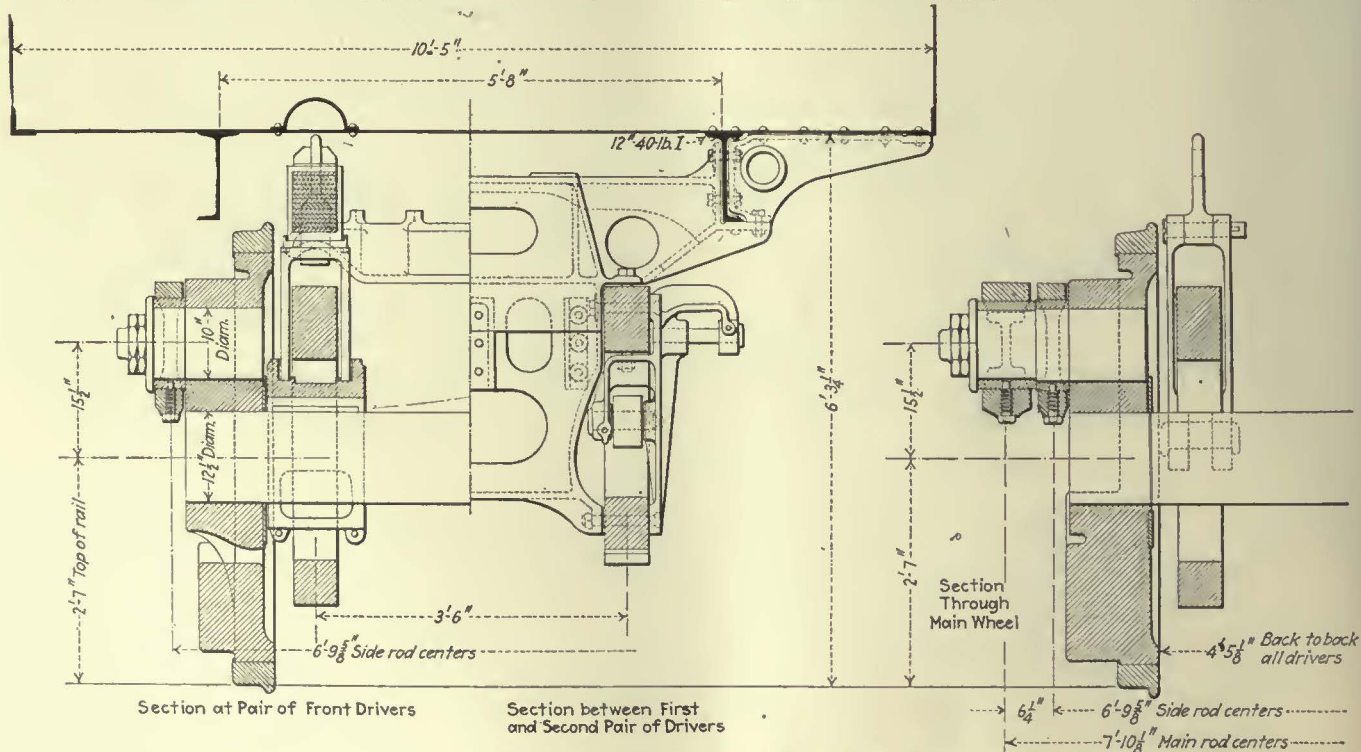
Each unit is of the Mikado 2-8-2 wheel arrangement, with 16½-ft. rigid wheelbase. Sufficient side swing is provided in the guiding trucks to permit operation around 20-deg. curves.

Power will be taken from the line at 25 cycles and 11,000 volts, through a pantograph and oil circuit breakers, to the main transformer, where it will be stepped down to a voltage suitable for the main motors.

A phase converter of the synchronous type will be used to transform the single-phase power from the line to two-phase power. The synchronous type, which was used on the large freight locomotive built for experimental purposes for the Pennsylvania Railroad, is used rather than the induction type, as on the present Norfolk & Western locomotives, in order to give better control of power factor.

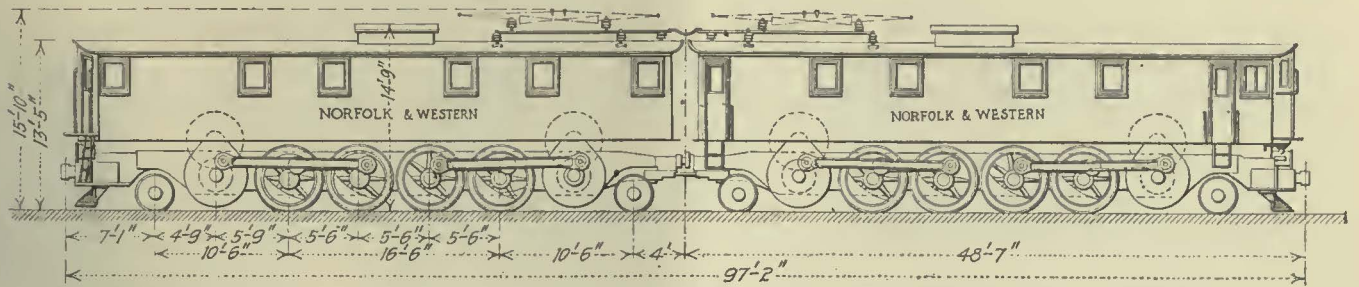
As in the present locomotives, the three-phase main

\*See also the issues for June 5, 1915, page 1057; Feb. 12, 1916, page 311; March 16, 1919, page 522; and June 12, 1920, page 1202.



SECTIONS OF THE LOCOMOTIVE UNDERFRAME TAKEN AT TYPICAL





THE NEW N. & W. LOCOMOTIVES WILL COMPRISE FOUR MOTORS, EACH DRIVING TWO AXLES THROUGH A JACKSHAFT

motors will be connected to the main transformer and phase converter by the two-phase-three-phase system of connection.

A liquid rheostat connected to the rotors of the main motors will provide for accelerating the locomotive to 14 and 28 m.p.h.

EACH SIDE FRAME A MASSIVE STEEL CASTING

The mechanical parts are of considerable interest, having been designed in detail by the engineers of the railway to meet the exacting service conditions of the celebrated Elkhorn grade, which are unsurpassed in this country, if not in the world.

The construction of the new locomotives is fundamentally the same as the present ones, the system of drive being that of motors geared to jackshafts and connected to driving wheels by side rods. In the new locomotives, however, the four main driving axles form one rigid wheelbase, with continuous side frames from end to end of unit. The cab structure is carried on and rigidly connected to the side frames and cross-tie castings. This differs from the present locomotive, each unit of which has a cab structure supported on a number of springs and sliding bearings, carried on two main trucks, each having two main driving axles and one guiding truck axle, the two main trucks being connected by a Mallet hinge.

The new arrangement follows closely that of the Mikado type of steam locomotive, and also has a similar type of spring equalization.

Side frames are to be vanadium steel castings connected by cross-tie castings which also serve to support

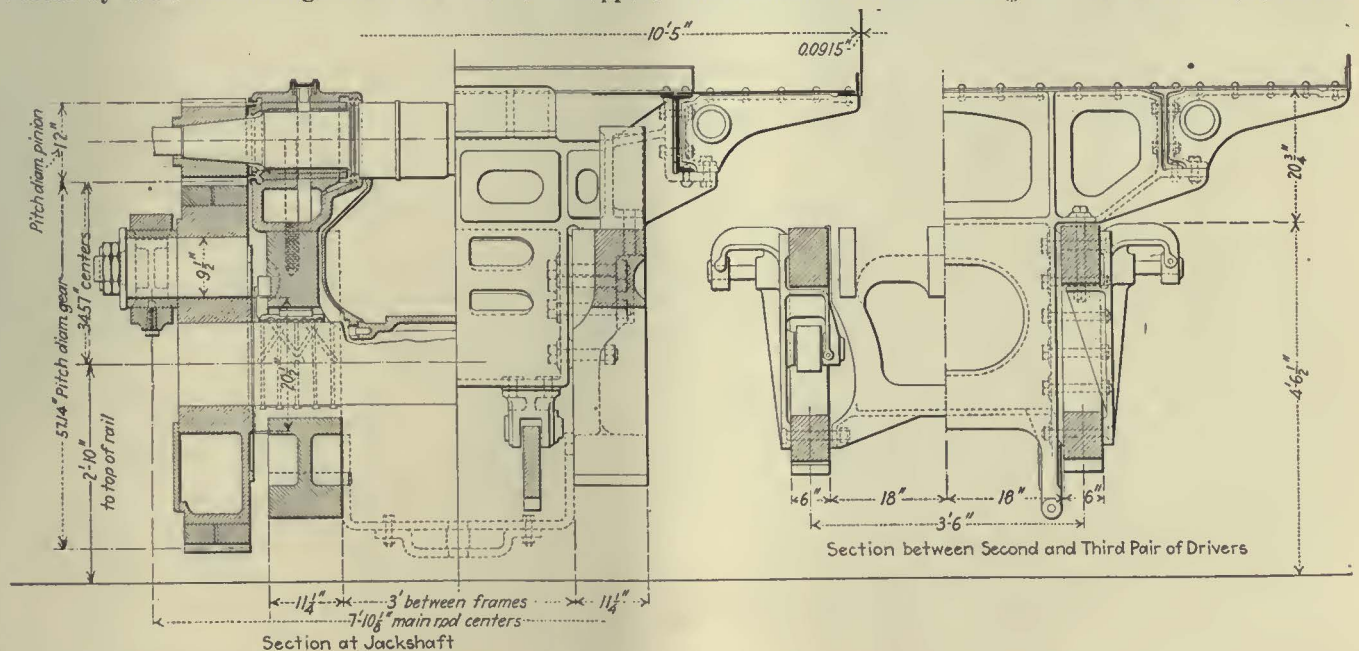
the heavier parts of the electrical apparatus in the cab.

An interesting feature of the mechanical parts is the method employed for supporting the jackshafts. For ease in removal of jackshafts, which carry a gear at each end, these are carried on heavy bronze bearings, which are split vertically and rest in heavy steel castings known as "jackshaft cellars." These cellars are set in pedestal ways in the side frames and are inserted from below, in similar fashion to a journal box in its pedestal ways, except that the jackshaft cellar and the pedestals are very accurately fitted and the cellar is built with extensions at the bottom which act as a tie bar, being bolted to the side frames. This makes the cellar practically an integral part of the side frame, and at the same time provides a ready means of removal of the jackshaft. It is the same arrangement that has proved very satisfactory on the present locomotives.

The spring suspension system is the same as that in successful use on steam Mikado steam locomotives, the front guiding truck being side equalized with the two adjacent drivers and the rear truck cross equalized with the other two drivers, thus forming a three-point suspension.

The 1,000-hp. motors will, as suggested above, be arranged either for a four-pole connection, corresponding to a speed of 14 m.p.h., or an eight-pole connection, corresponding to a speed of 28 m.p.h. Each motor will have forced ventilation supplied through air ducts from individual motor-driven blower sets.

The motors are mounted on the locomotive framing in an interesting manner. The stator frame is cast with horizontal brackets running the full width of the motor.



POINTS. THESE ILLUSTRATE THE RUGGEDNESS OF THE CONSTRUCTION



These rest on heavy steel cross-tie castings connected to the main side frames. The weight of the stator is thus carried on horizontal planed surfaces which can readily be trued up in relation to the centers of jackshaft, rotor shaft and driving axles. The rotor is carried independently of the stator on bearings which rest in separate housings mounted on and secured to the main side frames, the proper relation of the stator and the rotor being maintained by accurate fitting of the bearing surfaces.

The collectors of the rotor motor will be mounted on the motor shaft outside the pinions, one three-ring collector at each end of the shaft. The leads from the collector to the rotor winding will be carried through the hollow motor shaft, well insulated and protected from abrasion. Means will be provided for removing the collectors without disturbing the leads in the shaft. This construction differs from the earlier machines, but it was used in the Pennsylvania locomotive already referred to.

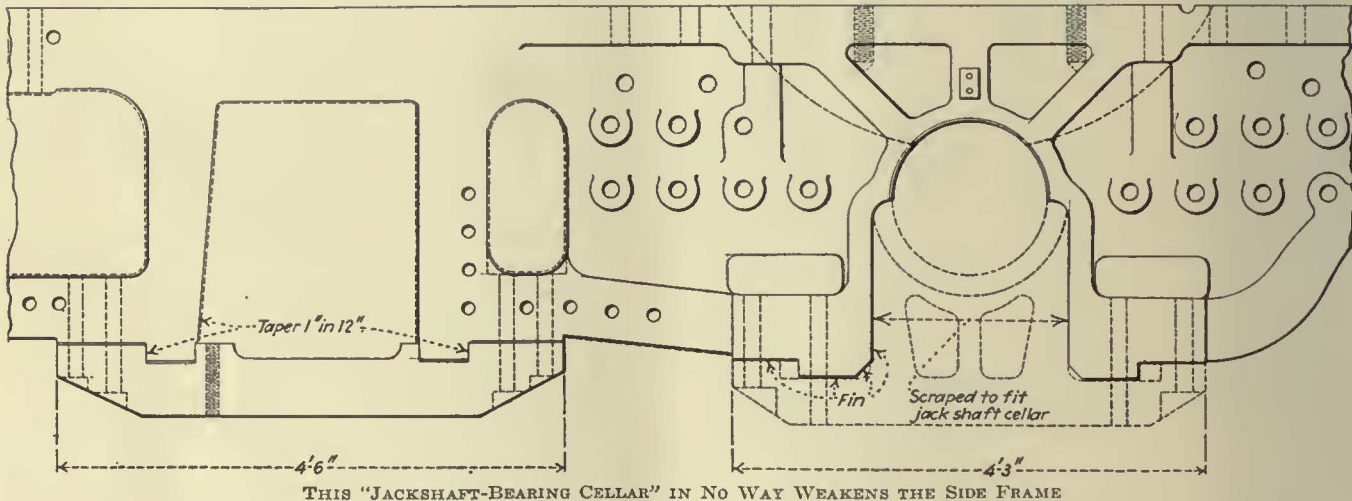
The pinions will be made from individually forged

converter will be separately excited, the exciter being the same machine which serves as a starting motor for the converter.

This auxiliary machine will be a single-phase series-type commutator motor, mounted on the phase-converter shaft to bring the phase-converter rotor up to synchronous speed, after which this commutator machine will be reconnected as a direct-current exciter separately excited from the motor-generator set to excite the rotor windings of the phase converter. The rotor, of course, will have two slip rings for supplying a starting current to the rotor windings.

#### OIL-COOLED TRANSFORMERS ADOPTED TO SECURE EXCELLENCE OF INSULATION

The transformer for each half unit will be of the shell type, oil insulated, forced cooled, built for mounting in the cab of the locomotive. This differs from the earlier machines, which had air-blast transformers. The extra weight was considered offset in the new units in view of the better insulation. An air-blast type



THIS "JACKSHAFT-BEARING CELLAR" IN NO WAY WEAKENS THE SIDE FRAME

steel blanks with twenty-eight machine-cut spur teeth,  $1\frac{1}{2}$  diametrical pitch, 20 in. total face per jackshaft. The rims of the flexible gears will be made from individually forged steel blanks with 100 machine-cut spur teeth. These will be mounted on cast-steel centers with flexible elements interposed between the rims and the centers. The center will carry a wristpin and the necessary amount of counterbalance weight. The pinions and gear rims will be heat-treated.

#### CONVERTER STARTING MOTOR WILL ALSO DO DUTY AS EXCITER

The phase converter will be a rotating machine with a two-phase wound stator and a wound rotor. One stator phase will be fed from the transformer and a proportional voltage will be generated in the other stator phase approximately 90 deg. electrically displaced from the transformer voltage. One terminal of this generating phase will be connected to a mid-point of the transformer and the other end to the one phase of the main rotor circuit. The other two motor leads will be connected to loads at the two ends of the main transformer secondary, resulting in a Scott connection to give three-phase power to the main motors.

This phase converter will be of the synchronous type, as already stated, which permits the transformation of power at high power factor. This means that the

transformer preventive coil will be provided to compensate for 15 per cent drop in voltage during acceleration and to minimize voltage unbalance during acceleration and regeneration. This will be of the same general construction as the main transformer.

A centrifugal pump will be used to circulate the transformer oil through an external radiator, and a blower will force air through the radiator in sufficient quantity to enable the transformer to perform its specified service. The pump and blower will be driven by a common motor, which will be forced ventilated by air taken from the blower.

A steel-plate electrode will be provided in the liquid rheostat for each phase of each motor. The electrodes will be rigidly supported through porcelain insulators and separated at the lower end by slate barriers. Steel ground plates will be interposed between the electrodes above the slate barriers, and in effect will form a separate compartment for each electrode. The electrodes for one motor will be removable as a unit. The electrolyte will be circulated by a motor-driven centrifugal pump, the motor being of the ball-bearing squirrel-cage induction type, arranged to start polyphase and run single-phase. In the cab the pump will supply electrolyte from a common storage tank, insuring that all electrodes of that cab are immersed in electrolyte of the same temperature and density.



A cooling tower for the electrolyte will be provided, consisting of a series of trays over which the electrolyte will flow in a thin sheet, while cooling air is circulated over the surface. The height of electrolyte around the electrodes will be controlled by a motor-operated overflow valve.

The control will involve the use of two types of switches, one with its individual piston and cylinder for each switch, the other in which several switches are operated collectively through cams mounted on a common shaft.

Each master controller will be provided with a speed lever, an accelerating lever and a reverse lever, with the usual mechanical interlocking to prevent false operation. The accelerating lever will be used to raise and lower the overflow valves in the liquid rheostat and thus control the speed and tractive effort.

Unit-type electrically controlled and pneumatically operated switches will be used for transformer-secondary switches, phase-converter switches and motor-overload and reversing switches, while the switch group for pole changeovers and motor-secondary short-circuiting switches will be of the cam type, electrically controlled and pneumatically operated.

An auxiliary controller will be provided with levers to control the phase converter and to set the transformer switches for running or regenerating. It will also include means for raising and lowering the pantographs; and for controlling the operation of the liquid rheostat.

#### HOW OPERATING RELIABILITY WILL BE SAFEGUARDED

Protective features furnished will include a time-element overload relay, arranged to trip the oil circuit breaker in case of sustained short circuit on the locomotive. Overload relays connected in two of the phases of each motor will be arranged to open the main motor switches on overload. Maximum-level relays, operated by electrolytic interlocks, to limit the height of liquid in the rheostat tanks to the proper points will prevent the motor secondary from short-circuiting switches from closing except when the liquid is at the maximum level. Contact on a drum mechanically connected to the overflow valve will prevent the motor line switches from closing on either the 14-m.p.h. or the 28-m.p.h. connection unless the overflow valves are at the desired height. A no-voltage line relay will be provided to open up circuits necessary for protection of the apparatus and interruption of power to the locomotive. The pole-changeover cam-type switches will be interlocked with the main motor switches so that the circuits will be always made or broken by the main motor switches.

#### Swedish Electrification Deferred

In its "Trade and Economic Review" for 1921, just published, the United States Department of Commerce analyzes the condition of the Swedish railways, stating that the financial depression was too serious to permit the completing of the electrification of the main line from Goteborg to Stockholm, the expense of which would have meant a deficit. The electrification of the Kiruna-Svarton line, however, is being carried on, its completion being expected during the present year. As a whole the State Railways were prosperous in 1921, a profit of more than \$6,000,000 having been made, as compared with somewhat over \$1,620,000 the year before. The private railways ran at a loss.

## Letters to the Editors

### Noiselessness in Special Trackwork

WILLIAM WHARTON JR., & Co., INC.

NEW YORK, N. Y., Dec. 26, 1922.

To the Editors:

In the issue of the *Electric Railway Journal* for Dec. 16, pages 944 and 945, appears an article describing two Balkwill track crossings furnished by this company to the Cleveland Railway. In the article the following statement is made: "The Balkwill crossing, of which noiselessness is but one feature . . ."

From the way in which this statement is worded it might be inferred that the noiseless feature can be secured only in the Balkwill crossing. The fact is, of course, that the flange-bearing throughout the crossing which constitutes the noiseless feature can be incorporated in practically any type of crossing, whether solid manganese steel or other steel, or T-rail built-up-type with filler or girder-rail crossing. The noiseless feature was incorporated in crossings and other special parts of layouts made by this company for a number of years, particularly in work made for the Kansas City Railways.

GEORGE R. LYMAN.

[NOTE—The sentence quoted by Mr. Lyman was inserted to point out that, while the Balkwill crossing, with the flange-bearing feature, was selected for the particular locations in Cleveland mentioned on account of their noiselessness, after all the unique feature of this type of crossing is its articulation. It was not intended to imply that the flange-bearing feature was unique, as flange-bearing special trackwork is well established in general practice.—EDITORS.]

### Thinks Fault Lies Rather with High Supertaxes

NEW YORK, Dec. 27, 1922.

To the Editors:

I note with interest the editorial in your issue of Dec. 23 with the caption "Discontinuance of Tax-Exempt Issues a Benefit to All." The views expressed in your editorial support the recent resolution of the American Electric Railway Association and coincide with those reported as the views of the present Federal administration, but there are always two sides to every question, and with all respect to your own attitude and to the prominence of those who hold the same views, it seems to me such views are based on a superficial consideration of the subject.

We have always had tax-exempt issues and until a comparatively recent date they have never come in for much adverse criticism. They have always commanded a market at a materially lower rate of interest than competing non-exempt securities, yet there has always been a sufficient demand for the latter to furnish industry as much capital as it needed. There is no substantial, if any, difference between the tax-exempt securities of today which came in for so much criticism and those of former days which were free from such criticism, and therefore it seems to me to be jumping at a conclusion to lay the blame for the existing condition on the tax-exempt securities and to claim that they are put out on basically wrong principles. Rather let us inquire what has happened in other directions to give rise to the difficulties which now exist and see if we



are not shooting at the wrong target in condemning the tax exempts.

To my mind the facts are fairly obvious, i. e., with mistaken zeal to extract an unfair, unjust and a wholly unreasonable income tax from men of large means, our legislators have enacted into law a super-tax schedule which puts such heavy taxes on this class of citizens as to be nothing short of ridiculous. The fact that this schedule is so manifestly unjust has had no effect on Congress because the number of very wealthy men is comparatively small. They cannot, therefore, deposit many votes, and owing to the fact that all of us are more or less jealous of those who are better off than we are these same wealthy citizens get very little sympathy from any one else. If press reports are to be credited, the income taxes received by the United States from this very wealthy class are diminishing from year to year, a condition doubtless brought about because our wealthy men are rapidly learning how to deal with the situation so as to comply with the law and escape being robbed. Of course one means to do this is to invest in tax-exempt securities, and the American Electric Railway Association has pointed out that this tendency has reached such proportions as to withdraw large amounts of capital otherwise available for industry and to bury it in comparatively dead projects; that is to say, dead in so far as they contribute to the progressive, constructive up-building of our industries. It would seem to me clear that the natural cure for this condition is not to do away with tax-exempt securities, which serve a very useful pur-

pose, but to correct the obviously unwise and unjust schedule of super taxes, which, as is reported, are yielding the government a steadily decreasing revenue, and by so doing remove the cause of the trouble instead of trying to stop the effect.

It has been frequently claimed that the great mass of the people are suffering by having to pay taxes to take the place of those which ought to be collected from the wealthy class were they not permitted to invest their money in tax-exempt securities. But I have never yet seen attention called to the fact that if tax exempts were prohibited every bond hereafter issued by a municipality or state or the nation would have to pay a considerably higher rate of interest and therefore that the so-called common people would likewise have to pay a correspondingly greater amount in taxes to cover such greater interest, and to pay it not only on the securities now bought by the wealthy people but also on the very large volume of the same securities which are bought by those who do not purchase them for the sake of saving income tax payments but on account of their safety as an investment.

I do not own one dollar's worth of tax-exempt securities and therefore am not personally interested in saving myself taxes by having them retained, but I would like for once to see the American people courageous enough to face the facts and to apply a remedy where a remedy belongs, and I would like to see a full and free statement in the public prints, not a continued harping on one side and ignoring of an obvious weight of evidence on the other.

CALVERT TOWNLEY.

## News of the Associations

### The Pass in Tacoma\*

After Only Fifteen Weeks the Tacoma Railway & Power Company Is Selling 11,000 Passes Weekly in a City of 100,000 Population—Riding Up 20 per Cent and Car-Hours 2.7 per Cent

By C. V. ALLEN

Publicity Manager Tacoma Railway & Power Company

STREET RAILWAYS all over the United States have been in a serious financial predicament in the last ten years for well recognized reasons. The Tacoma Railway & Power Company, while more fortunate than some other companies in that it had a 10-cent fare, nevertheless was faced with serious financial difficulties. Heavy pressure was being brought to force our fares to 5 cents, jitneys were to be started in competition with us, and the privately owned automobile was cutting into our earnings deeply. The street railway pass seems to us to be a ray of light at this time. While it has been in effect here but fifteen weeks, and we are really novices in the game, we think that it has given us the first assurance we have had in many years of financial success.

A large part of the credit for revising this pass from European models and making it workable in the

United States is due to Walter Jackson, an independent traction engineer of Mount Vernon, N. Y.

Tacoma is the sixth city in the United States to install the pass and is really the second large city to do so. Tacoma's population today is about an even 100,000. The form of pass used on our lines here follows closely that used in other cities where it is used. The face of the pass carries the following wording:

Pass bearer on cars of these companies within the one-fare limits of the city of Tacoma within the days shown on the face of this pass. Pass is to be shown car operator or conductor and is good for only one passenger and shall be in passenger's possession while on car.

This pass is absolutely transferable. The holder can loan the pass to his wife, children, or to anyone he may desire and there is absolutely no question asked as to his right to use the same. The pass entitles the holder to ride upon any cars operating within the city limits, at any time, for any distance, for a block or for a mile. The pass is good from the first car Monday

morning to the last car on Sunday night.

The convenience and economy of the pass can be shown by the uses to which it is put in Tacoma. The wholesale dealers who have in the past paid the street car fares of their city salesmen at a cost to them of 50 cents to \$2 a day, now furnish them with the \$1 pass, which is good for all riding they can possibly do during the entire week. Banks buy a number of them and the messengers use them as they go on their errands and return them to the office when they are through. Men and women working downtown who formerly paid 35 to 50 cents for their lunches now use the pass to go home and are able to save the price of it in approximately three days. This transferable quality of the pass has made it most popular.

#### TRANSFERS CUT IN HALF

Another advantage of the pass is the doing away with transfers. We issued weekly between 110,000 and 120,000 transfers. Every one of those transfers represents a potential row. Our trainmen have more arguments over transfers than anything else in connection with our business. The pass to date has practically cut the number of transfers issued in half.

The pass is really the first opportunity street railways have had to mer-

\*Abstract of paper read before Building owners and Managers' Convention at Tacoma, November, 1922.



chandise their transportation. Under the old fare system, a patron approaching a car was greeted with this little sign on the side of the entrance, "Have your exact fare ready." Here is a command. There is nothing pleasant about that little order. As he steps on the platform he glances up and sees the sign, "Ask for your transfer when you pay your fare." If he omits to do so, he will either have to go back and plead with the conductor to give him a transfer, in violation of orders, or else pay another fare on the next car. As the passenger takes his seat, he is greeted with the sign on the end of the car, "Warning! Not more than thirty days and not more than \$100 fine for the abuse of the transfer." That little sign isn't particularly encouraging or pleasing to the patron. He looks at his transfer, and on it is the statement that it must be used for the next connecting car. If he fails to do so, the inference is that he will have to pay another fare. It also states that the transfer must be made at a certain definite point. If he moves one block either way from the point of transfer, his transfer is rendered invalid.

All of these things make riding unpleasant and discourage it in every way. The pass absolutely eliminates all these annoying regulations. The passenger is free to get on or off without any question of any kind.

#### MORE PASSES—FEWER JITNEYS

The people of Tacoma have shown every evidence of liking the pass. The first week we sold 7,000 passes. Today, we are selling 11,000, which shows an average increase of approximately 250 per week over each preceding week. In order to do this, we have had not only to resell every purchaser that bought one the previous week, but we had to sell 250 additional. The fact that the sales have fallen off only in one week, and that the week of Labor Day when Monday was a holiday, speaks well for the popularity of the pass in Tacoma.

Just prior to the installation of the pass system there were some forty-eight jitney buses licensed to operate in Tacoma. Today, the latest reports we have show about fifteen operating and the number gradually falling off each week.

#### THEATERS BOOST NOW—ALSO THE MERCHANTS

Just prior to the installation of the pass the leading theaters in the city carried slides urging the public to support the demand for 5-cent fare. The slides had statements something like this:

Let's all pull together for a 5-cent fare. A 5-cent fare will help business. Get behind the 5-cent fare movement.

We approached the theaters and explained to them our plan to put in the pass system. The idea of the pass appealed to the theaters. They advised us that they would drop the slides urging the 5-cent fare and would advertise our pass system. This they have done ever since.

The leading retail stores in the city

have seen the beneficial effect of the pass in getting people to move and have joined with us in our advertising campaign. They have put on special Monday sales, using much space in the Sunday papers, and have suggested at the top of the "ad" the use of the pass, or recommended the purchase of one. The idea back of it is this: With an attractive Monday sale they could probably draw the women downtown for those sales. We are interested in their coming down on Monday for we have a much better chance to sell them a pass if they come downtown on Monday for they would have the rest of the week to use it. The stores also would be benefited, because after the women have purchased the pass, they would probably go down to any other sale the stores might have during the rest of the week.

One of the leading banks in the city is now planning to put out a passholder which is to be given away without charge—a small leather case bearing the name of the bank.

#### NIGHT SCHOOL ATTENDANCE UP 50 PER CENT—ADVERTISING METHODS

The night schools in Tacoma have advised us that their business has increased nearly 50 per cent since the pass was put in. They, too, have given us considerable publicity in their advertising. We are able to reciprocate in our advertising, and this in itself creates good will.

We are using posters in the windows of our cars. These posters and their color are changed every week, and may be read from the street or from the inside of the car. On the outside is a short, snappy statement like this, "Save Gas and Shoe Leather with a \$1 Weekly Pass." We elaborate a little on this same idea on the side of the card to be read by the passenger in the car. In our opinion this form of advertising is the most effective we've done.

We have placed billboards at the most important automobile and street car traffic arteries with the wording, "Just Park Your Pass in Your Pocket." This has been very striking advertising and very effective as well.

#### CHEATING ON THE PASS IS INCONSIDERABLE

An interesting feature of the pass about which we are often asked is the possibility of beating the company—cheating on the pass. Youngstown found some buyers were splitting their pass with a sharp instrument—one man taking half of the pass and one the other. This difficulty was easily eliminated by printing the pass on but one side. Another trick is that of cutting the pass in two pieces—the man getting on the car reaching in his vest pocket and pulling the pass out part way, the conductor taking it for granted that he has the whole pass. This is being eliminated by instructing our men to have the passholder show his complete pass. It is done by a card in the vestibule with the wording "The Best Way," a hand being shown holding the pass to display it fully. You will notice there

is no command or order in the thing, merely a suggestion.

Another trick worked is that of passing the pass out the window where a considerable number of people get on the car—take for instance at heavy loading places—one man can board the car, go through and take a seat and pass the card out the window to a friend, who in turn boards the car.

We feel, however, that the loss through these dishonest channels is practically negligible; and rather than cause any unpleasantness or arguments with anyone over the pass, no regulation of any kind will be made as to this practice.

#### INDUSTRIAL CONDITIONS STILL BELOW PAR

Most street railway men will probably be interested in the financial working out of the pass. Our report issued for the fourteenth consecutive week shows that the average rides taken by passholders per week is nearly twenty-seven. This is an average of nearly four car rides per day, which gives the holder of the pass his car rides at approximately 3.75 cents each.

The pass is, of course, an equivalent to a lower fare, and it is expected that our earnings will be somewhat under normal. The first few weeks of the pass worried us—our gross earnings dropped to approximately 20 per cent below the normal earnings of a year ago at this time. However, as the pass sales increased this drop in earnings became less and less until under this report (fourteenth week) our earnings have reached within 7.7 per cent of normal. In other words, the curve of our earnings is gradually drawing toward the line of normal earnings. We anticipate that with the entire elimination of the jitney bus, and the resumption of full working crews at the Milwaukee and Northern Pacific shops, our gross earnings will reach normal and undoubtedly go above our normal earnings line.

#### THEY DO COME BACK TO THE TROLLEY LINES

I think the most interesting point about the pass is the increase in riding. We carry normally at this time of year about 480,000 passengers per week. The pass has brought up our riding nearly 20 per cent, the week of this report showing 565,413 passengers carried. This increase in riding is one of the most healthful features inherent in the pass.

Also, it is shown by the report that the riding is not during peak loads. The total increase in car-hours to carry this 100,000 additional people was but 2.7 per cent. In other words, the most of the increased riding is during periods when our cars would be running empty, and this increase in traffic is costing us practically no more in additional service.

Therefore, taking every phase of the pass, we feel more pleased with it each week. We think the pass is going to be a permanent institution and that it has put us around the corner.



### Annual Meeting of American Engineering Council

THE American Engineering Council of the Federated American Engineering Societies will hold its annual meeting in Washington, D. C., on Jan. 11 and 12. The meeting will consider problems of national interest, including the report of the committee on work periods in continuous industries, of which the electric railway industry is one. Dean Mortimer E. Cooley, University of Michigan, president of the federation, will preside.

The climax of the meeting will be a reception to Prince Gelasio Gaetani, Italian Ambassador to Washington, who recently arrived in this country. The new diplomat is an engineer by profession.

### Rousing Meeting of Tennessee Utility Men

THE establishment of good public relations, the significance and importance of regulation by utility commissions and the value to the utility industry of the Tennessee Public Service Information Bureau were the principal themes occupying the attention of the first public utility conference held in Tennessee, when more than one hundred operators gathered at the State University in Knoxville on Dec. 14. The meeting was called by Percy Warner, chairman of the Tennessee Public Service Association.

One of the principal addresses of the day was by Julian H. Campbell, chairman Tennessee Railroad and Public Utilities Commission. In speaking on "The Public's Interest in the Public Utilities Commission" Chairman Campbell defined the duties of the commission by telling the utility men that the orders of the regulating body must inspire the confidence of the public and still provide an incentive to the utility so that the utility may better its conditions and cheapen its costs.

Another address of great importance to the utility men was that by Lovick P. Miles of Memphis, general counsel Memphis Street Railway. He declared that the average street car rider or water, gas or electric customer seldom pauses to reflect on the great value of these services. He related the history of the regulation of utilities and emphasized the fact that the plan for a state tribunal with complete jurisdiction is now generally regarded as the best means to compel the utilities and the public to discharge their obligations to each other.

In welcoming the utility men to the University of Tennessee, President H. A. Morgan said: "It is a fact that must be admitted that people are not fair. They do not appreciate the various problems you confront and we of the university are happy to have you here as a move to bring about a better understanding."

The work of the Tennessee Public Service Information Bureau, founded six months ago by the utilities of the State, was explained by Ross Murphy,

the director, who reviewed the conduct of the bureau and expressed appreciation of the welcome it had received throughout the State.

### Engineers Draw Up Code of Ethics

A JOINT committee representing several national engineering societies has prepared a code of ethics which has been adopted by the A.S.M.E. and will presumably be adopted shortly by other leading societies. The text of the code is as follows:

Engineering work has become an increasingly important factor in the progress of civilization and in the welfare of the community. The engineering profession is held responsible for the planning, construction and operation of such work, and is entitled to the position and authority which will enable it to discharge this responsibility and to render effective service to humanity.

That the dignity of their chosen profession may be maintained, it is the duty of all engineers to conduct themselves according to the principles of the following Code of Ethics:

1. The engineer will carry on his professional work in a spirit of fairness to employees and contractors, fidelity to clients and employers, loyalty to his country and devotion to high ideals of courtesy and personal honor.

2. He will refrain from associating himself with, or allowing the use of his name by, an enterprise of questionable character.

3. He will advertise only in a dignified manner, being careful to avoid misleading statements.

4. He will regard as confidential any information obtained by him as to the business affairs and technical methods or processes of a client or employer.

5. He will inform a client or employer of any business connections, interest or affiliations which might influence his judgment or impair the disinterested quality of his services.

6. He will refrain from using any improper or questionable methods of soliciting professional work and will decline to pay or to accept commissions for securing such work.

7. He will accept compensation, financial or otherwise, for a particular service, from one source only, except with the full knowledge and consent of all interested parties.

8. He will not use unfair means to win professional advancement or to injure the chances of another engineer to secure and hold employment.

9. He will co-operate in upbuilding the engineering profession by exchanging general information and experience with his fellow engineers and students of engineering, and also by contributing to work of engineering societies, schools of applied science and the technical press.

10. He will interest himself in the public welfare, in behalf of which he will be ready to apply his special knowledge, skill and training for the use and benefit of mankind.

### New York Association's Midwinter Meeting

THE executive committee of the New York Electric Railway Association has selected Thursday, Jan. 25, for the twenty-sixth midwinter meeting. This will be held in New York City at the Hotel Commodore.

Already the acceptances to invitations to address the gathering which have been received by the executive committee are sufficient to insure a valuable and interesting program, the details of which will be announced in a few days.

## American Association News

### Construction and Maintenance of Highways

A MEETING was held at the association headquarters in New York on Dec. 15 of the committee of the American Association on construction and maintenance of highways for motor vehicles. This committee was appointed last summer to collect data on this subject because of the seeming lack of authoritative information. There was not sufficient time to prepare a report for submission at the Chicago convention, but the committee sent out a questionnaire and is collecting records from various sources. The meeting on Dec. 15 was to go over the material received. Replies to the questionnaire were considered satisfactory, but those replies lacking in essential data will be followed up by correspondence and other sources of information on the subject will be followed up. Those in attendance were W. J. Harvie (chairman), Syracuse, N. Y.; C. F. Cheney, Des Moines, Iowa, and E. P. Roundey, Utica, N. Y.

### "One-Man Cars Decrease Accidents"

THE Information Bureau of the association has sent out some information in "blanket" form giving a list of some of the electric railways using one-man cars, opinions and statistics in regard to the accident record of these cars as compared with two-men cars, and some typical safety "ads," usable in a one-man car campaign.

### Connecticut Company Section Elects Officers

AT THE ANNUAL and forty-fourth monthly meeting of the Connecticut Company section, held in Waterbury on Dec. 13, the following were elected to the positions named: President, S. W. Baldwin; vice-president, E. T. Chapman; secretary, C. K. Savery; treasurer, George H. Crosson; director for three years, J. B. Potter.



# News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION  
PERSONAL MENTION

## May Offer Traffic Proposal

**Companies Hold Conferences Which May Lead to Operation of Subway—Benefit to City and Railways**

Tentative discussions which may lead to a proposition to the Rapid Transit Commission of Cincinnati, Ohio, from the Ohio Traction Company and the Cincinnati & Dayton Traction Company for the use of the rapid transit subway have been held recently between the interested persons, according to statements made by directors of the Cincinnati & Dayton Traction Company. The proposition involves bringing passengers from the Miami and Millcreek Valleys into the city by the subway.

Nothing definite has been done and nothing can be done until action is taken by the Ohio State Supreme Court regarding litigation over a bondholders' lien, in which decisions have been rendered by two lower courts in favor of the committee of bondholders of the two traction companies.

Leo J. Van Lahr, chairman of the bondholders' committee, said that the committee expects the decision of the Supreme Court to be handed down within a short time, and if the decision is favorable the committee will be in a position to make a proposition to the Rapid Transit Commission.

The Cincinnati & Dayton Traction Company would be a great feeder to the retail district of Cincinnati. Acquiring use of the subway, the traction company could bring into the city buyers from the Miami and Millcreek Valley sections up as far as Dayton who now do not patronize the Cincinnati market because of inadequate transportation facilities.

Mr. Van Lahr said that even if a transfer were necessary the traction company could do this at small cost, land its passengers at the junction of the rapid transit loop and Spring Grove Avenue and turn them over to shuttle train service to be taken into the heart of the shopping district. There would be a saving of at least ten minutes by this arrangement.

Martin Ackerman, general manager of the Cincinnati & Dayton Traction Company, said that the company is not trying to obtain the right to operate the Cincinnati subway, but merely trying to negotiate for authority to operate its cars through the underground railway from its present terminus at Spring Grove Avenue to the central section of the city.

Mr. Ackerman said that he had been in conference with the engineering department and expected to see the Rapid Transit Commissioners shortly. He said he believed that such an arrangement as is contemplated will be mutually beneficial to the railway company and the city of Cincinnati.

Recently Mr. Ackerman made inquiry at the City Hall as to whether or not the subway was to be abandoned. He was told unofficially at the time that the commission was not disposed to abandon the proposition even temporarily, but that construction would continue as long as a dollar of the \$600,000 voted by the people for the purpose remains.

Mr. Ackerman also inquired as to whether the cars of his company would be permitted to operate in the loop. He was told that to do so would defeat rapid transit. Special cars will be operated in the loop and he was informed the passengers from the connecting lines would have to transfer to the loop. The subway likely will be completed to Spring Grove Avenue within a year.

The traction company operating the loop, he was told, would have to supply the current as well as lay the rails and contract for the rolling stock.

## Utilities in Ohio Grow in 1922

The expansion of Ohio's utilities during 1922 is made the subject of an instructive article in the Dec. 16 issue of *Finance & Industry*. The writer, Benjamin E. Ling, director of the Ohio Commission on Public Utility Information, illustrates in tabular form the general business revival in Ohio. Referring to the securities authorized for issuance by the Public Utilities Commission, he shows that for refunding and reorganization purposes the electric railways were authorized by the commission to issue in securities \$25,170,192 and for additions and betterments \$8,758,650.

## Will Consider Further Deferment of Tax

Mayor George P. Carrel of Cincinnati, Ohio, has appointed A. E. Anderson, vice-president of the Procter & Gamble Company; Vice-Mayor Freene Morris and Maurice J. Freiberg, Cincinnati financier, members of a sub-committee of the Citizens' Traction Committee to consider the advisability of recommending to the City Council a further deferment of the Cincinnati Traction Company's franchise tax. The limit set by the Council last year was Jan. 1, 1923. Unless the Council again defers the payment, an increase in fares soon after the first of the year is anticipated since the receipts of the company are not sufficient to pay all operating costs and the franchise tax as well. Another committee was named to consider the status of the franchise of the traction company to ascertain if any act has been committed that would justify forfeiture proceedings. Both sub-committees were suggested in resolutions adopted by the general committee at its meeting on Dec. 14.

## Order Annulled

**Court Over-rules Decision of Commission Ordering Construction of Joint Union Passenger Terminal**

The California State Supreme Court on Dec. 19 annulled the order of the State Railroad Commission directing the steam road and interurban railway lines entering Los Angeles to join in the construction of a union passenger terminal on the old Plaza. The decision halts development under way in Los Angeles, a scheme whereby railroad passenger traffic would be concentrated for the public convenience, grade crossings eliminated and the city possess a terminal similar to those of large Eastern cities.

It was the opinion of the State Supreme Court that the Railroad Commission had exceeded its jurisdiction in ordering the project. This was the contention of railroad officials in Los Angeles when they appealed the commission's order in January, 1922. The commission issued its order on April 26, 1921.

The railroads insisted that the only governing body with authority to order the construction of a union passenger terminal depot was the Interstate Commerce Commission. The court upheld this view, ruling as follows:

We arrive at the conclusion that full power and authority over the matter of union terminal depot facilities of the railroads largely engaged in interstate commerce have been vested in the Interstate Commerce Commission and that the State commission has been divested of this power.

The railroads affected by the order were the Southern Pacific Lines, Union Pacific System, Atchison, Topeka & Santa Fé Railway and the Pacific Electric Railway, each of which now has a separate station.

The Railroad Commission's order called for plans for the new union station to be filed with that body within six months; also, the plans called for a gradual elimination of grade crossings and other features of a comprehensive scheme for transportation development meeting present, as well as future, requirements. The commission laid out five years as the period needed to complete its plan. The supervision and direction of the construction of the union station were to have been done by a committee composed of two men appointed by the city of Los Angeles and two by each of the railroads, a disinterested party to be chosen as chairman.

The railways at once announced they would fight the commission's order, and soon after petitioned the Supreme Court to order the issuance of a writ of review of the case. The court on Jan. 5, 1922, ordered the Railroad Commission to make a return of all of its



proceedings and the case since has been pending.

The campaign for a union passenger terminal in Los Angeles began in 1911, following a series of accidents which emphasized danger of grade crossings. Several associations petitioned the State Railroad Commission for relief by ordering the abolition of the grade crossings, but the commission feared that it lacked proper jurisdiction in this direction and ruled against itself. The matter was taken before the Supreme Court, which then held that the commission had full authority to cope with the situation.

The feature of the commission's order was made to include the elimination of grade crossings reaching as far inland as Pasadena and embraced upward of 150 grade crossings in and near Los Angeles. The railroads entered no objection to this feature of the order, but they did oppose an order to construct a union station.

Since the Supreme Court has now seen fit to reverse its former decision, the city of Los Angeles contemplates asking the court to grant a rehearing on the terminal case. Also, the commission will make similar appeal to the courts, and if it fails the commission will appeal at once to the Interstate Commerce Commission for an order directing the Southern Pacific, Santa Fé, Union Pacific and Pacific Electric Railway lines to join in a union terminal. The decision does not affect the commission's right to order the abolition of grade crossings. The Interstate Commerce Commission will be asked by the commission to place the case at the head of its 1923 calendar, if an appeal to that body is found necessary. The State Railroad Commission is ready to place before the Federal commission a complete record of the case, including elaborate traffic studies made by the commission's engineers.

The Supreme Court's decision did not condemn the Plaza site for the proposed union terminal, but the decision was one that simply decided the State Railroad Commission had undertaken to avail itself of the Interstate Commerce Commission authority.

### Agree on Scale of Sixty Cents

The long-threatened strike of the employees of the Gary & Southern traction line, running from Crown Point to Gary, Ind., was averted recently when the company heads and the unions reached a compromise agreement.

Several months ago when the company declared a reduction in wages, the men threatened to walk out. By an arrangement with the company officials and the Chambers of Commerce of the terminating cities the strike was averted through the three organizations agreeing to pay the scale in force until a wage agreement could be reached.

At the recent meeting of the officials of the traction line and the employees, the latter agreed to accept a wage scale of 60 cents an hour—a reduction of 6 cents an hour from the former scale.

### An Attempt Made to Throw Out Brooks-Coleman Act

Agitation has been started to secure the abrogation of the Brooks-Coleman act passed at the 1921 legislative session in Minnesota. This act put street railways under control of the State Railroad & Warehouse Commission as to rates. While it has been defended as an able law, some radical elements are opposed to it. It is said that the abrogation of the law would probably nullify all the preliminary work that has been done to establish property valuations of the railways in Duluth, Minneapolis and St. Paul.

Business men in the Midway district of St. Paul, from which formerly there was a one-fare rate to the centers of either city, subject to transfer also, seek an amendment at the legislative session which opens in January to unify the trolley systems of the Twin Cities. Minneapolis aldermen will oppose this change on the theory that the St. Paul system is kept up financially by the Minneapolis receipts. They believe the St. Paul City Railway should take care of itself. The St. Paul Association of Public and Business Affairs will ask a conference with Minneapolis business men on the subject.

Meanwhile the valuation proceedings hinge upon the final outcome of the suit by Minneapolis to get additional facts from the Twin City lines.

### Wages Advanced in Louisville

The Louisville (Ky.) Railway has added \$60,000 to its yearly wage outlay by announcing increases for 900 employees effective on Jan. 1. The new scale will be 34 cents for the first three months, 37 cents for the next nine months; after one year 40 cents and after two years 45 cents. The present rates are 33 cents for the first year, 35 cents for the second year, 37 cents the third, 39 cents the fourth, 41 cents the fifth and 43 cents after five years. The average pay of men for the new year will be \$130 a month. Operators of safety cars will have a scale 3 cents higher than others. The announcement of the wage advance came from President Barnes in time to help make Christmas a "merry" one. Mr. Barnes said that the general committee of the Co-operative Welfare Association, representing employees, requested the increase in order to put wages on a basis with other crafts.

E. F. Kelley, secretary to President Barnes, in discussing the wage increase announced for the carmen, called attention to an editorial on the subject in the Louisville *Courier-Journal*. This editorial shows a real human understanding of things and the different feeling of the press today as regards the company and what it does. It read in part as follows:

The New Year increase of wages is announced by the Louisville Railway early enough to make the carmen's Christmas brighter than it would have been in other circumstances.

The public has an interest in the welfare of employees of a street railway system.

Men sufficiently paid are in better humor than men poorly paid, and fit for better service than is rendered by employees who feel that they have ground for complaint.

Sensible persons—and sensible persons are a majority—want to see the street railways that pass their doors do well enough to warrant their improvement and extension from time to time as the demands upon them increase, and they want to see the men on the cars, and the men employed elsewhere by the company, well provided and content.

The advance of wages announced is not so large that every employee will feel that he is getting everything he deserves, but in no business would it be possible to draft the plan of an increase of pay that would meet every requirement of every employee.

When the carmen received 16 cents an hour, or less, the fare was 5 cents. The single fare now is 7 cents, but checks are purchasable at 6 cents. The motorman whose pay is about three times what a motorman received in 1905 and more than twice what he received in 1912 cannot feel that he is left out of consideration by a soulless corporation which has procured an increase of fares.

That this is true is pleasing to Louisvillians who make use of street cars, and who realize that greater efficiency, and more courtesy, may be expected of the carman who feels that he is making progress.

### Employees Armed in Buffalo—Emergency for Bus Operation May Be Announced

Loyal employees of the International Railway who are now operating cars in Buffalo have been armed with revolvers because of the frequent attacks which are being made upon the cars and their crews by striking employees and their sympathizers. County Judge Thomas H. Noonan has issued permits to carry firearms to a large number of platform employees of the International.

In defending his own action, Judge Noonan said he believes the men are entitled to protection by firearms. He said that permits in each and every case are granted only when an official of the traction company vouches for the applicant.

Mayor Frank X. Schwab of Buffalo has threatened to declare the existence of an emergency authorizing the operation of buses in Buffalo on Jan. 1. Such a step was taken by the Mayor at the outset of the strike of the trainmen in the employ of the International Railway, July 1, when numbered permits were issued to bus drivers by officials of the city at the City Hall.

Notice has been served upon the International Railway that such a step will be taken unless street car service shows a material improvement before Jan. 1, 1923.

Five striking platform employees of the International are under arrest in Niagara Falls charged with interfering with the operation of railway lines by attacking local cars and their crews in Niagara Falls.

Apparently every effort is being made by the municipal authorities to harass the International Railway in its fight against union domination. It is announced by Mitten Management, Inc., which operates the local and interurban lines of the International, that the company now employs more platform men and shop workers than before the strike and that the strike for union recognition is now regarded as a dead issue by it.



### Pass Abandonment Recommended in Youngstown

The street railway committee of City Council has recommended to Council and to the Youngstown Municipal Railway a rearrangement of rates of fare which would involve the discontinuance of the weekly pass, which has been used on the city lines since October, 1921.

The proposed rate of fare which has been referred to the company for consideration is 10 cents cash, eight tickets for 50 cents and free transfers.

The present rate of fare is 9 cents cash, six tickets for 50 cents, 1-cent charge for a transfer and the unlimited ride weekly pass, which sells for \$1.25.

The company has not yet replied to the committee in regard to the proposal.

### Improvements Depend Upon Outcome of Franchise

A. W. Harris and M. H. McLean of the Harris Trust & Savings Bank, Chicago, owners of the Des Moines (Ia.) City Railway, were in Des Moines recently inspecting the plant and in a public interview Mr. Harris announced that future extensions and improvements of the Des Moines plant were dependent very largely upon the outcome of the franchise suit which at that time was before the Iowa Supreme Court for consideration but has since been decided in favor of the company.

If the franchise is held valid by the high court Mr. Harris declared that the company would make extensive improvements. He directed attention to improvements now under way and which have been completed during the past few months. A number of lines have undergone extensive replacements, and service at the present time is the best that the city has ever known.

Public feeling toward the company has changed greatly in the last fourteen months. Now aside from the little "band of irreconcilables" in the praise of the service of the Des Moines City Railway and of its treatment of patrons.

### General Manufacturing Department of G. E. Reorganized

In several announcements issued on Dec. 29 by Vice-President G. E. Emmons a reorganization of the general manufacturing department of the General Electric Company is proclaimed. This reorganization, which is effective on Jan. 1, 1923, includes the appointment of H. F. T. Erben, heretofore manager of the Schenectady Works, as vice chairman of the manufacturing committee and ranking a member of the general manufacturing staff.

The vacancy thus created in the position of manager of the Schenectady plant is to be filled by the advancement of Charles E. Eveleth, who has been serving since Sept. 1 as assistant works manager under Mr. Erben. Mr. Eveleth will become works manager.

J. A. Smith will continue as general superintendent and in the absence of Mr. Eveleth will be in charge of the works.

The membership of the manufacturing committee and the appointment of a sub-committee, to be known as a committee on appropriations, is also announced. The general manufacturing department, of which Vice-President Emmons is in charge, will be as follows: H. F. T. Erben, vice-chairman of manufacturing committee and ranking member of the staff; J. T. Broderick, secretary of the manufacturing committee; L. G. Banker, general purchasing agent; M. C. Fitzgerald, manager of transportation department; W. C. Fish, manufacturing engineer; W. B. Curtiss, supervisor of production; G. S. Maxwell, supervisor of costs; E. Z. Steezer, supervisor of industrial relations.

### Interurban Line Favors Substitution of Buses Under Present Conditions

If bus transportation can be provided at lower cost with equal advantages of traction car service, the Indiana, Columbus & Eastern Traction line will abandon its electric traction service and enter the motor bus field. This was the gist of a statement issued on Dec. 27 from the local headquarters of the company in Springfield, Ohio.

The traction company is one of the largest in the state and is a pioneer in electric railway development in Ohio. It was a part of the Ohio Electric Railway system until the latter was dissolved some months ago by order of the federal court. The company has established a bureau of motor transport which is now engaged in compiling statistical data on the operation of bus lines. This bureau is in charge of O. E. Minnick, assistant engineer.

In making public the company's statement of Dec. 27 Arthur V. Bland, head of the Department of Public Relations of the traction line, pointed out that bus lines fixed their own rates, that their roadbed was furnished without cost to them and that for this reason their expenses were lower than those of the railway. If this situation was to be continued, he added, the traction company desired to take advantage of it, "as it makes no difference to us whether we transport on rubber or steel."

### \$1,250,000 in Improvements

President B. J. Denman of the Tri-City Railway & Light Company has announced that improvements amounting to \$1,250,000 would be made at the central station in Davenport, Iowa, operated by the People's Power Company and furnishing electrical energy for the tri-cities, Muscatine and scores of small towns and farms in that vicinity.

The installation of a triple generator

and a 35,000-hp. steam turbine will constitute the major part of the improvement. The work will take eighteen months to complete. New boilers and auxiliary equipment, an addition to the present central station and other improvements will constitute part of the development.

This new equipment will increase the capacity of the plant approximately 40 per cent, Mr. Denman estimates. Plans for the installation are now being prepared by G. T. Shoemaker, engineer of the United Light & Railway Company.

The construction department of the United Light & Railways Company will have charge of the installation of the turbine and auxiliary equipment.

So rapidly has the demand for electrical power grown in the industries of the tri-cities during the past few years that the present plant will reach its capacity soon. In order to provide for the demands of the future the company has decided to increase its installation.

## News Notes

**Subway Plan Disapproved.**—The Board of Estimate of New York City has rejected the plans of the Transit Commission for a \$69,000,000 subway in Manhattan, which was to have been known as the Eighth Avenue-Amsterdam Avenue line. It was to extend from Chambers Street uptown to Overbrook Terrace and Fort Washington Avenue.

**Notice Given of Indeterminate Permit.**—The Winona Interurban Railway, Warsaw, Ind., has filed notice with the Indiana Public Service Commission of its intention to surrender local franchises and permits and operate under an indeterminate permit under the jurisdiction of the commission. The company holds franchises in four counties and six cities of Indiana.

**Will Do Business in Texas.**—Southwestern Gas & Electric Company, incorporated under the laws of Delaware, with home office in Texarkana, Ark., and headquarters at Texarkana, Tex., has been granted a permit to do business in Texas. The company is capitalized at \$5,500,000 and W. L. Wood, Jr., Texarkana, Texas, is state agent. This company owns and operates the local railway lines in Texarkana.

**Loop Plan Favored.**—The City Plan Commission has made a report to the Camden, N. J., Common Council, favoring a loop plan of trolley service to be provided by the Public Service Railway in Camden and the Philadelphia Rapid Transit Company for the new Delaware River bridge. Cars from Philadelphia will cover the principal streets of Camden from the bridge plaza. The plans also touch transfer points.



## Financial and Corporate

### Arguments Rendered on Disclosing Disposition of Funds

The Minnesota State Supreme Court has under advisement the case of the appeal by the Twin City Rapid Transit Company from an order of the Hennepin County District Court for the company to disclose disposition of \$227,000 deposited in Eastern banks. The city had obtained a writ of mandamus for the disclosure.

In arguments before the high court attorneys for the company and the city differed widely as to the scope of the new Brooks-Coleman act under which determination of street car rates is placed in the jurisdiction of the State Railroad & Warehouse Commission, based on valuations. Judge David Simpson, of counsel for the company, says the law does not give the city officials power to compel corporations to disclose business transactions not germane to valuation hearings. City Attorney Neil M. Cronin argued if the company can refuse to submit to particular transactions it can refuse to explain any expenditure, having designated that it is immaterial, and he held without this information the accurate cost of operation cannot be reached.

The city had also required a list of stockholders of the Twin City Lines, which also was refused. Judge Simpson said that it was not within the province of the city attorney to examine personal records of the company which have no material and relative effect on rate valuation proceedings, and that the matter of names and addresses of stockholders is not relative to the subject. The city attorney read extracts tending to show that a commission or Council can order submission of all records, books and accounts of the company.

### Line Purchased

The Maumee Valley Railway of Perrysburg, Ohio, has been purchased by Lawrence G. Van Ness and B. A. Webster, general manager and auditor respectively of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad. Messrs. Van Ness and Webster purchased the traction line from the bondholders who recently acquired it at receivership sale. Perrysburg is a small municipality located on the outskirts of Toledo. The Maumee Valley Railway covers an area of 24 square miles. The traction company operates on 12 miles of its own tracks and 12 miles on the roadway of the Community Traction Company of Toledo.

Mr. Van Ness said that several northern Ohioans also are interested in the proposition with him and Mr. Webster. The new owners will begin at once to rehabilitate the line. Seven one-man

type cars already have been ordered from the Cincinnati Car Company. They will replace a like number of old-style heavy-truck cars.

Mr. Webster will be in charge of the traction line under the direction of Mr. Van Ness, who has been elected president of the company. S. E. Howard, for many years connected with the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, will succeed Mr. Webster as auditor of that railway.

### Income of \$4,261 for Chicago Elevated

The collateral trust report of the Chicago Elevated Railways for the year ended Dec. 31, 1921, shows a deficit after deductions of \$1,149,215. The gross income amounted to \$199,007.

The combined income account of the Metropolitan West Side Elevated Railway, Northwestern Elevated Railroad, South Side Elevated Railroad and Chicago & Oak Park Elevated Railroad for the year ended June 30, 1922, is as follows:

Gross operating revenue.....	\$17,629,020
Operating expenses:	
Maintenance of way and structures...	\$2,128,879
Maintenance of car equipment.....	1,625,728
Power.....	1,669,920
Conducting transportation.....	7,173,322
Traffic.....	21,811
General and miscellaneous.....	926,353
Total operating expenses.....	13,546,015
Net operating revenue.....	\$4,083,005
Taxes, city comp. and other items.....	1,316,707
Operating income.....	\$2,766,298
Non-operating income.....	147,321
Gross income.....	\$2,913,619
Deductions:	
Rentals.....	\$412,949
Interest.....	2,475,591
Miscel. debits.....	20,816
Total interest and rentals.....	2,909,358
Net income.....	\$4,261

The net income of \$4,261 is considerably smaller than it was for the year ended June 30, 1921, when \$102,016 was realized, and for the year ended June, 1920, when there was a surplus of \$97,817.

### Former Order Set Aside

Judge Killits in the Federal Court at Toledo has set aside a former order entered Oct. 18, 1921, under which the Indiana, Columbus & Eastern Traction Company was authorized to abandon its line between Lima and Defiance.

The city of Lima recently asked to be made a party to the suit and pleaded that the order would relieve the company of obligations it assumed when it was granted a franchise some years ago and which has several years yet to run.

The order had been concurred in by

the Ohio Public Utilities Commission. Service was to have been discontinued on Dec. 31, 1922.

### November Shows Deficit in Toledo

Notwithstanding that the average number of passengers carried daily increased during the month of November the Community Traction Company, Toledo, Ohio, showed a deficit from operations amounting to \$2,602, being the first time a draft has been made upon the stabilizing fund since August, 1921.

Commissioner Wilfred E. Cann told the members of the board of control at their meeting on Dec. 15 that it would be his policy to build up the lines and service rather than attempt to arrive at any lower fares. His efforts to cut fares through the adoption of one-man car operations and other economies were flatly nullified by the City Council, which controls service.

Lee Camp, business agent of the street railway men, in letters to other cities has taken full credit to his organization for introducing in the Council the legislation which knocked out the one-man cars.

In line with the new policy, Mr. Cann has permitted the company to increase allowances for depreciation and to build up the maintenance and repair fund in an effort to decrease failures from mechanical and track defects. The larger depreciation fund next summer will permit considerable work to be done in rehabilitating the property, securing extensions, and rerouting lines.

The net result in November was largely influenced by heavy drafts made for accidents, extra maintenance and the winter fuel bill. In anticipation of winter weather track maintenance expenditures were increased 0.65 cent per car-mile. There was an increase of 0.628 cent per car-mile in the cost of transportation, which is due to heavy payments made for coal for heating the cars. Increased expenditures for injuries and damages of 0.469 cent per car-mile reflect the clearing of many old claims and an abnormal increase in the claims from automobile collisions.

Of all claims paid 41.4 per cent of the money went for automobile accidents, for which the commissioner thinks a new traffic ordinance will provide some remedy.

The sinking fund now totals \$391,299. Mr. Cann plans to have a maintenance fund of \$640,000 for the coming year to keep the tracks and cars in excellent operating condition.

Operations for the first half of December have shown the best patronage since the cost-of-service plan was put into effect nearly two years ago. One week day in that period showed more than 200,000 revenue passengers compared with the average of 165,000 throughout the month of November. December is running about \$25,000 in gross revenue ahead of November based upon present returns.



### Expresses Hope for Future of Property

At the recent annual meeting of the Duluth-Superior Traction Company, Duluth, Minn., President Robertson expressed the hope that the affairs of the company had passed the critical stage and that when the investigation now under way had ended the company would be permitted to earn a reasonable return and render the kind of service the people were entitled to.

It was brought out that the increased fare in the city of Duluth had improved the company's revenue since Aug. 1. Cumulative preferred stock dividends at the rate of 4 per cent per annum for the quarters ending June 30 and Sept. 30, 1921, were paid Oct. 2, 1922, and at a meeting of the directors held on Nov. 20 preferred stock dividends of 1 per cent for each of the quarters ending Dec. 31, 1921; March 31, 1922, and June 30, 1922, were declared payable Jan. 2, 1923, to stockholders of record Dec. 15, 1922.

### Surplus of \$1,355,303 in Eleven Months

During the first eleven months of 1922 the Virginia Railway & Power Company, operating in Richmond, Petersburg, Portsmouth and Norfolk, lost in gross earnings 7.75 per cent in comparison with the same period in 1921. During the same period the company cut operating expenses 19.06 per cent under the figures of 1921 for the first eleven months, and recorded increases in net earnings, and surplus of 18.71 and 64.14 per cent, respectively.

During the above-mentioned period the gross earnings of the system were \$8,576,642 compared with \$9,296,909. Operating expenses were \$5,271,814 for this period in 1922, and \$6,512,916 in 1921.

Net earnings from operation are listed at \$3,304,832 compared with \$2,783,993, an increase of \$520,839 during this period. The company's other income, derived from rents, etc., is listed at \$123,811. Taxes were \$2,073,340, a slight decrease. The surplus listed by the company in its eleven months statement is \$1,355,303 com-

pared with \$825,674 for eleven months last year, an increase of \$529,629.

These figures are for the entire system. The company operates besides its electric railroads in these four cities the lighting plants in Richmond and Petersburg.

### New England Investment Declares Dividend

The New England Investment & Security Company, Springfield, Mass., has announced a dividend of \$2 a share payable on Jan. 2, 1923, to holders of the preferred shares of record on Dec. 20, 1922. Other properties of the New England Investment & Security Company declaring dividends include the Springfield Railway Companies, the Springfield Street Railway Company and the Worcester Consolidated Street Railway. The Springfield Railway Companies have declared a dividend of \$2 per share payable on Jan. 2, 1923, to preferred shareholders of record on Dec. 20, 1922. A 3 per cent dividend on the capital stock of the Springfield Street Railway is payable on Jan. 2 to stockholders of record on Dec. 20, 1922. A \$2.50 dividend per share on the first preferred stock of the Worcester Consolidated Street Railway is declared payable on Dec. 30 to stockholders of record on Dec. 20, 1922.

### November Net Income Decreases

The Department of Street Railways, Detroit, Mich., for the thirty days ended November, 1922, realized a total operating revenue of \$1,593,120. Of this amount \$1,499,984 was revenue from transportation. The total revenue is less than it was for the thirty-one days in October, when it amounted to \$1,614,010. Total operating expenses decreased from \$1,127,370 for the October period to \$1,107,092 in November. There was a decrease in the net income of \$5,291 under the October figure. Traffic showed a considerable falling off in the month of November. During October there were 37,752,445 passengers carried against 37,103,301 passengers in November, 1922. November, 1922, car-miles operated totaled 3,799,880, against 3,890,517 in October, 1922.

### \$64,857 in Excess Over Operation Cost

A decrease of \$24,267 is noted in the total receipts of the Boston (Mass.) Elevated Railway for the five months ended Nov. 30, 1922, compared with the five months period of 1921. The figures are \$13,158,502 and \$13,182,769 respectively. However, the total cost of service for the 1922 period was \$162,738 less than it was for the five months period of 1921. This produced an excess of receipts over cost of service for the 1922 period of \$64,857. For the same period in 1921 the result was an excess of cost of service over receipts amounting to \$73,613. There was an increase in the total number of revenue passengers, 135,918,976 being transported during the five months ended Nov. 30, 1921, and 145,166,757 for the same period this year.

### Automobile Equipment of Public Service to Be Taken Over by Production Company

The Public Service Production Company on Jan. 1, 1923, will take over the maintenance of the automobile equipment of the Public Service Corporation of New Jersey and its subsidiaries and this will include the construction of automobile bodies.

The Public Service Production Company was incorporated in the interests of the Public Service Corporation of New Jersey in February, 1922. It was explained at that time that the purpose of the Public Service Corporation was to broaden its field of usefulness and that the new company would be an engineering organization. It is separate from the so-called operating companies, the Public Service Electric Company, the Public Service Railway and the Public Service Gas Company, which confine their work to operation.

The charter of the production company is extremely broad with respect to the activities in which the company may engage. It has its office at the Public Service Terminal, 80 Park Place, Newark, N. J. N. A. Carle is vice-president and general manager and E. B. Meyer is chief engineer of the company.

	Latest	Month Ago	Year Ago	Peak	1913
Street Railway Fares*	Dec. 1922 6.96	Nov. 1922 6.98	Dec. 1921 7.20	May 1921 7.24	4.84
Street Railway Materials*	Nov. 1922 174	Oct. 1922 177	Nov. 1921 158	Sept. 1920 247	100
Street Railway Wages*	Dec. 1922 208	Nov. 1922 208	Dec. 1921 214	Sept. 1920 232	100
Steel Unfilled orders (Million tons)	Nov. 30 1922 6.84	Oct. 31 1922 6.90	Nov. 30 1921 4.25	Apr. 30 1917 12.18	5.91
U.S. Bank Clearings Outside N. Y. City (Billions)	Nov. 1922 13.56	Oct. 1922 14.69	Nov. 1921 11.77	March 1920 18.54	Av. Mo. 1913 6.12
Business Failures Number	Nov. 1922 1.758	Oct. 1922 1.600	Nov. 1921 1.979	Jan. 1922 2.722	Av. Mo. 1913 1.213
Liabilities (millions)	Nov. 1922 54.08	Oct. 1922 36.94	Nov. 1921 72.78	Jan. 1922 105.7	Av. Mo. 1913 24.64

**Conspectus of Indexes for Dec., 1922**  
Compiled for Publication in this Paper by  
**Albert S. Richey**  
Electric Railway Engineer  
Worcester, Mass.

	Latest	Month Ago	Year Ago	Peak	1913
Eng. News-Record Construction costs	Dec. 1922 192.6	Nov. 1922 188.6	Dec. 1921 167.8	June 1920 273.8	100
U.S. Bur. Lab. Stat. Wholesale Commodities	Nov. 1922 156	Oct. 1922 154	Nov. 1921 141	May 1920 247	100
Bradstreet's Wholesale Commodities	Dec. 1 1922 13.78	Nov. 1 1922 13.35	Dec. 1 1921 11.31	Feb. 1 1920 20.87	9.21
Dun's Wholesale Commodities	Dec. 1 1922 185.5	Nov. 1 1922 182.3	Dec. 1 1921 164.5	May 1 1920 263.3	120.9
U.S. Bur. Lab. Stat. Retail food	Nov. 1922 145	Oct. 1922 143	Nov. 1921 152	June 1920 219	100
Nat. Ind. Conf. Bd. Cost of living	Nov. 1922 158.4	Oct. 1922 157.1	Nov. 1921 163.0	July 1920 204.5	(1914) 100

\*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 motor-men and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.



## Seeks to Purchase Electric Properties

The Cumberland County Power & Light Company, Portland, Me., has filed a petition with the Public Utilities Commission seeking permission to buy the properties of the York County Power Company and the Westbrook Electric Company.

For the past ten years both companies have been operated by the Cumberland County Power & Light Company, which owns the common stock of both. With but slight changes in the boards of directors the officers of all three companies are the same, and the territory controlled by them represents a continuous lighting and power system all operated under the direction of the Cumberland County Power & Light Company.

The three companies have an aggregate capitalization of \$10,700,000, and this will be in no way affected by the sale.

Coincidentally with the filing of the petition by the Cumberland County Power & Light Company, a petition was filed by each company to sell to the Cumberland County Power & Light Company.

The capital stock of the Cumberland County Power & Light Company is given in its petition as \$10,000,000 with a bonded indebtedness of \$4,218,000, and net earnings for the past year of \$621,367.

## Securities Sold at Auction

Electric railway securities sold by Adrian H. Muller & Company on Dec. 6 at the Public Auction Room, 14 Vesey Street, New York, were as follows:

Fifty shares Louisville & Southern Indiana Traction Company, \$25 lot.

One hundred and twenty-five shares Indianapolis & Louisville Traction Company, \$50 lot.

Three shares Milford & Uxbridge Street Railway Company common, \$2 per share.

\$55,000 Boise & Interurban Railway first mortgage 5 per cent gold bonds, due April 4, 1946, 45 per cent and interest.

\$11,000 Ohio River Electric Railway & Power Company first 5 per cent, July, 1924, January, 1919, coupons on, 10 per cent.

\$17,000 New York & North Shore Traction Company first mortgage 40-year 5 per cent bonds, certificate of deposit, \$40 lot.

Three hundred and ninety shares New York & North Shore Traction Company, \$4 lot.

## New Companies to Seek Shore Line Rights

Three petitions for consideration of the General Assembly were received on Dec. 14 at the office of the Secretary of State to do with the efforts of trolley interests to acquire the right to again operate the defunct Shore Line Electric Railway from New London, Conn., to New Haven, Conn.

The East Lyme Traction Company, East Lyme, and the Eastern Connecticut Railway, Norwich, seek authority to buy sections of the present lines of the company. The East Lyme Traction Company wants to secure control of the Shore Line road from its junction with the tracks of the Connecticut Company, at Montauk Avenue and Bank Street,

in New London, through the towns of New London and Waterford to Keeney's corner.

The Eastern Connecticut Railway seeks permission to change its name to the Norwich & Hallville Railway and to purchase that section of the Shore Line road from Norwich to Preston, Conn. In another petition, Robert W. Perkins, Charles B. Whittlesey and Edward M. Day, who are the petitioners representing the two mentioned companies, also seek a charter and franchise to operate the Shore Line road from New Haven to Old Saybrook, Conn.

## Cash Dividends to Be Paid

A dividend of 6 per cent on the outstanding preferred stock of the Virginia Railway & Power Company, Richmond, Va., was recently declared by the directors, 3 per cent of which is payable on Jan. 20 and 3 per cent on July 20, both to stock of record on Dec. 31. The company declared dividends payable in preferred stock in January of this year and last year. This is the first cash dividend paid on these shares since the middle of 1919. No dividends have been paid on the common stock since 1918.

# Financial News Notes

**Net Income Increases.**—The report of Beaver Valley Traction Company, New Brighton, Pa., shows gross of \$525,867 for ten months ended Oct. 31, 1922, a decrease of \$31,359. The net after taxes was \$132,565, which is an increase of \$74,646.

**Valuation Reduced.**—There has been a reduction of more than \$1,000,000 in the valuation of the St. Joseph (Mo.) Railway, Light, Heat & Power Company by the state board of equalization. An announcement to this effect was recently made at St. Joseph.

**Preferred Stock for Sale.**—A syndicate headed by Stone & Webster is offering \$3,800,000 of 7 per cent preferred stock of the Central Indiana Power Company. The price is 90 and accrued dividends to yield about 7.78 per cent. The proceeds will be used for extensions and improvements.

**Wants to Sell Stock.**—The recently incorporated Alabama Traction Company, which is now operating the old North Alabama company's lines in Albany and Decatur, has applied to the Public Service Commission for permission to sell stock. The sale of the Alabama Traction Company was referred to in the *Electric Railway Journal*, issue of Dec. 2.

**Authorizes Purchase.**—The Missouri Public Service Commission at Jefferson City, Mo., has granted permission to the St. Joseph Electric Railway, Light, Heat & Power Company to pur-

chase all of the property of the Savannah (Mo.) Electric Light & Power Company. It includes all the distributing system and lines of the Savannah company. The price was reported as \$40,000.

**Balance of Bonds Offered.**—The \$250,000 balance of an authorized issue of \$1,500,000 of 7 per cent general mortgage bonds of Nova Scotia Tramways & Power Company, due in thirty years, is now being offered by J. C. Mackintosh & Company of Halifax. They are for sale at par to yield 7 per cent. The major portion of the issue was offered last spring. The bonds constitute a specific charge on all the assets of the company subject to the first mortgage issue of \$2,250,000 now outstanding and due in 1946. Management of the company is in the hands of Stone & Webster, of Boston.

**Will Pay Dividend.**—For the first time since 1917, the New York State Railways, operating lines in Rochester, Syracuse, Utica, Rome and interurban lines, will pay a dividend on Jan. 2 of 1½ per cent on the common stock, 10 per cent on account of accumulated dividends on the preferred stock and 1½ per cent on preferred stock to holders of record on Dec. 22. The New York State Railway has \$19,952,000 in common stock outstanding, of which \$13,604,300 is owned by the New York Central Railroad. The outstanding 5 per cent cumulative preferred stock amounts to \$3,862,500. The dividend will mean a distribution of \$733,817.

**November Receipts Show Increase.**—Receipts of the Cincinnati (Ohio) Traction Company for the month of November show an increase of \$24,646 over the same month last year. The November receipts this year were \$671,813. Last year in November the fare dropped from 8 to 7½ cents and this monthly report offered the first opportunity for comparison between 1922 and 1921. The showing of the traction company during November is regarded as particularly good in view of the fact that motor buses, which have developed their business during the past six or seven months, have cut the traction company receipts by about \$500 a day, according to William J. Kuertz, Director of Street Railways.

**Eleven Months Net Equals \$1,850,259.**—The net income of the Philadelphia (Pa.) Rapid Transit Company for the eleven months ended Nov. 30, 1922, was \$1,850,259, against \$1,447,394 for the same period in 1921. There was an increase in the number of passengers carried and in the passenger revenue. From January-November, 1922, 772,975,336 passengers were carried, compared with 763,216,214 for the same period in 1921. The passenger revenue increased from \$37,786,322 for the eleven months ended November, 1921, to \$37,937,833 for the eleven months ended November, 1922. Capital betterments and extensions for 1922 will approximate \$2,000,000. As in former years, it is said that they will be financed largely from the renewal reserve.



# Traffic and Transportation

## Ordinance Passed

### City Council of Seattle Approves Five-Cent Fare Bill—Increased Patronage Essential for Permanency

Five-cent carfare on the Seattle (Wash.) Municipal Railway lines, with a charge of 1½ cents for transfers, effective March 1, has been assured by the passage of a fare reduction ordinance by unanimous vote of the City Council and signature of Mayor E. J. Brown. The ordinance represents the views of Mayor Brown in every particular, who urged that the reduction be postponed until March 1 of next year. The measure as passed did not meet with the approval of all members of the City Council, several of whom favored free transfers, but the vote was unanimous nevertheless. Street car fare reduction in Seattle has been a public issue for more than a year, and the bill just passed is an amended form of a measure introduced last June in the Council.

The new fare provides the following: Fare for single continuous ride, without transfer privilege, 5 cents; for single continuous ride with transfer privilege, 7 cents cash, or 5 cents cash and one 1½-cent token; children going to or from school, cash fare, 3 cents; for two children, 5 cents; children under 15 years of age, going to or from Sunday school, same rates as for week day school; children under 5 years of age, accompanied by parent or guardian, free; passengers whose ride originates on following "feeder lines" will be furnished a transfer to or from a connecting main line on the payment of 5 cents cash: North Fortieth Street, Youngstown shuttle, Madison and James Street cables, and Ray Street line; transfer to the Seattle & Rainier Valley line will be issued only on payment of 10-cent cash fare; rate of fare upon that portion of the Highland Park and Lake Burien Railway line operated by the city outside the city limits will be 10 cents, in addition to the fare charged on said line within the city limits; metal tokens will sell at the rate of four for 5 cents, each token being good for transfer to intercity lines in connection with a 5-cent cash fare; the 8½-cent tokens now in use will be redeemed in cash or accepted for fare with transfer privileges.

When the new low fare goes into effect, city officials state that increased patronage will be absolutely essential if the system is to be operated permanently under such a fare. George F. Russell, superintendent of public utilities, has officially reported to Mayor Brown that there must be an increase of 46 per cent in car riding to make the railway pay with a 5-cent fare. Figures compiled by Supt. Russell show that during the first ten months of the present year the average number of pay passengers carried monthly was

7,995,902. In order to make the system meet all rates, the average monthly pay rides must be increased to 11,746,465, the accountants report. The average monthly receipts for the first ten months of 1922, according to Supt. Russell, was \$516,002. Figured on the basis of the present number of daily car rides, the new rates will provide \$328,626 a month. Operating expenses, including the depreciation charge together with the monthly apportionment of bond interest and principal, averaged \$528,103 a month for the first ten months of the year.

## Weekly Pass to Supplement Zone Fares

### San Diego Electric Railway Announces Welcome New Year's Gift to the Public

Following a survey made by Walter Jackson, the San Diego (Calif.) Electric Railway has decided to usher in the new year with the unlimited-ride, transferable weekly pass in five varieties.

The principal pass, sold at \$1, will be good in both the inner and outer fare zones of San Diego. The basic fare in San Diego is 5 cents, while the two-zone rider has the privilege of buying a monthly, bearer type commutation book averaging a 6½-cent fare; a 7½-cent token, bought four for 30 cents, or 10 cents straight cash. The weekly pass is simply an additional, optional rate. It is expected to prove exceptionally popular with two-zone riders, as they are then likely to enjoy less than a 5-cent fare for wholesale use and also be freed of all change, token, receipt and transfer transactions.

Three other passes will be sold at \$1.25 a week for the suburban routes to Coronado, Ocean Beach and National City. The Coronado pass covers a combination of San Diego car-ferry-Coronado car. Its use will relieve Coronado riders from the present practice of tendering three fare tickets in each direction. The fifth pass, to sell for \$2, is for the more remote community of Chula Vista, in the heart of the lemon country. All these suburban passes are supplemental to existing cash, round-trip and commutation rates.

Mr. Jackson is now in San Diego to work up the necessary publicity in co-operation with Claus Spreckels, general manager, and E. J. Burns, assistant general manager of the San Diego Electric Railway. The installation of the passes was purposely delayed to Jan. 1, 1923, so that the publicity with press, business interests, theaters, platform men and general public could be carried out more effectively after the Christmas rush was over. It is an interesting coincidence that the San Diego zone system also went into effect on New Year's, namely, Jan. 1, 1920.

## Conferences Next Step in Traffic Problem

Conferences between members of the special traffic committee that evolved the one-way traffic plan now under consideration and engineers and officials of the Portland Railway, Light & Power Company, Portland, Ore., will be the next step in the movement to solve the traffic problem in the congested district of Portland. This course was determined after I. F. Fuller, vice-president of the traction company, had pledged co-operation on the part of his company to the city in meeting the traffic problem. Mr. Fuller made it plain, however, that his company was not inclined to expend between \$200,000 and \$250,000 in rerouting of street cars, if relief could be gained without this outlay. He also informed the Council that one-way traffic for street cars was not practicable on north and south streets, but could be worked out on east and west streets.

Mr. Fuller, in a recent hearing on the subject, explained that his company carried about 250,000 passengers each day. He also called attention to the fact that the company was running about the same number of cars that were operated in 1913, and for that reason the street cars had not contributed materially to the traffic problem that now demands solution. He stated that one-half of the 60-ft. streets and one-third of the 80-ft. streets are lost to use of traffic because of the parking of automobiles on both sides of such streets.

Mr. Fuller stated that on east and west streets it would be mainly a question of how best to bring about one-way traffic. He recommended that establishment of non-parking zones during the rush hours, provision for loading zones and one-way traffic on all streets that are not double-tracked for street cars would solve the traffic congestion and at the same time mean no outlay of large sums of money. He expressed the company's entire willingness to co-operate with the city officials in the working out of a practical and economical plan for solving the congestion problem.

## Hark to the Commandments of the Boston Elevated

The Boston Elevated Railway has recently published a safety bulletin for its employees. It contains various suggestions, and among others the following "ten commandments for railroad men."

Carelessness often means death. Don't be careless.  
 Look both ways.  
 Don't just leave it to the other fellow.  
 Know your brakes.  
 Keep your mind on your work.  
 Always be in position, for "death" attacks from all directions and angles.  
 Keep your ear under control at all times.  
 Don't take chances. Always know.  
 Never race with death; you can't beat him.  
 Keep safety first in your mind at all times, and when in doubt say it to yourself.

The bulletin concludes with the slogan adopted for safety work by the company: "Any accident may be fatal."



### Complains of High Charges

Upon petition filed by Hugo Kelley, secretary to Mayor E. J. Brown of Seattle, Wash., and forty-six others, the Department of Public Works at Olympia will immediately file a complaint challenging the reasonableness of the rates and tariffs of the Seattle & Rainier Valley Railway. The petition states that in view of the reduction in fares proposed on the Seattle Municipal Railway the fares of the Rainier Valley line will be exorbitant unless also reduced. The petition sets forth that the purchase price of the city lines is being paid out of fares, while the Rainier line, which runs from the center of the city to Renton, a suburb, has no such charge on its revenue. Hearing on the complaint will be held as soon as the department's engineering and accounting forces can prepare data and secure facts.

### Bus Operation Decreases Railway Traffic

Decrease in traffic of the Columbus, Newark & Zanesville and the Indiana, Columbus & Eastern traction lines in 1922 over that of 1921 is ascribed to bus competition in a report filed Dec. 23 in the office of F. A. Healy, secretary-treasurer of the lines in Springfield, Ohio. The report showed a decrease of approximately 8.2 per cent for the Indiana, Columbus & Eastern and about 11.9 per cent for the Columbus, Newark & Zanesville lines.

Mr. Healy said that four bus lines, all of them operating since May 1, parallel the Columbus, Newark & Zanesville line, and it was to this fact that the company attributed the heavier decrease in traffic on that road. He estimated that by the first of the year the two roads would have lost \$250,000, the greater portion because of bus competition, although automobile traffic in the summer season is another factor that serves to cut down revenue.

### Buses to Accommodate West Springfield Residents

Owing to a protracted delay on the part of the Springfield, Mass., City Council in legislating in relation to a street car route leading to the new Hampden County Memorial Bridge, Clark V. Wood, president of the Springfield Street Railway, has consented to put on buses to run across the bridge for the accommodation of West Springfield residents. Negotiations between Mr. Wood and the respective municipal authorities on either side of the river are expected to be taken up within a few days in respect to the details of such an arrangement. It is not settled as to whether such a bus line would carry the free transfer provision. The Springfield City Council's transportation committee was favorable to granting an independent bus line a franchise to run over the bridge. The West Springfield selectmen were not disposed to accede to this arrangement, but it is understood that sentiment was

shifting toward that solution in case no other means was open to establish an early service of some sort across the bridge and so shorten the distance from that involved by the present route over the North End Bridge. President Wood has signified his willingness to apply for a franchise to lay tracks through Vernon Street to the bridge immediately upon a vote of the City Council to widen Vernon Street.

### Provincial Government Passes Regulatory Act on Fares

Provision for the appointment of temporary commissions to fix passenger fares of the British Columbia Electric Railway was made by the Legislature of British Columbia by an act passed on Dec. 15. The act was entitled the British Columbia Electric Railway passenger rates act.

This takes the place to some extent of the former public utilities act which was abolished two years ago, but is limited in its scope to the company mentioned and to railway service. One of the reasons why the former commission was discontinued was the cost to the government. The new scheme provides for the cost, including the remuneration of commissioners, secretaries and so forth, to be assessed upon one or other of the parties.

In fixing rates, the commissions are required to give the company a fair and reasonable return on the value of the property of the company. Appraisals of property may be made, the costs being imposed upon the company.

The commissions are to be appointed by orders-in-council on application either of some municipality traversed by the company's lines, the company itself or not less than 100 voters residing in a locality without municipal organization.

The company operates in nearly a score of cities and municipalities and fares have been charged on temporary agreements, modifying the existing franchises. The new act continues all existing fares until changed, but its powers are to be invoked, it is stated, only in case municipalities and the company cannot come to mutually satisfactory agreements. The city of Vancouver recently passed a new franchise by which both parties agreed not to use the provisions of the act.

### Will Extend One-Man Car Service

The Morris County Traction Company, Morristown, N. J., will install an automatic block signal system on its lines which run from Lake Hopatcong to Maplewood and Elizabeth. The company will extend the use of one-man cars. They are now being run from Summit to Elizabeth, Wharton to Rockaway and Danville to Boonton. All two-men cars now in use will be remodeled. Employees of the company are protesting the installation of the one-man system and have appeared before the Board of Aldermen of the city of Denver.

## Transportation News Notes

**Seeks Fare Adjustment.**—The Muskogee (Okla.) Traction Company has made application to the Oklahoma Corporation Commission for an adjustment of street car fares in that city. The company is now operating under an 8-cent fare, with two tickets for 15 cents. The company wants the 8-cent fare for single rides continued, but would sell tickets in blocks of five for 35 cents.

**Buses Ordered.**—A. N. Broadhead, president of the Jamestown, (N. Y.) Street Railway, has ordered three passenger motor buses to be placed in operation on the south side of the city. Some time ago the Jamestown Common Council granted the company's request for permission to try out motor bus service in that section of the city. The buses will be placed in operation early in January as a feeder for the Jamestown traction lines.

**City Attorney Seeks Lower Fare.**—The city attorney of Oklahoma City, Okla., has filed a petition with the commission requesting a decrease in fares on the lines of the Oklahoma Railways. John W. Shartel, president of the railway company, declined to give any comment other than that he considered the agitation over a 5-cent fare at this time unwise. He is expected to file his answer shortly with the State Corporation Commission.

**Make Change in the Street.**—In order to expedite the loading of cars in the evening rush hours, the Springfield (Mass.) Street Railway has adopted the system of making change in the street for passengers, uniformed employees being stationed for that purpose at busy corners between 4:30 and 6 o'clock in the afternoon. This was done at the suggestion of the Police Commission. Whether the arrangement will be permanent or not will depend on results. The object is more particularly to speed the departure of pay-as-you-enter cars, and passengers are said to have responded to it to a gratifying extent.

**Second Class Rates Cut.**—The Pacific Northwest Traction Company, Olympia, Wash., recently filed a tariff with the Department of Public Works establishing second class rates applicable to articles of food and drink and lowering first class rates on shipments of 50 lb. or more on its lines between Seattle and Bellingham, effective Dec. 15. The second class rates to be established are practically 20 per cent lower than the reduced first class rates announced. They apply between Bellingham and Everett, and all intermediate points, and between Seattle and all points north of Everett, including Maryhill, Silvana, Burlington, Sedro Woolley, Milltown and Conway.



## Personal Mention

### Mr. Murphy Manager

Engineer in Charge of Electrical, Mechanical and Roadway Departments  
Succeeds Mr. Reynolds

Ernest A. Murphy, assistant general manager of the United Traction Company, Albany, N. Y., in charge of electrical, mechanical and roadway departments, has been appointed general manager of the company to succeed Albert E. Reynolds, resigned. Mr. Murphy was formerly superintendent of equipment of the company. To this position he was appointed in 1917 and continued in it until Dec. 31, 1921, when he was made assistant general manager.

The story goes, if memory does not



E. A. MURPHY

wander, that none other than Abraham Lincoln said he did little reading of biographies because biographies so seldom reflected the facts of the flesh and blood individual. Too often the biographer fits his subject to a pre-conceived picture instead of drawing the picture himself. As a matter of fact, critics of biographical volumes have in their reviews often done a better service to readers than the authors themselves have done to their subjects. Again, if memory does not play false, Macaulay's essay on the Earl of Chatham's biography was a notable example of the critic outwriting the creator. It would be interesting to tell the whole story about Mr. Murphy at this time, but here it is necessarily a case of *pars pro toto*, presenting a part of the whole.

Picture in your mind's eye, then, a young man graduating from the Manchester Institute in England with the degree of electrical and mechanical engineer, determined to succeed at his chosen profession and seeking America as the battle ground on which he would carve out his career. Then picture the same young man going from shop to shop and job to job and company to company ever learning, ever advancing, ever improving and you have a good

portrait of young Murphy. He is an engineer with the instincts of a business man. There is a directness about him that to some might seem disconcerting, but it is merely the outward manifestation of the inward man. Mr. Murphy never hesitates. He is never likely to get lost. He is sure of himself but not satisfied with that individual. This is a distinction with a great difference.

Mr. Murphy has done some very big things up at Albany in the shops and at the same time has worked numerous small economies which in the aggregate are a startling total. It has been the good fortune of the *Electric Railway Journal* to describe some of this work in the past. But the fact must not be overlooked that biography, to many, is still a matter of dates and places and positions. For them is the following:

Mr. Murphy began his railway career with the London Metropolitan Railway and figured prominently in the electrification of the London Tramways. His first position in this country was with the Chicago Elevated Railroad, where he specialized in automatic train control and installed that system on the elevated trains. This work completed, Mr. Murphy became a member of the engineering staff of the Illinois Traction System and later assisted in equipping the Pittsburgh, Harmony, Butler & Newcastle Railway, Pittsburgh, Pa. Mr. Murphy was appointed general superintendent of the electric department of the Interborough Rapid Transit Company, New York, in 1913, from which position he went to Albany as head of the equipment department of the United Traction Company.

### Mr. Ham Elected President of Safety Council

William F. Ham, president of the Washington Railway & Electric Company, Washington, D. C., has been elected president of the Washington Safety Council, the permanent safety body of the District of Columbia. John J. Boobar has been elected vice-president, A. E. Seymour, secretary, and John Poole, treasurer. These officers will serve until the first annual meeting in February, when permanent officers will be elected and the organization perfected. Following his election, Mr. Ham said he would do his utmost to make the permanent safety drive a success. The safety instructions in the schools, Mr. Ham said, would be continued as they had proved valuable.

The council pledged itself to a continuous campaign for safety. One of the important features of the by-laws is the provision for a traffic committee which is to make a survey of all traffic conditions and submit reports proposing any changes deemed advisable.

Membership in the council will be

open to any corporation, association, partnership or individual. These memberships will be divided into three classes, namely, individual, sustaining and contributing.

### New Roadmaster in B.R.T. Track Division

Frederick L. Finch has been appointed roadmaster in the surface track division of the Brooklyn (N. Y.) Rapid Transit Company. He brings to his new position a broad experience gained in various track jobs he has held in both the East and West. In 1903 he became superintendent of track and roadway with the Mahoning & Shenango Railway & Light Company at Youngstown, Ohio. After serving for seven years in that capacity he went to Spokane, Wash., as superintendent of track with the Washington Water Power Company, which operates an electric railway. After three years he



F. L. FINCH

returned East to become general roadmaster for the International Railway with headquarters in Buffalo, N. Y. He resigned from this position to go to the Brooklyn Rapid Transit Company to work under P. Ney Wilson, the superintendent of surface roadway. Mr. Finch's father was a railroad contractor in Pittsburgh and built street railroads in various parts of the East. His father was his first employer.

### Mr. Jackson Joins N.E.L.A.

Carl D. Jackson, a member and former chairman of the Wisconsin Railroad Commission, has resigned from the commission, effective Dec. 31, 1922. Mr. Jackson will become an attorney for the National Electric Light Association and the American Gas Association. His position as commissioner pays \$5,000 a year, and a number of the Wisconsin Railroad Brotherhood officials have been mentioned as possible successors. City Attorney Niven of Milwaukee has asked Gov. John J. Blaine to appoint to the position a Milwaukee man who could represent on the commission the interests of this, the largest city in Wisconsin. The term of Henry Trumbower, another railroad commissioner, will expire in February.



## Another Important Post for Mr. Loring

Former Trustee of Eastern Massachusetts Street Railway Called to Office by Governor Cox

Homer Loring, former chairman of the trustees of the Eastern Massachusetts Street Railway, Boston, Mass., has been made chairman of the State Commission on Administration and Finance by Governor Cox of Massachusetts. This is one of the most responsible posts that the Governor has had to fill and the selection is another tribute to Mr. Loring's sterling worth as an administrator. By virtue of his position on the commission Mr. Loring will be the new budget commissioner for the state.

Mr. Loring goes about his work quietly. He had long been president of the Fort Dodge, Des Moines & Southern Railway and prominent as a director of a score of other corporations before anything was known about him publicly outside of the immediate circle in which he moved. But when the need arose Mr. Loring was found out in the open battling for the preservation of the things he was convinced were sound.

Perhaps the first thing that he did to attract the attention of the public to him was to foster in 1918 the campaign in behalf of the holders of the securities of Massachusetts electric railways. As chairman of the Association of Massachusetts Street Railway Security Owners he directed a successful educational campaign on behalf of the street railways of the state in 1918. In this connection it is generally conceded that the association's activities were chiefly responsible for securing the passage of remedial legislation during 1918.

Largely on account of his activities in this connection Mr. Loring was induced to address the members of the American Electric Railway Association in conference in New York on Nov. 1, 1918. Even then Homer Loring was merely a name among the rank and file of electric railway operators outside of New England. At that time he said that no one claimed the new legislation giving state aid to the railways was perfect, but that all agreed that it rescued the Boston Elevated from receivership and "that it will enable the Bay State Street Railway, with 900 miles of track, to be successfully reorganized."

Perhaps the legislation passed by the state did enable the Bay State Street Railway to be successfully reorganized as the Eastern Massachusetts Street Railway, but the opinion prevails down Boston way that Mr. Loring as chairman of the public trustees had a great deal to do with making the reorganization successful and that he accelerated the process. At the petty salary of \$5,000 a year Mr. Loring worked over the remains of this railway until he had revitalized them. Then Mr. Loring withdrew. His work as trustee of the East-

ern Massachusetts Street Railway was in the nature of a public service, but he now enters upon an even larger public service.

It is a distinct loss that men like Homer Loring are so seldom elected to public office or accept appointment when urged to do so. In the light of events since Mr. Loring appeared before the members of the American Electric Railway Association as a speaker the advice he gave at that time appears now to have been prophetic, namely: (1) Be frank with the public; lay all the cards on the table. (2) Do not try to defend inflated capital; you cannot successfully do so in these modern days. (3) If public control is demanded, insist upon a definite guarantee of interest return. (4) Give special attention to systematic public education and if possible organize your security owners for this task.

## Mr. Harrsen Joins Electric Bond & Share Forces

H. P. Harrsen has resigned as assistant general manager of the Michigan Railroad and the Michigan United Railway to join the staff of the Electric Bond & Share Company, New York, N. Y., attached to the foreign department. Here there will be a greater opportunity than has existed in Michigan for the application of the broad experience and the peculiar talents of Mr. Harrsen. Until he took up his present post with the companies in Michigan three years ago a great deal of Mr. Harrsen's time had been devoted to the management of public utility properties in foreign lands. He has had experience in all phases of public utility work, including operation, supervision of construction and the securing of franchises from municipal, state and federal authorities. In addition to English he is thoroughly conversant with Spanish and German and has a fair working knowledge of French.

Mr. Harrsen was born in St. Louis in 1876. He was graduated from St. Louis public schools and for two years was a student at the Undergraduate Department, Washington University, St. Louis. He then had two years shop practice with the Emerson Electric Manufacturing Company, St. Louis, and served two years as station operator of the Aguascalientes Electric Light Company at Aguascalientes, Mexico. Then for two years he was private secretary to the president and general manager of the Mexico Tramways. Next came a service of six years with the Toledo Railways & Light Company, then known as the Toledo Traction Company, in the following positions: carhouse inspector, dispatcher, chief dispatcher, division superintendent, then superintendent. For eight years Mr. Harrsen was associated with Dr. F. S. Pearson in Mexico, first as general superintendent of the Mexico Tramway Company, then general manager and finally managing director of the Mexico Tramway and the Mexican Light & Power Company. Then followed a service of four years as managing director of the

Barcelona Traction Company at Barcelona, Spain, in charge of the operation of the interurban system out of that city as well as the power company. As assistant general manager of the Michigan Railroad for the last three and one-half years in charge of operating the system, the civil engineer, electrical engineer, traffic manager, superintendent of equipment, master mechanics and superintendents reported directly to Mr. Harrsen.

W. M. Vandersluis has been appointed electrical engineer for the Chicago electrification and terminal improvements of the Illinois Central Railroad, succeeding Hugh Pattison. Mr. Vandersluis was formerly signal engineer of the Illinois Central Railroad, and later secretary of the commission appointed by the railroad to decide upon the system of electrification.

Raymond A. Masters has been appointed division superintendent of the Halsey division of the Brooklyn (N. Y.) City Railroad effective Dec. 15. Mr. Masters has been in the schedule department of the company since January, 1920. Prior to that he was connected with the Michigan Railroad as train dispatcher on the Western division. He also served with the Union Traction Company of Indiana and with the so-called Ben Hur line.

L. J. Smith, assistant engineer of the Pacific Electric Railway, Los Angeles, Calif., and in charge of supervision of track bonding and welding since the year 1918, resigned on Nov. 1, 1922. He accepted the position of Western district sales manager in handling transformer sales and representative of the Packard Electric Company of Warren, Ohio. Mr. Smith in his new position also is Western representative for the Ideal Electric & Manufacturing Company of Mansfield, Ohio.

Raymond S. Price has been appointed assistant division superintendent of the central division of the Public Service Railway, Newark, N. J. Mr. Price started with the Public Service as conductor in New Brunswick in 1911. He then became chief dispatcher of the Public Service Railroad with headquarters at Port Reading. In 1919 he was made assistant superintendent of the railroad, which he held until his recent promotion. Mr. Price will be stationed at Elizabeth, where Philip F. Maguire is division superintendent.

John J. Hubbard, assistant secretary of the Public Service Commission of New York, has resigned and will engage in private practice as an expert accountant and financial adviser to public utilities. He will make his headquarters in New York City. Mr. Hubbard has been connected with the commission in various capacities for ten years. One of his important jobs was expert accountant and chief of the division of capitalization. During his service in this branch the commission approved the issuance of more than \$800,000,000 of public utility securities.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE  
MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

## Business Review of 1922

Major Movements in Business Shown by Statistics Compiled by Department of Commerce—Some Surprising Changes Shown in Production and Consumption Figures

AT THIS time of the year it is customary for business to pause long enough to take account of the progress made during the twelve months just elapsed, and from this standpoint to make some conjectures as to the coming months of the new year. It is with a feeling of satisfaction that most industries can view the progress of the past year in spite of the many difficulties which have been experienced. At the close of 1922 there are no serious obstacles in sight which should hinder further advances during the early part of the new year. The unsettled conditions in foreign countries, particularly in Europe, are still depressing domestic trade, and to a certain extent have, no doubt, kept the prices of agricultural products below the level of other commodities. Within the past two months this latter condition has, in a measure, been relieved.

Production of manufactured commodities in 1922 was about 50 per cent greater than in 1921, according to figures compiled by the Department of Commerce from latest reports to the Bureau of the Census made in connection with the "Survey of Current Business." Textile mills were about 20 per cent more active than in 1921, the iron and steel industry increased its output from 60 to 70 per cent over 1921, non-ferrous metals from 50 to 95 per cent, petroleum 15 per cent, coke 40 per cent, paper 20 to 30 per cent, rubber 40 per cent, automobiles 50 per cent, building construction 50 per cent, lumber 35 per cent, brick 50 per cent, cement 15 per cent, leather 20 per cent, sugar 45 per cent, and meats about 5 per cent. Agricultural receipts were in general higher than in 1921.

The increase in production and the reduction in immigration improved the labor situation from a large surplus of labor at the end of 1921 to a point where shortages occur, while unemployment has almost been eliminated.

Transportation conditions changed from a huge surplus of idle freight cars to a considerable shortage, while car loadings were 11 per cent greater than in 1921.

Prices to the farmer increased about 17 per cent during the year, wholesale prices advanced 10 per cent and retail food prices declined 5 per cent. This condition gives the farmer a greater purchasing power and narrows the margin between wholesaler and retailer.

The volume of trade was consider-

ably heavier than in 1921. Sales of mail order houses increased 6 per cent and chain stores show a gain of 13 per cent. Debits and bank clearings also show about this same relation.

The iron and steel industry was from 60 to 70 per cent more active than in 1921 but about 25 per cent less active than in the boom year of 1920. Iron ore movement was 65 per cent greater than in 1921, pig iron production increased 60 per cent and steel ingot production 71 per cent. Unfilled orders of the United States Steel Corporation rose about 60 per cent during the year. Iron and steel prices rose from 15 to 50 per cent, with the highest relative increase in pig iron. Exports of iron and steel, based on ten months' figures, declined 26 per cent.

### EQUIPMENT AND ALLIED INDUSTRIES DO LARGE BUSINESS

Locomotive shipments by manufacturers for the first eleven months of 1922 were 16 per cent less than in 1921, owing to the decline of shipments for foreign account of 56 per cent. Domestic shipments increased 8 per cent. Unfilled orders for foreign locomotives on Dec. 1 were less than a year ago, but domestic orders were over ten times as large. Orders for freight cars placed in eleven months of 1922 were over seven times as large as a year ago.

Production of steel sheets averaged about 75 per cent of capacity in 1922 as against 35 per cent in 1921. Sales of fabricated structural steel were about 88 per cent larger in 1922 than in 1921, based on eleven months' figures.

Copper production showed an increase of 36 per cent over eleven months of 1921, but was almost 30 per cent below the 1920 figures. Exports of copper were 29 per cent greater than in 1921, on the basis of ten months' figures. The price of copper advanced about 10 per cent during the year.

In spite of the strike, bituminous coal production was only 7 per cent less than in 1921 for the eleven months' period, a decrease of 26,000,000 tons. Anthracite coal, however, showed a decline of 47 per cent, with a loss of 40,000,000 tons. Production of beehive coke increased 32 per cent and by-product coke production increased 41 per cent. Public utility electric power showed an increase of 7 per cent on a ten months' basis.

The average surplus of 282,926 freight cars on Dec. 1, 1921, has almost disappeared, and in its place the aver-

age shortage has increased from almost nothing to 133,786 cars. The number of cars in bad order has been considerably reduced during the year. Total car loadings for 1922 increased about 11 per cent over 1921, in spite of the drop in car loadings, and were almost up to the high mark of 1920. Railroad revenues declined 2 per cent from 1921 on a ten months' basis, due to a decrease of 1 per cent in freight revenue and 9 per cent in passenger revenue. Operating expenses were reduced by 6 per cent, resulting in a gain of 23 per cent in net operating income.

Wholesale prices have made a gradual rise in 1922 and the index number of the Department of Labor is 10 per cent greater than a year ago. Farm products and metals had the greatest relative gains. The index numbers of *Dun's* and *Bradstreet's* showed larger increases during the year, the former rising 13 per cent and the latter 21 per cent.

The total United States interest-bearing debt was reduced by \$667,000,000 during the twelve months ending Dec. 1, or about 3 per cent: Liberty and Victory loans were reduced by \$2,153,000,000, or about 11 per cent. Customs receipts increased 46 per cent and were far greater than in any previous year. Total ordinary receipts of the government declined 24 per cent and disbursements were reduced by 30 per cent, with a balance of ordinary receipts of over \$300,000,000 in eleven months. Per capita money circulation declined slightly during the year.

The number of business failures was 27 per cent larger than in 1921 and exceeds any previous year since 1915. The amount of defaulted liabilities exceeded the huge defaults in 1921 by 5 per cent.

Security prices rose considerably during the year, industrial stocks averaging an increase of about 34 per cent, railroad stocks about 17 per cent and bonds about 20 per cent. Stock sales were 55 per cent greater than in the 1921 period and bond sales increased 26 per cent; Liberty-Victory bond sales declined 18 per cent, but other bonds increased in volume by 92 per cent.

The general index of foreign exchange compiled by the Federal Reserve Board increased about 10 per cent during the year and now stands at 67 per cent of par. The principal changes during the year were the increases in the pound sterling, the Canadian dollar, and the Argentine, Dutch and Swedish exchanges, and the continued rapid fall in German marks.

Exports were about 16 per cent less than in the eleven months' period of 1921 and the lowest in value since 1915. Imports up to the time the new tariff law went into effect were above the 1921 corresponding period by approximately 16 per cent. Imports of gold declined 62 per cent and exports increased 57 per cent, but an export balance of \$215,000,000 still remained for the eleven months of 1922.



## Market for Steel Ties Unusually Brisk

Prospects as to the use of steel ties by the electric railways in 1923 are brighter than for several years past. While the largest bookings and orders have usually come in February, a large number of orders have already been placed during December for delivery before March 15. Early orders are said to be due to some extent to the fact that present prices are based on steel in stock and on order which was bought at \$8 to \$10 per ton under the present prices.

Manufacturers of steel ties are desirous of holding present prices, but will probably be forced to follow the steel market to its present level of \$2 per 100 lb., Pittsburgh. It is hardly anticipated, however, that any advance beyond this is in immediate prospect because of the fact that the large production and bookings of the mills in December, which were at a 40,000,000 rate, caused no flurry in either corporation or independent prices.

## Metal, Coal and Material Prices

Metals—New York	Dec. 26, 1922
Copper, electrolytic, cents per lb.....	14.75
Copper wire base, cents per lb.....	16.50
Lead, cents per lb.....	7.25
Zinc, cents per lb.....	7.27
Tin, Straits, cen's per lb.....	38.875
<b>Bituminous Coal, f.o.b. Minea</b>	
Smokeless mine run, f.o.b. vessel, Hamp- ton Roads, gross tons.....	\$8.625
Somerset mine run, Boston, net tons.....	4.425
Pittsburgh mine run, Pittsburgh, net tons	3.125
Franklin, Ill., screenings, Chicago, net tons	3.125
Central, Ill., screenings, Chicago, net tons	2.20
Kansas screenings, Kansas City, net tons	2.50
<b>Materials</b>	
Rubber-covered wire, N. Y., No 14, per 1,000 ft.....	6.50
Weatherproof wire base, N. Y., cents per lb.	16.50
Cement, Chicago net prices, without bags	\$2.20
Linseed oil (5-bbl. lots), N. Y., cents per gal.	93.00
White lead, (100-lb. keg), N. Y., cents per lb.	12.375
Turpentine, (bbl. lots), N. Y., per gal.....	\$1.36

## Rolling Stock

Sacramento (Calif.) Northern Railroad has recently closed a contract with the General Electric Company covering the purchase of two 60-ton steel locomotives. They are designed for both 600- and 1,500-volt operation and with arrangement for operation on either third rail or trolley. These locomotives are equipped with four General Electric 251-600/1,500-volt motors which have a nominal one-hour rating of 200 hp. each. At the hourly rating of the motors the locomotives will have a tractive effort of 21,000 lb. and a speed of 18.3 m.p.h. when operating on 1,500-volt trolley. General dimensions of the locomotives are as follows:

Length inside of knuckles.....	37 ft. 4 in.
Length of cab.....	32 ft. 7 in.
Height of cab.....	11 ft. 11 in.
Height with trolley down.....	12 ft. 11 in.
Width over all.....	9 ft. 7 in.
Total wheelbase.....	25 ft. 5 in.
Rigid wheelbase.....	7 ft. 2 in.
Track gage.....	4 ft. 8 in.
Minimum radius of curvature.....	50 ft. locomotive alone

Weights are approximately as follows:

Electrical equipment.....	39,400 lb.
Air brake and compressor.....	4,600 lb.
Mechanical equipment.....	76,000 lb.
Total weight.....	120,000 lb.
Weight per driving axle.....	30,000 lb.

Chicago Surface Lines has just placed orders for 100 motor passenger cars of the same type as the sixty-nine that are now under construction in its shops for hauling trailers. J. G. Brill Company will furnish seventy bodies and all the trucks and the remaining thirty bodies will be built by the McGuire-Cummings Company. Each car will be equipped with four G. E. 275 motors.

## Track and Roadway

Brooklyn (N. Y.) Rapid Transit Company has purchased 600 International steel ties for use in reconstructing track.

Gary (Ind.) Street Railway, in its improvements for 1923, plans the construction of 8 miles of additional track, an extension of the line east on Fifth Avenue to the new tube mills and a line to the new Gary-Miller Municipal bathing beach. Officials state that the cost of laying the stretch of track to the beach will cost in the neighborhood of \$500,000. Construction for both tracks will be started in the spring and an effort will be made to have them completed by the middle of next summer.

## Power Houses, Shops and Buildings

Concord (N. H.) Electric Railways plans the immediate rebuilding of its power plant in West Concord, recently damaged to a great extent by fire.

Oklahoma Union Railway, Tulsa, Okla., will erect a brick and tile freight building at Sapulpa, according to an announcement by officials of the road. A site for a future passenger station will be provided near the freight depot.

Cincinnati & Dayton Traction Company, Hamilton, Ohio, had its Cincinnati terminus damaged by fire recently to the extent of \$3,000. The storeroom containing records of the traction company was destroyed. There were a score or more passengers in the station when the fire was discovered.

New York (N. Y.) Transit Commission has ordered the reconstruction of the local station of the Interborough Rapid Transit Company at Thirty-third Street and Fourth Avenue into an express station. The commission also authorized the lengthening of all platforms at the local stations on the east side subway between Brooklyn Bridge and Grand Central Station. It is estimated that these rebuilding and reconstructing jobs will cost \$4,000,000.

Jamestown, Westfield & Northwestern Railroad, Jamestown, N. Y., one of the traction lines controlled by the Broadhead interests of Jamestown, will build a new freight terminal in Jamestown to handle more efficiently the rapidly increasing freight traffic throughout Chautauqua County and southwestern New York. Two acres of property have been purchased and it is proposed to construct two freight and express sheds, each 300 ft. long and 18 ft. wide.

## Trade Notes

Chicago Surface Lines has ordered 250 Johnson hand-operated fare boxes. These are in addition to the 270 that are already installed.

United Electric Railways, Providence, R. I., has purchased 900 of a new type of Rooke register from the Rooke Automatic Register Company which will take nickels, dimes, quarters and metal tokens. The railway has standardized on this type of fare collecting device and is using it on all its cars, both pay-enter and pay-leave, as well as on the open summer cars. They are also used on one-man cars, on interurban cars where fairly sizable through fares are picked up on the first collection, and on motor buses. Delivery on the new registers will begin Jan. 2.

Johnson Fare Box Company, Chicago, Ill., has sold to Lloyd E. Work & Company of that city \$250,000 of first mortgage 6½ per cent sinking fund gold bonds, secured by pledge of the Ravenswood plant. The proceeds of the issue will be used by the Johnson company to provide additional working capital needed in carrying out contracts into which it has recently entered and to retire an issue of serial bonds and take care of floating indebtedness. The company reports 32,000 of its boxes in use, with the demand constantly growing and the outlook bright for sales in the foreign fields. Among the prominent cities in which the Johnson box is now in use are New York, Brooklyn, Washington, Baltimore, St. Louis, Memphis, Grand Rapids, Minneapolis, St. Paul, Omaha, Denver, Los Angeles, San Diego and cities in which Stone & Webster operate.

## New Advertising Literature

Elliott Service Company, New York, N. Y., through its public safety department, has recently issued four posters on safety. They are designed for display in street cars, garages and gasoline service stations and other suitable places and are intended particularly to caution automobilists against reckless driving. They show collisions between automobiles and trolley cars caused by the carelessness of the automobile driver.

International Steel Tie Company, Cleveland, Ohio, with an attractive Christmas greeting card, has issued a pamphlet entitled "Tracks Built on Concrete Base." This little book gives the message for better trade in 1923. The booklet contains some fourteen pages and is a reprint of an article which appeared in the *Electric Railway Journal* by A. E. Harvey, superintendent of way and structures of the Kansas City (Mo.) Railways. The article was entitled "Tracks Built on Concrete Base in Kansas City." Some general views of the work as it was carried on in Kansas City are shown in the pamphlet.





# PEACOCK STAFFLESS BRAKES

## Protection In Emergencies

There comes a time in the life of every safety car, equipped with air brakes of even the most perfect design and construction, when the old stand-by hand-brake is needed just the same. Sometimes an unavoidable accident cripples part of the air brake system or perhaps the power fails and air pressure cannot be secured. With the car stopped on a grade—perhaps a steep one—isn't that a pretty good time to be thankful that you've got good, reliable, powerful Peacock Staffless Brakes on your safety car?

## NATIONAL BRAKE COMPANY

890 Ellicott Square, Buffalo, N. Y.

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





# Bankers and Engineers

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Incorporated  
Business Established 1894  
115 BROADWAY, New York  
PHILADELPHIA CHICAGO SAN FRANCISCO

## THE J. G. WHITE ENGINEERING CORPORATION

*Engineers—Constructors*

Industrial Plants, Buildings, Steam Power Plants, Water  
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Incorporated  
EXAMINATIONS REPORTS APPRAISALS  
ON  
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES  
NEW YORK BOSTON CHICAGO

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OPERATING, TRAFFIC AND RATE INVESTIGATIONS  
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## SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT  
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## ENGELHARDT W. HOLST

*Consulting Engineer*  
Appraisals, Reports, Rates, Service Investigation,  
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## ROBERT M. FEUSTEL CONSULTING ENGINEER

Rate, Traffic and Reorganization  
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REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

## PETER WITT UTILITY CONSULTANT

456 Leader-News Bldg., Cleveland, O.

## C. E. SMITH & CO.

*Consulting Engineers*

2065-75 Railway Exchange Bldg., St. Louis, Mo.  
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Investigations, Appraisals, Expert Testimony, Bridge  
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## DAY & ZIMMERMANN, INC. ENGINEERS

*Design, Construction  
Reports, Valuations, Management*

NEW YORK PHILADELPHIA CHICAGO

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*Consultant on Fares, Buses, Motor Trucks*

Originator of unlimited ride, transferable weekly  
pass. Campaigns handled to make it a success.

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## JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and  
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.



**The Corporation Service Bureau**  
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**LABOR ADJUSTERS**  
*Investigations—Inspections—Confessions*  
**GENERAL OFFICES:**  
 Suite 1215, Ulmer Building, Cleveland, Ohio

**Dwight P. Robinson & Company**  
 Incorporated  
 Design and Construction of  
*Electric Railways, Shops, Power Stations*  
**125 East 46th Street, New York**  
 Chicago      Youngstown      Dallas  
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**Byllesby**  
**Engineering & Management**  
**Corporation**  
 208 S. La Salle Street, Chicago  
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**KELLY, COOKE & COMPANY**  
**Engineers**  
 149 BROADWAY      424 CHESTNUT STREET  
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*Consulting Accountants*  
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 Reports to Bankers  
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**JOE R. ONG**  
**Consulting Transportation Engineer**  
*Specializing in Traffic Problems and in Methods to  
 Improve Service and Increase  
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 PIQUA, OHIO

**Transmission Line and Special Crossing  
 Structures, Catenary Bridges**  
 WRITE FOR OUR NEW DESCRIPTIVE CATALOG  
**ARCHBOLD-BRADY CO.**  
 Engineers and Contractors      SYRACUSE, N. Y.

**THE P. EDWARD WISH SERVICE**  
 50 Church St.      Street Railway Inspection      131 State St.  
 NEW YORK      DETECTIVES      BOSTON

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



# Infene

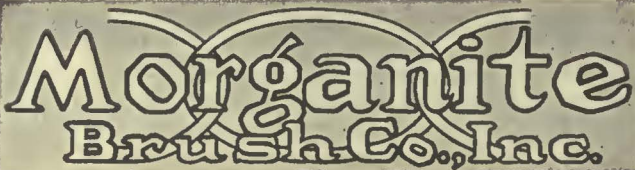
When Kaffir boys find an *infene*, or baboon, asleep in the jungle and there is a dead snake handy, they pull off what to their sense of humor is a whale of a circus.

The dead snake is tossed about the baboon's neck and when the poor monk wakes with a start the show begins. He will screech and moan in agonized fright for hours without making the least effort to move, apparently paralyzed with terror.

Just as many an operator will cuss himself blue in the face seven days in the week over scored and pitted commutators without making a single constructive effort to get rid of the trouble

... when all that's needed is competent selection of Morganite Brushes, i. e., *individual prescription according to each motor's working conditions accomplished by experts who do that and nothing else.*

*"A Morganite engineer waiting to see you, Sir."*



**Main Office and Factory:**  
 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

- Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia
- Herzog Electric & Engineering Co., 150 Stewart St., San Francisco
- Electrical Engineering & Mfg. Co., 909 Penn. Ave., Pittsburgh
- Special Service Sales Company, 502 Delta Bldg., Los Angeles
- J. F. Drummy, 75 Pleasant St., Revere, Massachusetts
- Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto, Ontario, Canada
- W. R. Hendey Co., Hoge Bldg., Seattle







## The New Turnbuckle

Instead of a big coarse-threaded jam nut that needs a two-fisted wrench for application you require only a pocket-size wrench that is applied at a convenient angle. The secret? The jam-nut idea is replaced by a split clamp with a spring power that won't be loosened once the little nut on the side has been tightened.

This new turnbuckle will last as long as the truck, because—

***It's Boyerized!***



**“To use a flowery expression—you’ll *eventually* use Boyerized Parts, so why not now?”**

—eventually you will use them, because sooner or later will come the realization that they are more economical because of the long-wearing quality imparted by the Boyerizing (special steel treatment) Process.

Why not begin using them now and begin economizing at once?

## Other BOYERIZED Parts

Brake Pins  
Brake Hangers  
Brake Levers  
Pedestal Gibs  
Brake Fulcrums  
Center Bearings  
Side Bearings

Spring Post Bushings  
Spring Posts  
Bolster and Transom  
Chafing Plates  
Manganese Brake Heads  
Manganese Truck Parts  
Bushings  
Bronze Bearings

*Boyerized Parts cost slightly more because they last at least four times as long as ordinary parts—  
Let us quote you!*

## Bemis Car Truck Company

*Electric Railway Supplies*  
**SPRINGFIELD, MASS.**

**Representatives:**

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.  
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.  
W. F. McKenney, 54 First Street, Portland, Oregon  
J. H. Denton, 1328 Broadway, New York City, N. Y.  
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



OF A SERIES OF ARTICLES PICTURING THE INFLUENCE OF THE ENGINEER IN THE AFFAIRS OF THE WORLD. PRESENTED BY THE MCGRAW-HILL COMPANY, INC., WHOSE PUBLICATIONS HAVE SERVED THE ENGINEER THROUGH HALF A CENTURY OF INDUSTRIAL PROGRESS

*Coal Age*

*Electrical World*

*Electrical Merchandising*

*American Machinist*

*Industrial Engineer*  
(Published in Chicago)

*Engineering and Mining Journal-Press*

*American Machinist*  
European Edition  
(London)

## THE SAFETY OF INDUSTRY

SOME four centuries ago Leonardo da Vinci wrote a treatise on flying in which he endeavored, though not with entire correctness, to describe the mechanism of a bird's flight. It took the intervening centuries to make his theory a fact; and theory is valuable only when it becomes a fact.

¶ It is the irrefutability of basic facts which gives the modern engineer the leadership in many of our greatest and most essential undertakings.

¶ In his hands he holds the safety of this industrial age. Not merely its commercial stability, but the solution, as well, of many of our problems of government, of the revision of ethical principles, the defining of international agreements. From his statistical data will be gleaned much of the means for the social and material reconstruction of the world.

¶ The rise of the engineer as a leader in thought development has been rapid. It has come through proof of his ability to analyze, deduce and conclude; and then to put these findings into action, to express energy in terms of fact.

¶ An impressive proof of his leadership is his being found among the directors of many important financial, commercial and industrial corporations. And when an engineer speaks his associates give heed. For he does not surmise, he states facts; he does not offer conjecture or guesses, he submits statistical evidence.

¶ These newly risen leaders are the producers of facts, the originators of statistics, the developers of proofs. Theirs is the science of truth. They deal with absolutes, yet have no dogmas, for their absolutes are bases for operations, not limitations of practice.

¶ No new truth startles the engineer. He is able to see the combinations of circumstance which lead to the one and only possible conclusion which the new truth proclaims. The engineer gives the safety of certainty to industry.

*Power*

*Engineering News-Record*

*Bus Transportation*

*Electric Railway Journal*

*Ingenieria Internacional*  
(Printed in Spanish)

*Chemical and Metallurgical Engineering*

*Journal of Electricity and Western Industry*  
(San Francisco)

MCGRAW-HILL COMPANY · INC ·  
NEW YORK



# ROME WIRE

## "Super Service" Cord and Cable



- 1 Rome Super Service Cord and Cable is new—new in construction—new in the service it renders—new in the terrific tests it withstands. Fit for the toughest job in every service where endurance counts.
- 2 Fine stranded copper, effectively insulated and built up with cotton and rubber, over all a heavy layer of Super Service 60% rubber with embedded cords, vulcanized in steel molds under tons of pressure.
- 3 Send for a sample, get a bit of it between your hands, feel that moulded-on name, try to break it, tear it, cut it—treat it to the most destructive tests you know—and know why we call it Super Service.

**So —  
You Snip the Coupon—  
We Ship the Sample**

**DON'T DO IT TO DAY — DO IT NOW !!!**

TO THE ROME WIRE COMPANY, 159 RAILROAD STREET, ROME, NEW YORK  
PLEASE SEND THAT SAMPLE OF ROME SUPER SERVICE PERSONALLY TO:

Name: \_\_\_\_\_ Company: \_\_\_\_\_

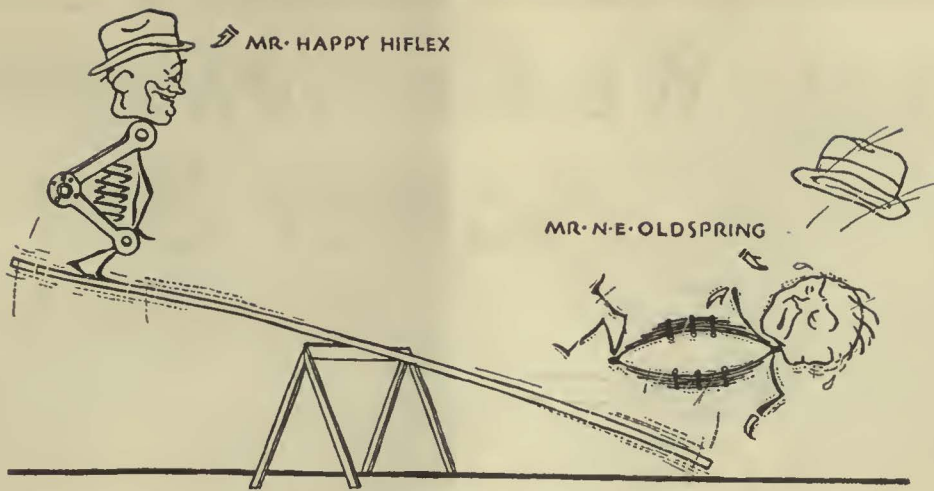
Address: \_\_\_\_\_

Check Kind Wanted { Super Service Cable.....  
Super Service Cord.....  
Super Service Heater Cord.....

• 2109-L

# WIRE = ROME





## Who Is Hiflex?

He is the "missing link" between comfort and *un*-comfort— or profit and loss.

He is that property which gives to the

## MITTEN-TRAYLOR MOTORBUS

the easy riding and safe operating qualities which make it a real passenger carrying vehicle—a profitable *passenger* carrier.

In a word—HIFLEX is a super spring suspension—not merely a shock absorber—that makes possible the operation of a Mitten-Traylor Motorbus on solid tires with all the comfort, economy and reliability of a pleasure car on pneumatics.

Meet HIFLEX—our bulletin will introduce him to you.

# MITTEN-TRAYLOR

I N C O R P O R A T E D

Philadelphia





# In Last Week's News:

## \$8,513,000 Spent in St. Louis in Three Years

17,782 Items of Supplies Bought

COL. A. T. PERKINS, manager for receiver United Railways, St. Louis, Mo., appeared before the Electrical Board of Trade in St. Louis a few days ago and gave a succinct account of the last three and a half years' stewardship of the property under the receiver. He told his hearers what the city must have or should do in connection with a reorganization, which is expected to take place early in 1923.

\* \* \*

### Surprise Expressed at Figures

Expressions of amazement were heard at some of the tables when Colonel Perkins launched into the manufacturing feature of his talk by stating the extent of supplies purchased by the receiver. He is using 17,782 different items of supplies, according to a catalog recently completed.

\* \* \*

Colonel Perkins then said:

"In the last three years we have reconstructed 100 miles of track at a cost of \$4,000,000. We have rebuilt 100 old cars at a cost of \$1,000,000. We have built 150 new cars at a cost of about \$1,500,000. Another fifty new cars under way will cost \$513,000. To handle the new equipment it has been necessary to build other things—a new station and shops, seven new power substations, besides spending \$1,500,000 for street paving for the use of the public."

—and another  
\$4,000,000  
will be raised  
for further improvements

*Day by day in every way  
the field gets better and better*





**Griffin Wheel Company**  
McCormick Building  
Chicago, Ill.



# GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

**FOUNDRIES:**

Chicago

Detroit  
Denver

Boston  
Kansas City  
Council Bluffs

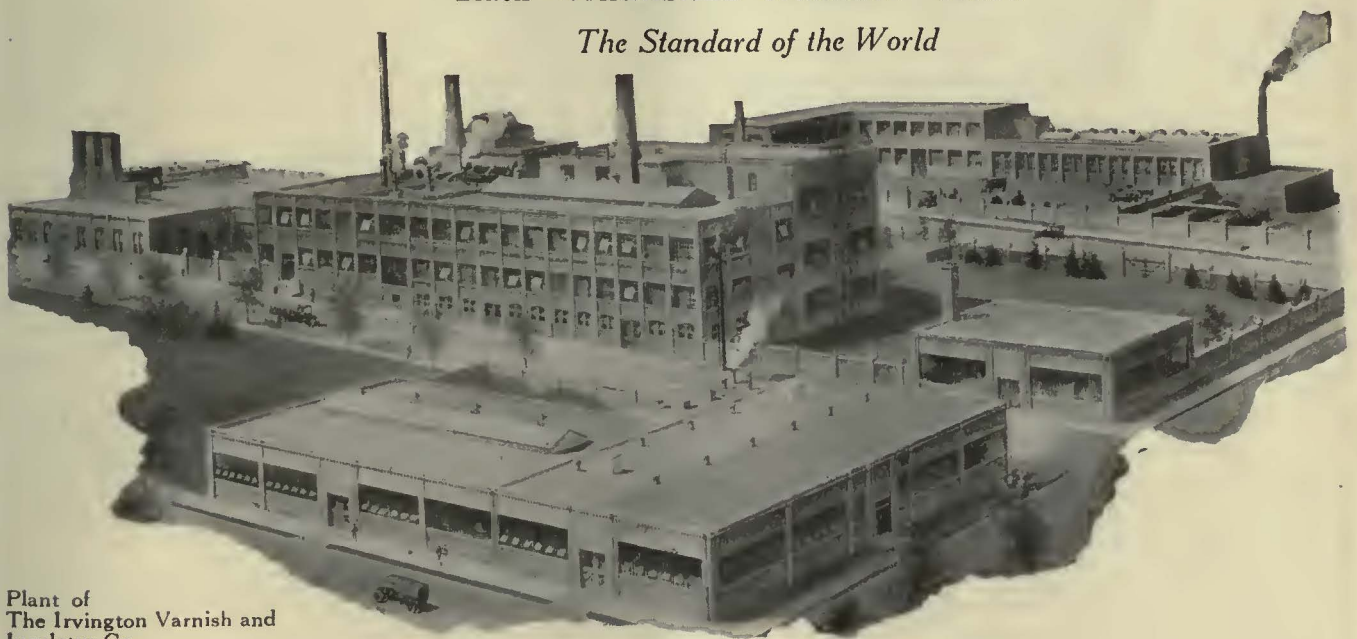
St. Paul  
Los Angeles

Tacoma

*The Plant Behind the Product*  
**"IRVINGTON"**

Black—VARNISHED CAMBRIC—Yellow

*The Standard of the World*



Plant of  
The Irvington Varnish and  
Insulator Co.

The largest and most modern factory devoted exclusively to the  
manufacture and development of VARNISHED INSULATION.

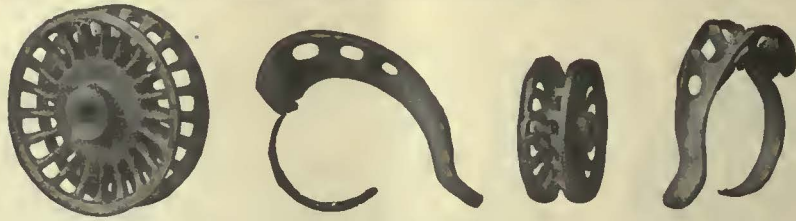
**Sales Representatives:**

Mitchell-Rand Mfg. Co., New York  
T. C. White Electric Supply Co., St. Louis  
E. M. Wolcott, Rochester

L. L. Fleig & Co., Chicago  
Consumers Rubber Co., Cleveland  
Clapp & Lamoree, Los Angeles

F. G. Scofield, Toronto





## 7:30 P.M.—Supper Stony Cold

"I couldn't help it mother. I stood nearly an hour on the corner of 8th and G Avenue, and the cars were lined up for a mile.

"Something was wrong with the trolley wire, and the cars couldn't run. I suppose it was sleet, just like that night

last winter when I walked home." Who fell down? Who forgot to order Nuttall Sleet Cutters *before* the sleet storm? Don't be caught unprepared.

Nuttall has them—all sorts—packed ready to express today.

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube Co. & Supply Co., Ltd., Montreal and Toronto.

R.D. NUTTALL COMPANY  
PITTSBURGH  PENNSYLVANIA

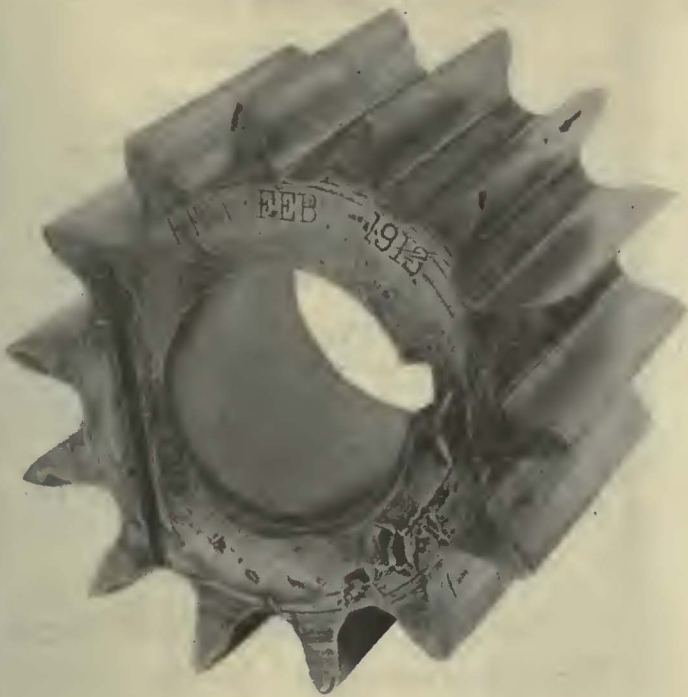


N-256g

# Nuttall

The St. Louis Car Co.  
extends to its many  
friends and patrons  
best wishes for a  
Prosperous New Year





# 492,750 miles

May 3, 1913

to

April 10, 1922

In that steady grind of *City Railway* service

## "Tool Steel"

And the user writes:

"We have several other pinions yet in service and in good condition which will probably give service almost equal to the one we have just taken out."

"Tool Steel" Quality **T. S. Q.** "Tool Steel" Quality

## Advantages of HASKELITE Headlining —

*The Lightest Weight Headlining Made Today*

1. The weight of 3/16 in. HASKELITE headlining is 0.58 lb. per square foot. The weight of 1/4 in. composition board is 0.9 lb. per square foot—an advantage for HASKELITE of 53%.
2. HASKELITE headlining is exceptionally stiff, lengthwise of the car, and requires support only at the carlines—29 in. apart.
3. HASKELITE headlining is furnished with face grain the long way of the car, giving a transverse flexibility which permits the panels readily to be sprung into place.
4. Panels requiring more than an eight or nine-foot radius of curvature are formed by us.
5. The surface of HASKELITE headlining is smooth and close-grained—an ideal surface for beautiful finish.
6. Widths available vary from 50 in. to 90 in.; lengths vary from 30 in. to 240 in.—by steps of 10 in.



Write for our Blue Print Booklet on HASKELITE roofs  
and for samples of 3/16 in. HASKELITE headlining.

# HASKELITE MFG. CORPORATION

133 W. Washington St.

Chicago, Ill.





**U.S. ELECTRIC SIGNALS**  
**For Safer Service**

Big and Clear  
 Reliable and Positive  
 An Inexpensive Protection

**United States Electric Signal Co.**  
 West Newton, Mass.

**International Creosoting & Construction Co.**  
 Galveston, Texas

Plant—Texarkana Beaumont Galveston

**MONEY SAVERS TO RAILWAYS**

Treated railway ties, poles, piling,  
 bridge timbers, etc.

See our full page advertisement  
 in last week's issue.

**ROME WIRE**  
 BARE AND INSULATED

**Rome Merit Wins Customers  
 Rome Service Holds Them**

**ROME WIRE COMPANY**  
 Main Plant and Executive Offices: Rome, N. Y.  
 "Diamond" Branch: Buffalo, N. Y.

DISTRICT SALES OFFICES:  
 New York, 50 Church St. Chicago, Ill., 14 E. Jackson Blvd.  
 Boston, Mass., Little Bldg. Detroit, Mich., 25 Parsons St.  
 Los Angeles, Cal., J. G. Pomeroy, 336 Azusa St. 2113-L

**ELRECO TUBULAR POLES**

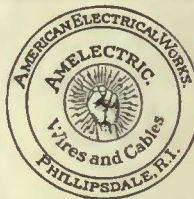


THE "WIRE LOCK" / THE CHAMFERED JOINT

**COMBINE**  
 Lowest Cost Lightest Weight  
 Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request

**ELECTRIC RAILWAY EQUIPMENT CO.**  
 CINCINNATI, OHIO  
 New York City, 30 Church Street



**AMELECTRIC PRODUCTS**  
 BARE COPPER WIRE AND CABLE  
 TROLLEY WIRE  
 WEATHERPROOF WIRE AND CABLE  
 PAPER INSULATED UNDERGROUND CABLE  
 MAGNETIC WIRE

Reg. U. S. Pat. Office  
 Galvanized Iron and Steel Wire and Strand  
 Incandescent Lamp Cord

**AMERICAN ELECTRICAL WORKS**  
 PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;  
 Cincinnati, Traction Bldg.; New York, 233 B'way


**FLOOD CITY**  
 Rail Bonds and Trolley Line Specialties  
 Flood City Mfg. Co., Johnstown, Pa.

**Chapman Automatic Signals**  
 Charles N. Wood Co., Boston





**INSULATED WIRES AND CABLES**  
**JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY**

**AETNA INSULATION LINE MATERIAL**  
 Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches



**Albert & J. M. Anderson Mfg. Co.**  
 289-93 A Street Boston, Mass.  
 Established 1877

Branches—New York, 135 B'way  
 Philadelphia, 428 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.  
 London, E. C. 4, 38-39 Upper Thames St.





## SPECIAL TRACKWORK

Of the well-known WHARTON Superior Designs  
and Constructions

Steel Castings  
Converter and  
Electric

Forgings  
Drop Hammer  
and Press

Gas Cylinders  
Seamless  
Steel

Wm. Wharton Jr. & Co. Inc., Easton, Pa.  
(Subsidiary of Taylor-Wharton Iron & Steel Co.,  
High Bridge, N. J.)

ORIGINATORS OF  
MANGANESE STEEL TRACKWORK

## High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS  
COMPLETE LAYOUTS  
IMPROVED ANTI-KICK BIG-HEEL SWITCHES  
HARD CENTER AND MANGANESE  
CONSTRUCTION

New York Switch & Crossing Co.  
Hoboken, N. J.

# American Rail Bonds

CROWN  
UNITED STATES  
TWIN TERMINAL  
SOLDER  
TRIPLEX

Arc Weld and Flame Weld

*Send for new  
Rail Bond Book*

**American Steel & Wire  
Company**  
CHICAGO  
NEW YORK

## SPECIALISTS

in the  
Design and Manufacture  
of  
*Standard—Insulated—and  
Compromise Rail Joints.*

The Rail Joint Company  
61 Broadway, New York City

## BARBOUR-STOCKWELL CO.

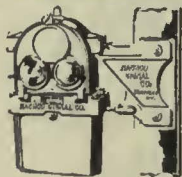
205 Broadway, Cambridgeport, Mass.  
Established 1858

Manufacturers of  
Special Work for Street Railways  
Frogs, Crossings, Switches and Mates  
Turnouts and Cross Connections  
Kerwin Portable Crossovers  
Balkwill Articulated Cast Manganese Crossings  
ESTIMATES PROMPTLY FURNISHED

## AUTOMATIC SIGNALS

Highway Crossing Bells  
Headway Recorders

NACHOD SIGNAL COMPANY, INC.  
LOUISVILLE, KY.



## Standard Underground Cable Co.

Manufacturers of  
Electric Wires and Cables of all kinds;  
also Cable Terminals, Junction Boxes, etc.  
Boston Philadelphia Pittsburgh Detroit New York  
San Francisco Chicago Washington St. Louis



## Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company  
PITTSBURGH, PA.

## NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties.  
Oak Switch Ties.

*Prompt shipment from our own stocks.*

**Headquarters—Nashville, Tenn.**

A. D. Andrews, Terre Haute, Ind., Representative.



**THE INDIANAPOLIS SWITCH & FROG Co., SPRINGFIELD, OHIO**  
**Indianapolis Economy Products That Make Dollars "Grow"**

**Indianapolis Solid Manganese:**

Frogs, Crossings, Mates and Tongue-switches. Super-quality material. Par-excellent designs. Gives many lives to one, of ordinary construction and when worn down, CAN BE RE-STORED by INDIANAPOLIS WELDING.

**Indianapolis Electric Welder:**

Efficient, Rapid, ECONOMICAL, Durable. Price, \$2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

**Indianapolis Welding Steel:**

Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

**Indianapolis Welding Plates:**

Eliminate "Joints" and "Boods" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

**Indianapolis Welding Supplies:**

CABLES, HELMETS, LENSES, CARBONS.

**Turntables:**

Ball-bearing, for ash-pits, storage yards, etc.

**Indianapolis "Economy" Products:**

are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

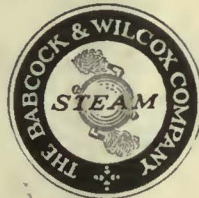
**THE BABCOCK & WILCOX COMPANY**

85 LIBERTY STREET, NEW YORK

Builders since 1868 of  
 Water Tube Boilers  
 of continuing reliability

**BRANCH OFFICES**

- BOSTON, 49 Federal Street
- PHILADELPHIA, North American Building
- PITTSBURGH, Farmers Deposit Bank Building
- CLEVELAND, Guardian Building
- CHICAGO, Marquette Building
- CINCINNATI, Traction Building
- ATLANTA, Candler Building
- TUCSON, ARIZ., 21 So. Stone Avenue
- DALLAS, TEX., 2001 Magnolia Building
- HONOLULU, H. T., Castle & Cooke Building



**WORKS**

Bayonne, N. J.  
 Barberton, Ohio

Makers of Steam Superheaters  
 since 1898 and of Chain Grate  
 Stokers since 1893

**BRANCH OFFICES**

- DETROIT, Ford Building
- NEW ORLEANS, 521-5 Baronne Street
- HOUSTON, TEXAS, Southern Pacific Building
- DENVER, 435 Seventeenth Street
- SALT LAKE CITY, 705-6 Kearns Building
- SAN FRANCISCO, Sheldon Building
- LOS ANGELES, 404-6 Central Building
- SEATTLE, L. C. Smith Building
- HAVANA, CUBA, Calle de Aguilar 104
- SAN JUAN, PORTO RICO, Royal Bank Building

**RAILWAY MOTOR BRUSHES**



Grade 407 is universally recognized and adapted as the premier compressor motor brush on standard railway systems. One of a series of standard railway compressor motor brushes.

**COLUMBIA BRUSHES**  
 COST NO MORE — LAST LONGER

NATIONAL CARBON COMPANY, INC.  
 CLEVELAND, OHIO      SAN FRANCISCO, CAL.



We make a specialty of  
**ELECTRIC RAILWAY**  
**LUBRICATION**

We solicit a test of TULC  
 on your equipment.

**The Universal Lubricating Co.**  
 Cleveland, Ohio

**STERLING VARNISH**

Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

**The Sterling Varnish Co., Pittsburgh, Penna.**

Ramapo Iron Works  
 Established 1881

Ajax Forge Company  
 Established 1833

**RAMAPO AJAX CORPORATION**

Successor

**HILLBURN, NEW YORK**

Chicago      New York      Superior, Wis.      Niagara Falls, N. Y.  
 Automatic Return Switch Stands for Passing Sidings  
 Automatic Safety Switch Stands  
 Manganese Construction—Tee Rail Special Work

**ALLIS-CHALMERS**  
 MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,  
 Condensers, Gas and Oil Engines, Air Compressors,  
 Air Brakes

**RWB DYNAMOTORS**

FOR  
 CARBON ARC RAIL JOINT WELDING  
 CARBON ARC RAIL BONDING  
 CARBON and METALLIC ARC GENERAL WELDING  
 Rail Welding and Bonding Co., Cleveland, O.



## TRACTION MOTORS DESERVE THE BEST

Let Us Prove That



## RAILWAY MOTOR BRUSHES ARE THE BEST

BECAUSE

They are SELF-LUBRICATING, NON-ABRASIVE and of UNIFORM QUALITY.

Their CARRYING CAPACITY is HIGH and their COEFFICIENT OF FRICTION LOW.

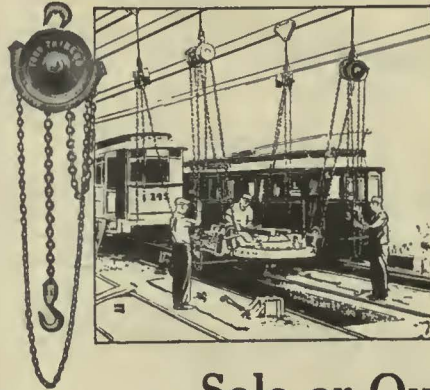
There is a specially designed grade for every purpose—RAILWAY MOTORS, AIR COMPRESSORS or POWERHOUSE EQUIPMENT.

Write for CATALOG B-3

The United States Graphite Company  
Saginaw, Michigan, U. S. A.

District Offices: New York Philadelphia Pittsburgh St. Louis Chicago San Francisco Denver

## FORD TRIBLOC



### Solo or Quartet

USED individually, there are Triblocs to manage any load to 40 Tons; used in batteries of two, three, or four, they take care of loads up to 80, 120 and 160 Tons respectively.

Write for information on any type or capacity to 40 tons

2222-D

FORD CHAIN BLOCK CO.  
2ND & DIAMOND STREETS PHILADELPHIA, PA.

OVER-SEAS REPRESENTATIVE

ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA  
51 CHAMBERS ST. NEW YORK, U. S. A.

PARIS BRUSSELS TURIN BARCELONA RIO DE JANEIRO

## MAIL THAT ORDER TO NIC

### Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO.  
Brooklyn, N. Y.

AMERICAN means QUALITY  
RATTAN SUPPLIES OF EVERY DESCRIPTION

### BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

Alliance, Ohio

### Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER  
SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY

Sold by Net Weights and Full Lengths  
SILVER LAKE COMPANY  
Manufacturers of bell, signal and other cords.  
Newtonville, Massachusetts



FOR dependable service the W & B "Railroad Special" Wrench is unexcelled—and it's practically indestructible.

Seven sizes, 6 to 21 inches.

Screw Wrench Book on request

J. H. WILLIAMS & CO.  
"The Wrench People"

BROOKLYN  
143 Richards St.

BUFFALO  
143 Vulcan St.

CHICAGO  
1143 W. 129 St.



*You're having brush trouble*  
**CORRECT IT**

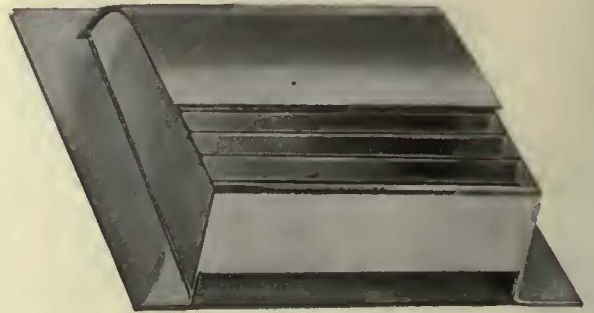
**USE LE CARBONE CARBON BRUSHES**

*They talk for themselves*

**COST MORE PER BRUSH  
COST LESS PER CAR MILE**

**W. J. Jeandroin**  
345 Madison Avenue, New York  
Pittsburgh Office: 634 Wabash Bldg.  
San Francisco Office: 525 Market Street  
Canadian Distributors: Lyman Tube & Supply Co., Ltd.,  
Montreal and Toronto

# VENTILATORS

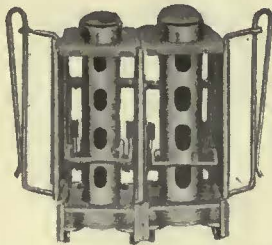


**T**HE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

*More than seven thousand N-L Ventilators sold during 1922.*

**The Nichols-Lintern Company**  
7960 Lorain Ave., Cleveland, O.  
*N-L Products manufactured and sold in Canada by  
Railway and Power Engineering Corporation, Ltd.,  
133 Eastern Avenue, Toronto, Ontario*

## JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

### Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**  
Ravenswood, Chicago, Ill.



Safe One-Man Car operation demands that the motorman's fare collection duties be reduced to the minimum. This is accomplished by the use of

## CLEVELAND Fare Boxes

**The Cleveland Fare Box Co.**  
Cleveland, Ohio



Type R-10

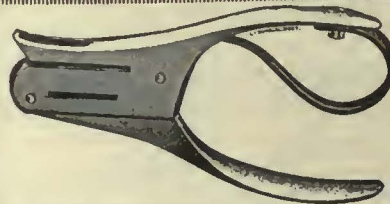
## International Registers

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for  
**HEEREN ENAMEL BADGES.**

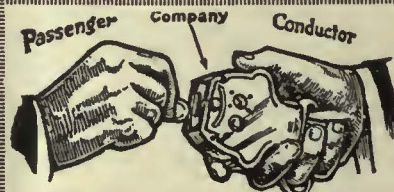
**The International Register Co.**  
15 South Throop Street, Chicago, Illinois



## A Style for Every Service

*Send for Catalog*

**BONNEY-VEHSLAGE  
TOOL CO.**  
Newark, N. J.



**Direct  
Automatic  
Registration**  
By the  
**Passengers  
Rooke Automatic  
Register Co.**  
Providence, R. I.



# SEARCHLIGHT SECTION

## EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

**UNDISPLAYED—RATE PER WORD:**  
*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.  
*Positions Vacant* and all other classifications, 8 cents a word, minimum charge \$2.00.  
*Proposals*, 4¢ cents a line an insertion.

**INFORMATION:**  
*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.  
 Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

**DISPLAYED—RATE PER INCH:**  
 1 to 3 inches.....\$4.50 an inch  
 4 to 7 inches..... 4.30 an inch  
 8 to 14 inches..... 4.10 an inch  
 An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

### POSITIONS VACANT

**DRAFTSMAN** wanted; familiar with steam and street railway special track work. State salary, experience, etc. P-495, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

**ENGINEER** wanted, familiar with street railway special track work, to work into sales organization. Give full details in first letter. P-494, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

**ENGINEER** with broad experience in electric railway field for important editorial position on Electric Railway Journal; must be under thirty-five, energetic, good personality and must have a constructive view of the industry. If you are one who enjoys lots of hard work as well as wide association in a fine way with electric railway men and can write, address Managing Editor, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

**GRADUATE** electrical engineer wanted by large street railway in eastern Pennsylvania for manager's office; should be about thirty years of age, experienced thoroughly in street railway motors, feeder lines and substations; preferably a man with shop experience. P-490, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

**SUPERINTENDENT** wanted for Street Railway Company in a town of 25,000 people in the Southwest, operating 12 cars. None but high grade men of experience need apply. P-497, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

**YOUNG** engineer, with a year or two experience in the electric railway field, for an editorial position in New York on Electric Railway Journal. Journal editorial work offers a splendid opportunity for a man to grow rapidly. Must be energetic and have initiative; good opportunity for advancement. Address Managing Editor, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

### POSITIONS WANTED

**AUDITOR**, broad experience as chief accounting officer with representative utility interests, now engaged on important work for federal government, desires connection with progressive utility as auditor, secretary or treasurer. PW-488, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

**CIVIL** engineer, technical; married; member American Society Civil Engineers; six years' miscellaneous engineering experience, twelve with street and interurban

### POSITIONS WANTED

railways; present, engineer maintenance of way and structures, large property; engineer of recognized ability; excellent references; interview solicited. PW-489, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

**SUPERINTENDENT** motive power and equipment, with good record based on broad experience, city and interurban, A.C. and D.C., desires position. PW-491, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

### FOR SALE

An exceptional opportunity is offered to acquire the

## Completely Equipped Plant and Good Will of an Established Electrical Manufacturing Company

with a national reputation for making the highest grade of product, and known to practically every large public service company in the country.

*The entire business may be purchased outright or a partian of the capitol stock.*

Address: BO-496, Electric Railway Journal, 10th Ave. and 36th St., New York.

### FOR SALE

#### 20—Peter Witt Cars

Weight Complete, 33,000 lbs.  
 Seat 53, 4—G. E. No. 258-C Motors.  
 K-12-H Control, West. Air Taylor Trucks,  
 R.H. Type, Complete.

ELECTRIC EQUIPMENT CO.  
 Commonwealth Bldg., Philadelphia, Pa.

### FOR SALE

1 New Indianapolis

#### ELECTRIC WELDER

TRANSIT EQUIPMENT CO.  
 Cars—Motors  
 501 Fifth Avenue, New York.

## The Searchlight Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

### THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time. *Are you* using the Searchlight Section?

### "Paint Sells Transportation"

Let us show you

BECKWITH-CHANDLER COMPANY  
 203 EMMETT ST. NEWARK, N. J.



Gets Every Fare  
**PEREY TURNSTILES**  
 or **PASSIMETERS**

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.  
 30 Church Street, New York City



# WHAT AND WHERE TO BUY

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

- Advertising, Street Car**  
Collier, Inc., Barron G.
- Air Receivers, Aftercoolers**  
Ingersoll-Rand Co.
- Anchors, Guy**  
Electric Service Sup. Co.  
Ohio Brass Co.  
Standard Steel Works Co.  
Westinghouse E. & M. Co.
- Armature Shop Tools**  
Elec. Service Supplies Co.
- Automatic Return Switch**  
Stands  
Ramapo Ajax Corp.
- Automatic Safety Switch**  
Stands  
Ramapo Ajax Corp.
- Axles**  
Bemis Car Truck Co.  
St. Louis Car Co.
- Axles, Car Wheel**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Westinghouse E. & M. Co.
- Axle Straighteners**  
Columbia M. W. & M. I. Co.
- Babbitt Metal**  
More-Jones Br. & Metal Co.
- Babbitting Devices**  
Columbia M. W. & M. I. Co.
- Badges and Buttons**  
Electric Service Sup. Co.  
Internat'l Register Co., The
- Batteries, Dry**  
National Carbon Co.
- Bearings and Bearing Metals**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Gilbert & Sons, B. F. A.  
Le Grand, Inc., M. S.  
More-Jones Br. & Metal Co.  
Westinghouse E. & M. Co.
- Bearings, Center and Roller**  
Side  
Stueckl Co., A.
- Bearings, Roller**  
Stafford Roller Bearing Car  
Truck Corp'n
- Bells and Gongs**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Consolidated Car-Heating Co.  
Electric Service Sup. Co.
- Bollers**  
Babcock & Wilcox Co.
- Bonding Apparatus**  
American Steel & Wire Co.  
Electric Service Sup. Co.  
Indianapolis Switch & Frog  
Co.  
Ohio Brass Co.  
Rail Welding & Bonding Co.  
Railway Track-work Co.
- Bonds, Rail**  
American Steel & Wire Co.  
Electric Service Sup. Co.  
General Electric Co.  
Indianapolis Switch & Frog  
Co.  
Ohio Brass Co.  
Railway Track-Work Co.  
Rail Welding & Bonding Co.  
Westinghouse E. & M. Co.
- Book Publishers**  
McGraw-Hill Book Co.
- Brackets and Cross Arms**  
(See also Poles, Ties,  
Posts, etc.)
- Bales Exp. Steel & Tr. Co.**  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
Hubbard & Co.  
Ohio Brass Co.
- Brake Adjusters**  
National Ry. Appliance Co.  
Westinghouse Tr. Br. Co.
- Brake Shoes**  
Amer. Br. Shoe & Fdry. Co.  
Barbour-Stockwell Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.
- Brakes, Brake Systems and**  
Brake Parts  
Allis-Chalmers Mfg. Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
National Brake Co.  
Westinghouse Tr. Br. Co.
- Brooms, Track, Steel or Rat-**  
tan  
Amer. Rattan & Reed Mfg.  
Co.
- Brushes, Carbon**  
General Electric Co.  
Jeandron, W. J.  
Le Carbone Co.  
Morganite Brush Co.  
National Carbon Co.  
Westinghouse E. & M. Co.
- Brushes, Graphite**  
Morganite Brush Co.  
National Carbon Co.  
U. S. Graphite Co.
- Brushes, Wire Pneumatic**  
Ingersoll-Rand Co.
- Brush Holders**  
Anderson Mfg. Co., A. &  
J. M.  
Columbia M. W. & M. I. Co.
- Buses, Motor**  
Brill Co., The J. G.  
Mitten Traylor, Inc.  
St. Louis Car Co.
- Bushings**  
Nat'l Fibre & Insulation Co.
- Bushings, Case Hardened and**  
Manganese  
Bemis Car Truck Co.  
Brill Co., The J. G.
- Cables (See Wires and**  
Cables)
- Cambric, Tapes, Yellow &**  
Black Varnished  
Irvington Varnish & Ina. Co.
- Carbon Brushes (See Brushes**  
Carbon)
- Car Lighting Fixtures**  
Elec. Service Supplies
- Car Panel Safety Switches**  
Consolidated Car-Heating Co.  
Westinghouse E. & M. Co.
- Cars, Dump**  
Differential Steel Car Co.
- Cars, Gas Rail**  
St. Louis Car Co.
- Cars, Passenger, Freight**  
Express, Etc.  
Amer. Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
National Ry. Appliance Co.  
St. Louis Car Co.  
Wason Mfg. Co.
- Cars, Second Hand**  
Electric Equipment Co.
- Cars, Self-Propelled**  
General Electric Co.
- Castings, Brass, Composition**  
or Copper  
Anderson Mfg. Co., A. &  
J. M.  
Columbia M. W. & M. I. Co.  
More-Jones Br. & Metal Co.
- Castings, Gray Iron and**  
Steel  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.
- Castings, Malleable and**  
Brass  
Amer. Brake Shoe & Fdry.  
Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Le Grand, Inc., Nic
- Catchers and Retrievers,**  
Trolley  
Electric Service Sup. Co.  
Ohio Brass Co.  
Wood Co., Chas. N.
- Catenary Construction**  
Archbold-Brady Co.
- Ceilings, Plywood, Panels**  
Haskelite Mfg. Co.
- Circuit Breakers**  
General Electric Co.  
Westinghouse E. & M. Co.
- Clamps and Connectors for**  
Wires and Cables  
Anderson Mfg. Co., A. &  
J. M.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
Hubbard & Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Cleaners and Scrapers—**  
Track (See also Snow-  
Flows, Sweepers and  
Brooms)  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Ohio Brass Co.
- Clusters and Sockets**  
General Electric Co.
- Coal and Ash Handling (See**  
Conveying and Hoisting  
Machinery)
- Coil Banding and Winding**  
Machines  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Coils, Armature and Field**  
Columbia M. W. & M. I. Co.  
Economy Elec. Devices Co.  
General Electric Co.  
Rome Wire Co.
- Colls, Choke and Kicking**  
General Electric Co.  
Westinghouse E. & M. Co.
- Coin-Counting Machines**  
Electric Service Sup. Co.  
Internat'l Register Co., The  
Johnson Fare Box Co.
- Commutator Slotters**  
Electric Service Sup. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Commutator Truing Devices**  
General Electric Co.
- Commutators or Parts**  
Cameron Elect'l Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Compressors, Air**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Ingersoll-Rand Co.  
Westinghouse Tr. Br. Co.
- Compressors, Air, Portable**  
Ingersoll-Rand Co.
- Condensers**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Ingersoll-Rand Co.  
Westinghouse E. & M. Co.
- Condenser, Papers**  
Irvington Varnish & Ina. Co.  
Connectors, Solderless  
Westinghouse E. & M. Co.
- Connectors, Trailer Car**  
Consolidated Car-Heat'g Co.  
Electric Service Sup. Co.  
Ohio Brass Co.
- Controllers or Parts**  
Allis-Chalmers Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Controller Regulators**  
Electric Service Sup. Co.
- Controlling Systems**  
General Electric Co.  
Westinghouse E. & M. Co.
- Converters, Rotary**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Conveying and Hoisting Ma-**  
chinery  
Columbia M. W. & M. I. Co.
- Copper Wire**  
Anaconda Copper Min. Co.
- Cord Adjusters**  
Nat'l Fibre & Insulation Co.
- Cord, Bell, Trolley Register,**  
etc.  
Brill Co., The J. G.  
Electric Service Sup. Co.  
Internat'l Register Co., The  
Roebling's Sons Co., J. A.  
Samsom Cordage Works  
Silver Lake Co.
- Cord Connectors & Couplers**  
Electric Service Sup. Co.  
Samsom Cordage Works  
Wood Co., Chas. N.
- Couplers, Car**  
Brill Co., The J. G.  
Ohio Brass Co.  
Westinghouse Tr. Br. Co.
- Cranes**  
Allis-Chalmers Mfg. Co.  
Cross Arms (See Brackets)
- Crossings**  
Ramapo Ajax Corp.  
Crossing Foundations  
International Steel Tie Co.
- Crossing Frog & Switch**  
Ramapo Ajax Corp.  
Wharton, Jr., & Co., Wm.
- Crossing Manganese**  
Indianapolis Switch & Frog  
Co.
- Ramapo Ajax Corp.**  
Crossing Signals (See Sig-  
nals, Crossing)
- Crossings, Track (See Track)**  
Special Work
- Crossings, Trolley**  
Ohio Brass Co.
- Crushers, Rock**  
Allis-Chalmers Mfg. Co.
- Curtains and Curtain**  
Fixtures  
Brill Co., The J. G.  
Electric Service Sup. Co.  
Morton Mfg. Co.
- Dealers' Machinery**  
Electric Equipment Co.
- Derailing Devices (See Track**  
Work)
- Derailing Switches**  
Ramapo Ajax Corp.
- Destination Signs**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Detective Service**  
Wish Service, P. Edward  
Dogs, Lathe  
Williams & Co., J. H.
- Door Operating Devices**  
Con. Car-Heating Co.  
Nat'l Pneumatic Co., Inc.  
Doors and Door Fixtures  
Brill Co., The J. G.  
General Electric Co.
- Doors, Folding Vestibule**  
Nat'l Pneumatic Co., Inc.  
Draft Rigging (See Couplers)
- Drills, Rock**  
Ingersoll-Rand Co.
- Drills, Track**  
American Steel & Wire Co.  
Electric Service Sup. Co.  
Ingersoll-Rand Co.  
Ohio Brass Co.
- Dryers, Sand**  
Electric Service Sup. Co.
- Ohio Brass Co.**  
Electrical Wires and Cables  
Amer. Electrical Works  
American Steel & Wire Co.  
Roebling's Sons Co., J. A.
- Electric Grinders**  
Railway Track-Work Co.
- Electrodes, Carbon**  
Indianapolis Switch & Frog  
Co.  
Railway Track-Work Co.
- Electrodes, Steel**  
Indianapolis Switch & Frog  
Co.
- Railway Track-Work Co.**  
Engineers Consulting Con-  
tracting and Operating  
Allison & Co., J. R.  
Archbold-Brady Co.  
Arnold Co., The  
Beeler John A.  
Bylesby & Co., H. M.  
Day & Zimmermann  
Feustel, Robert M.  
Ford, Bacon & Davis  
Hemphill & Wells  
Holst, Englehardt W.  
Jackson, Walter  
Kelly, Cooke & Co.  
Ong, Joe R.  
Parsons, Klapp, Brinkerhoff  
& Douglas  
Richey, Albert S.  
Robinson & Co., Inc.,  
Dwight P.  
Sanderson & Porter  
Sangster & Mstbews  
Smith & Co., C. E.  
Stone & Webster  
White Engineering Corp.,  
The J. G.  
Witt, Peter
- Engineers, Consulting, Con-**  
Engines, Gas, Oil or Steam  
Allis-Chalmers Mfg. Co.  
Ingersoll-Rand Co.  
Westinghouse E. & M. Co.
- Fare Boxes**  
Cleveland Fare Box Co.  
Economy Electric Devices  
Co.  
Johnson Fare Box Co.  
National Ry. Appliance Co.
- Fences, Woven Wire and**  
Fence Posts  
American Steel & Wire Co.
- Fenders and Wheel Guards**  
Brill Co., The J. G.  
Cleveland Fare Box Co.  
Consolidated Car Fender Co.  
Electric Service Sup. Co.  
Le Grand, Inc., Nic
- Fibre and Fibre Tubing**  
Nat'l Fibre & Insulation Co.  
Westinghouse E. & M. Co.
- Field Coils (See Coils)**
- Flooring Composition**  
Amer. Mason Safety Tread  
Co.
- Forgings**  
Columbia M. W. & M. I. Co.  
Williams & Co., J. H.
- Frogs & Crossings, Tee Rail**  
Ramapo Ajax Corp.
- Frogs, Track**  
(See Track Work)  
Wharton, Jr., & Co., Wm.
- Frogs, Trolley**  
Ohio Brass Co.
- Fuses and Fuse Boxes**  
Columbia M. W. & M. I. Co.  
Consolidated Car-Heating Co.  
General Electric Co.  
Westinghouse E. & M. Co.  
Williams & Co., J. H.
- Fuses, Refillable**  
Columbia M. W. & M. I. Co.  
General Electric Co.
- Gages, Oil and Water**  
Ohio Brass Co.
- Gaskets**  
Westinghouse Tr. Br. Co.
- Gas-Electric Cars**  
General Electric Co.
- Gas Producers**  
Westinghouse E. & M. Co.
- Gasoline Torches**  
Economy Electric Devices  
Co.
- Gates, Car**  
Brill Co., The J. G.
- Gear Cases**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Westinghouse E. & M. Co.
- Gears and Pinions**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
General Electric Co.  
National Railway Appliance  
Co.  
Nuttall Co., R. D.  
Tool Steel Gear & Pinion  
Co.
- Generating Sets, Gas-Electric**  
General Electric Co.
- Generators**  
Allis-Chalmers Mfg. Co.  
Westinghouse E. & M. Co.
- Goggles, Eyes**  
Indianapolis Switch & Frog  
Co.  
Smith Heater Co., Peter  
Gongs (See Bells and Gongs)  
Greases (See Lubricants)
- Grinders and Grinding Sup-**  
plies  
Indianapolis Switch & Frog  
Co.  
Railway Track-Work Co.  
Grinders, Portable  
Railway Track-work Co.
- Grinders, Portable Electric**  
Railway Track-work Co.  
Grinding Bricks and Wheels  
Railway Track-work Co.
- Guard Rail Clamps**  
Ramapo Ajax Corp.
- Guard Rails, Tee Rail and**  
Manganese  
Ramapo Ajax Corp.
- Guards, Trolley**  
Electric Service Sup. Co.  
Ohio Brass Co.
- Hammers, Pneumatic**  
Ingersoll-Rand Co.
- Harps, Trolley**  
Anderson Mfg. Co., A. &  
J. M.  
Electric Service Sup. Co.  
More-Jones Br. & Metal Co.  
Nuttall Co., R. D.  
Star Brass Works
- Headlights**  
Electric Service Sup. Co.  
General Electric Co.  
Ohio Brass Co.
- Headlining**  
Haskelite Mfg. Co.
- Heaters, Car (Electric)**  
Consolidated Car Heating Co.  
Economy Electric Devices  
Co.  
Gold Car Heating & Light-  
ing Co.  
National Ry. Appliance Co.  
Smith Heater Co., Peter
- Heaters, Car, Hot Air and**  
Water  
Smith Heater Co., Peter
- Heaters, Car (Stove)**  
Electric Service Sup. Co.  
Sterling Varnish Co.  
Westinghouse E. & M. Co.
- Helmets, Welding**  
Indianapolis Switch & Frog  
Co.  
Railway Track-Work Co.
- Hoists and Lifts**  
Columbia M. W. & M. I. Co.  
Ford-Chain Block Co.  
Ingersoll-Rand Co.
- Hose, Bridges**  
Ohio Brass Co.
- Hydraulic Machinery**  
Allis-Chalmers Mfg. Co.
- Instruments, Measuring and**  
Recording  
Economy Electric Devices  
Co.  
Electric Service Sup. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and**  
Tape  
General Electric Co.  
Irvington Varnish & Ina.  
Co.  
Nat'l Fibre & Insulation Co.  
Standard Underground Cable  
Westinghouse E. & M. Co.
- Insulating Silk**  
Irvington Varnish & Ins.  
Co.
- Insulating Varnishes**  
Irvington Varnish & Ins.  
Co.  
Sterling Varnish Co., The



## Brake Shoes

### A. E. R. A. Standards

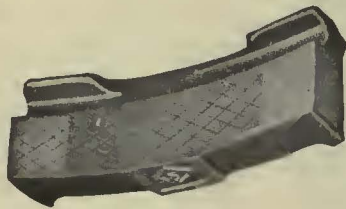
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for

**SAFETY  
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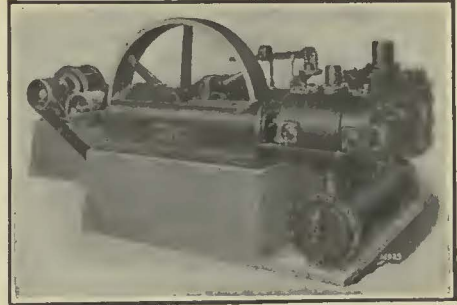


D-67 for Narrow Treads  
D-87 for Wide Treads

American Brake Shoe and Foundry Co.

30 Church Street, New York

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## Compressor Efficiency at Full and Partial Loads

Type "XCB" Air Compressors are equipped with the 5-Step Clearance Control, which automatically causes the compressor to operate at full, three-quarter, one-half, one-quarter or no load, depending upon the demand for air.

This compressor can be big enough to deliver the large volume needed during rush periods, without sacrificing efficiency when the demand is lessened.

Bulletin 3042

# Ingersoll Rand

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615-C

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BEARINGS**

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Grand Central Terminal  
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85 Union Trust Bldg., Harrisburg, Pa.  
Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

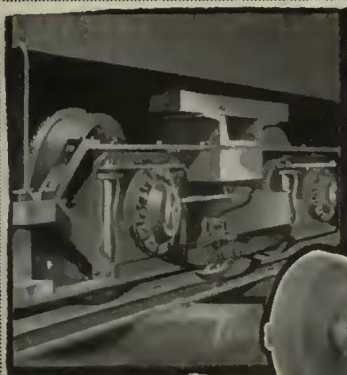
### RAILWAY SUPPLIES

- |                                  |  |
|----------------------------------|--|
| Tool Steel Gears and Pinions     | Drew Line Material and Railway Specialties |
| Anderson Slack Adjusters         | Hartman Centering Center Plates            |
| Genesco Paint Oils               | Economy Power Saving Meters                |
| Dunham Hopper Door Devise        | II & W Electric Heaters                    |
| Feasible Drop Brake Staffs       | Garland Ventilators                        |
| Flaxlinum Insulation             | Flit Sanders                               |
| Angle-American Varnishes         | National Safety Car Equipment              |
| Paints, Enamels, Surfacing,      | Co.'a One-Man Safety Sars                  |
| Shop Cleaner                     | Central Equipment Company's                |
| Johnson Fare Boxes               | Hand Holds                                 |
| Peerless and Perry Side Bearings | Tnemo Paint & Oil Company's Cement Paint   |



- Insulation (See also Paints)**  
Anderson Mfg. Co., A. & J. M.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
General Electric Co.  
Irvington Varnish & Ins. Co.  
Sterling Varnish Co., The
- Insulation, Slot**  
Irvington Varnish & Ins. Co.
- Insulators**  
(See also Line Material)  
Anderson Mfg. Co., A. & J. M.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
Flood City Mfg. Co.  
General Electric Co.  
Irvington Varnish & Ins. Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Insulator Pins**  
Electric Service Sup. Co.  
Hubbard & Co.
- Insurance, Fire**  
Marsh & McLennan
- Jacka (See also Cranes, Hoists and Lifts)**  
Buckeye Jack Mfg. Co.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Joints, Rail**  
(See Rail Joints)
- Journal Boxes**  
Bemia Car Truck Co.  
Brill Co., The J. G.
- Junction Boxes**  
Standard Underground Cable Corp. Service Bureau, The
- Lamp Guards and Fixtures**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent**  
(See also Headlights)  
Anderson Mfg. Co., A. & J. M.  
General Electric Co.  
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**  
Nichols-Lintern Co.  
Ohio Brass Co.
- Lanterns, Classification**  
Nichols-Lintern Co.
- Lathe Attachments**  
Williams & Co., J. H.
- Lightning Protection**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)**  
Anderson Mfg. Co., A. & J. M.  
Archbold-Brady Co.  
Columbia M. W. & M. I. Co.  
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Electric Ry. Equip. Co.  
General Electric Co.  
More-Jones Br. & Metal Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Locking Spring Boxes**  
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- Locomotives, Electric**  
General Electric Co.  
Westinghouse E. & M. Co.
- Lubricating Engineers**  
Texas Co.
- Universal Lubricating Co.**
- Lubricants, Oils and Greases**  
Texas Co.  
Universal Lubricating Co.
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Columbia M. W. & M. I. Co.
- Machine Work**  
Columbia M. W. & M. I. Co.
- Manganese Steel Castings**  
Wharton, Jr., & Co., Wm.
- Manganese Steel Guard Rails**  
Ramapo Ajax Corp.
- Manganese Steel Special Track Work**  
Indianapolis Switch & Frog Co.  
Ramapo Ajax Corp.  
Wharton, Jr., & Co., Wm.
- Meters (See Instruments)**
- Meters, Car, Watt-Hour**  
Economy Electric Devices Co.
- Motor Buses**  
(See Buses, Motor)
- Motor Men's Seats**  
Brill Co., The J. G.  
Electric Service Sup. Co.  
Wood Co., Chas. N.
- Motors, Electric**  
Allis-Chalmers Mfg. Co.  
Westinghouse E. & M. Co.
- Motors and Generators, Sets**  
General Electric Co.
- Nuts and Bolts**  
Allis-Chalmers Mfg. Co.  
Barbour-Stockwell Co.  
Bemia Car Truck Co.
- Columbia M. W. & M. I. Co.**  
Hubbard & Co.
- Oils (See Lubricants)**
- Packing**  
Electric Service Sup. Co.  
Westinghouse E. & M. Co.
- Paints and Varnishes, Inau-lating**  
Beckwith-Chandler Co.  
Sterling Varnish Co.
- Paints and Varnishes (Preser-vative)**  
Beckwith-Chandler Co.
- Paints and Varnishes for Woodwork**  
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- Pavement Breakers**  
Ingersoll-Rand Co.
- Paving Material**  
Amer. Br. Shoe & Fdry. Co
- Pickups, Trolley Wire**  
Electric Service Sup. Co.  
Ohio Brass Co.
- Pinion Pullers**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
General Electric Co.  
Wood Co., Chas. N.
- Pinions (See Gears)**
- Piles, Cass Hardened, Wood and Iron**  
Bemia Car Truck Co.  
Electric Service Sup. Co.  
Ohio Brass Co.  
Westinghouse Tr. Br. Co.
- Pipe Fittings**  
Westinghouse Tr. Br. Co.
- Planers (See Machine Tools)**
- Plates for Tee Rail Switches**  
Ramapo Ajax Corp.
- Pliers—Rubber Insulated**  
Electric Service Sup. Co.  
Ingersoll-Rand Co.
- Pneumatic Tools**
- Pole Reinforcing**  
Hubbard & Co.
- Pole Line Hardware**  
Ohio Brass Co.
- Poles, Metal Street**  
Bates Exp. Steel Truss Co.  
Electric Ry. Equip. Co.  
Hubbard & Co.
- Poles, Trolley**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Nuttall Co., R. D.
- Poles, Tubular Steel**  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.
- Poles and Ties, Treated**  
International Creosoting and Construction Co.
- Poles, Ties, Post, Piling and Lumber**  
International Creosoting and Construction Co.  
Le Grand, Inc. Nlc  
Nashville Tie Co.
- Power Saving Devices**  
Economy Electric Devices Co.  
National Ry. Appliance Co.
- Pressure Regulators**  
General Electric Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Pumps**  
Allis-Chalmers Mfg. Co.  
Ingersoll-Rand Co.
- Pumps, Vacuum**  
Ingersoll-Rand Co.
- Punches, Ticket**  
Bonney-Vehalge Tool Co.  
International Reg. Co., The  
Wood Co., Chas. N.
- Rail Braces & Fastenings**  
Ramapo Ajax Corp.
- Rail Grinders (See Grinders)**
- Rail Joints**  
Rail Joint Co., The
- Rail Joints, Welded**  
Indianapolis Switch & Frog Co.
- Railway Safety Switches**  
Consolidated Car Heating Co.  
Westinghouse E. & M. Co.
- Rail Welding**  
Rail Welding & Bonding Co.  
Railway Track-work Co.
- Rattan**  
Amer. Rat. & Reed Mfg. Co.  
Brill Co., The J. G.  
Electric Service Sup. Co.  
St. Louis Car Co.
- Registers and Fittings**  
Brill Co., The J. G.  
Electric Service Sup. Co.  
International Reg. Co., The  
Rooke Automatic Reg. Co.
- Reinforcement, Concrete**  
American Steel & Wire Co.
- Repair Shop Appliances (See also Coil Banding and Winding Machines)**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Repair Work (See also Colls)**  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Replacers, Car**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Resistance, Grid**  
Columbia M. W. & M. I. Co.
- Resistance, Wire and Tube**  
General Electric Co.  
Westinghouse E. & M. Co.
- Resistances**  
Consolidated Car-Heating Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**  
General Electric Co.  
Westinghouse E. & M. Co.
- Roller Bearings**  
Stafford Roller Bearing Car Truck Corp.
- Roofs**  
Haskelite Mfg. Co.
- Sanders, Track**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Nichols-Lintern Co.  
Ohio Brass Co.
- Sash Fixtures, Car**  
Brill Co., The J. G.
- Scrapers, Track (See Clean-ers and Scrapers, Track)**
- Screw Drivers, Rubber In-sulated**  
Electric Service Sup. Co.
- Sending Materials**  
Brill Co., The J. G.
- Seats, Bus**  
St. Louis Car Co.
- Seats, Car (See also Rattan)**  
Amer. Rattan & Reed Mfg. Co.  
Brill Co., The J. G.  
Heywood-Wakefield Co.  
St. Louis Car Co.
- Second Hand Equipment**  
Electric Equipment Co.
- Secret Service**  
Corp. Service Bureau, The
- Shades, Vestibule**  
Brill Co., The J. G.
- Shovels**  
Allis-Chalmers Mfg. Co.  
Brill Co., The J. G.  
Hubbard & Co.
- Slide Bearings (See Bearings, Center and Side)**
- Signals, Car Starting**  
Coo. Car Heating Co.  
Electric Service Sup. Co.  
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**  
Nichols-Lintern Co.
- Signal Systems, Block**  
Electric Service Sup. Co.  
Nachod Signal Co., Inc.  
U. S. Electric Signal Co.  
Wood Co., Chas. N.
- Signal Systems, Highway**  
Crossing  
Nachod Signal Co., Inc.  
U. S. Electric Signal Co.
- Slack Adjusters**  
(See Brake Adjusters)
- Sleet Wheels and Cutters**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Ry. Equip. Co.  
More-Jones Br. & Metal Co.  
Nuttall Co., R. D.
- Smokestacks, Car**  
Nichols-Lintern Co.
- Snow-Plows, Sweepers and Brooms**  
Amer. Rat. & Reed Mfg. Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Consolidated Car Fender Co.
- Special Adhesive Papers**  
Irvington Varnish & Ins. Co.
- Spikes**  
Amer. Steel & Wire Co.
- Splicing Compounds**  
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Track**  
Amer. Steel & Wire Co.  
Bemia Car Truck Co.  
Brill Co., The J. G.  
St. Louis Car Co.
- Sprinklers, Track and Road**  
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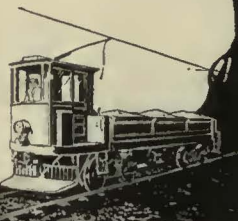
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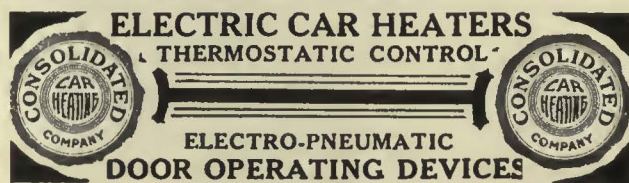
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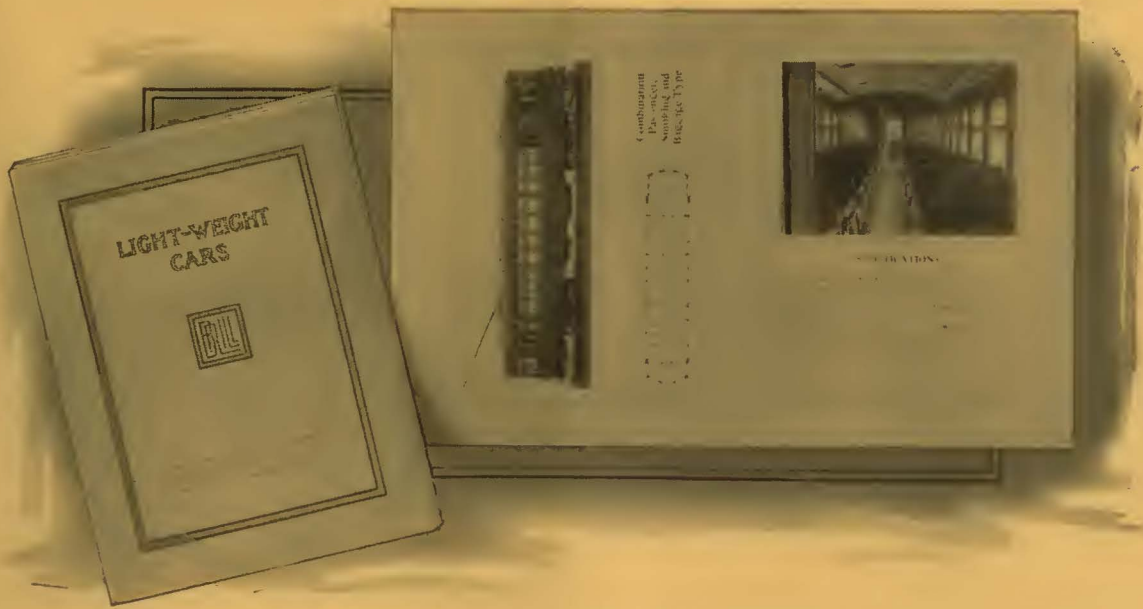
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