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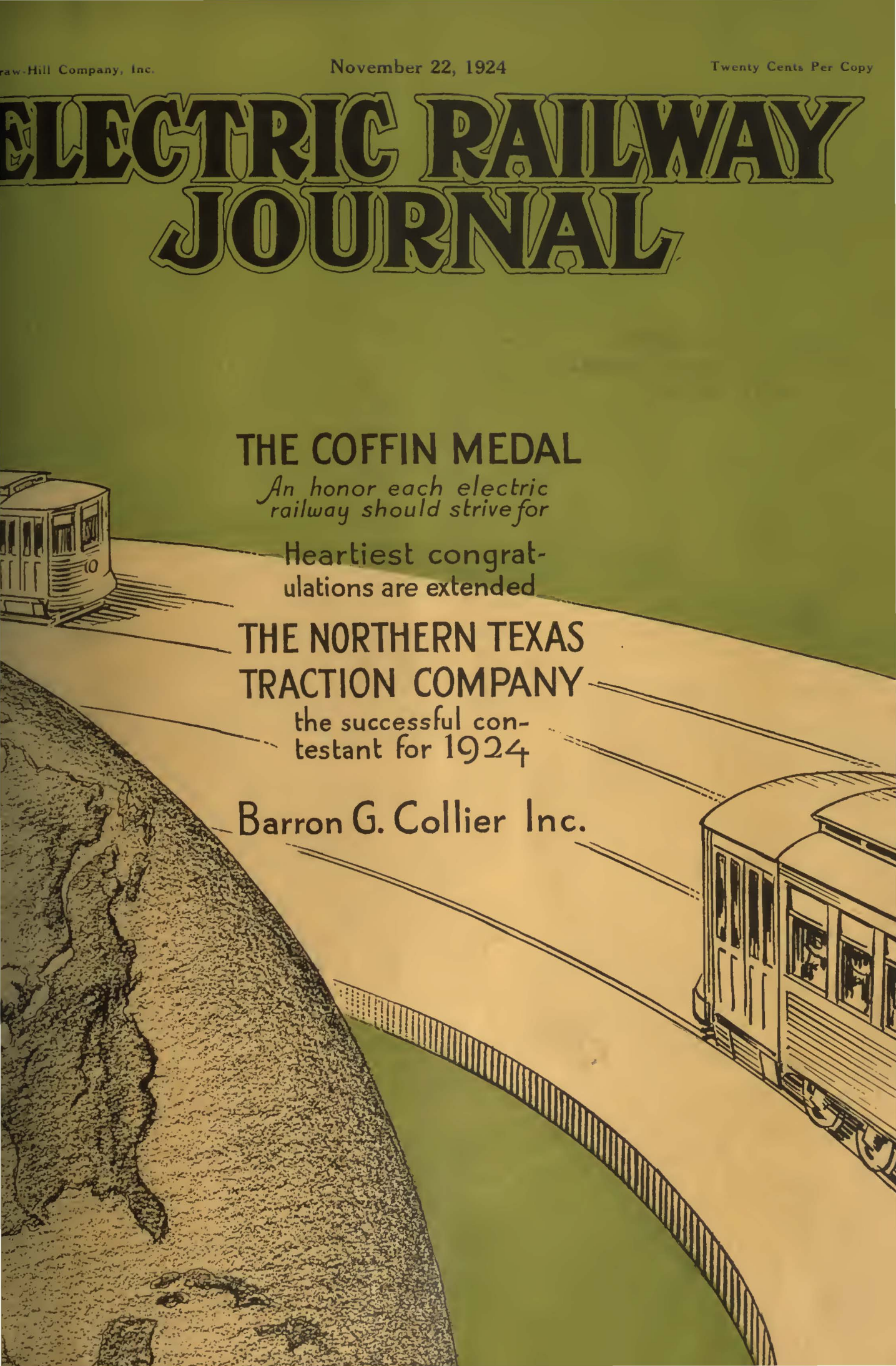
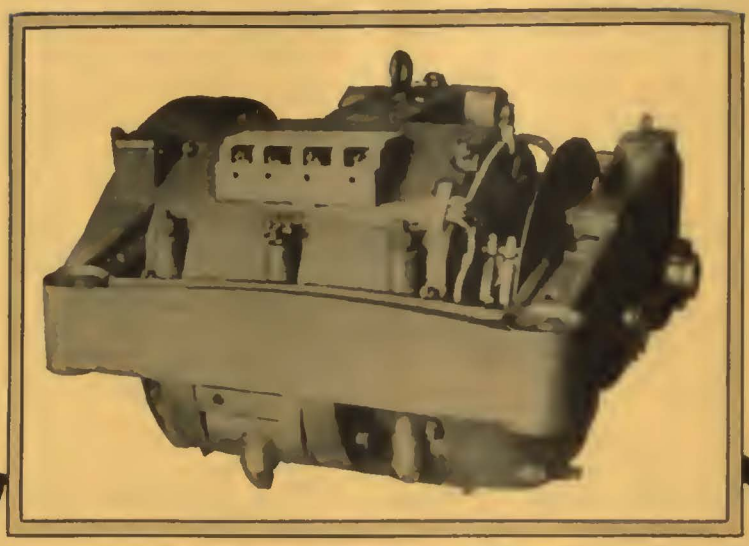
ELECTRIC RAILWAY JOURNAL





Westinghouse No. 3 Railway Motor

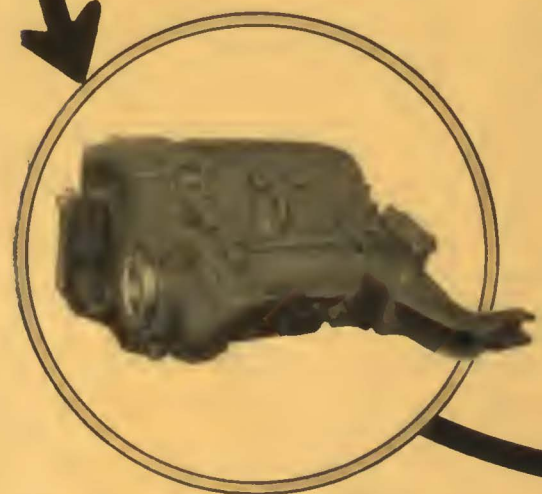
2500 Miles Per Month For Thirty Three Years!

RELIABILITY, Low Maintenance and Long Life are personified in the Westinghouse No. 3 Railway Motor, removed from service for exhibition at the A. E. R. A. Convention recently held at Atlantic City. This motor, built thirty-three years ago, has run over a million miles.

Westinghouse Railway Motors

represent the best of thirty-three years operating and manufacturing experience. They are better today than ever.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries



Westinghouse No. 510, 35 HP., 600-volt Railway Motor. The up-to-date successor of No. 3.
Complete specifications upon request.

W
WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 64, No. 21 New York, November 22, 1924 Pages 869-906

ELECTRIC RAILWAY JOURNAL

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"What Are the Facts?"

SO READS the placard which the head of one of the largest industrial organizations in the United States has had placed on the wall behind his desk, where its message will greet the incoming visitor. The phrase is a good one to be kept in mind by others as well as business executives. It expresses a policy of particular importance in the publication of technical magazines. This thought is never lost sight of by the editors of the ELECTRIC RAILWAY JOURNAL.

Fiction and fancy have their places. Indeed, it would be a dull world that was composed entirely of facts and figures. But the place of fiction is not in this paper. Here, we believe, our readers expect to find an accurate presentation of facts.

It is gratifying to have the confidence of the industry in the matter published by the JOURNAL. We are very jealous of this confidence. We believe it is justified. We spare no pains to make it so. Mistakes do sometimes occur, as in every business. When discovered they are immediately acknowledged and corrected. But the search for facts is continued unremittingly.

This policy has established for the JOURNAL a record for accuracy, and we insist that it shall be second to none.

Number of Copies Printed, 6,300

STEEL TWIN TIES

Low Initial Cost—Long Life Joints Renewable Foundation

THE REASONS for the continually growing interest in steel tie construction for paved track work which are stated above are definitely based on experience. The cost records for 1924 (where the work was installed with modern equipment) are apparently less on the index basis than prewar costs.

The long life of Joints (the weakest point in any track) is on record showing up to thirteen years experience.

The renewal methods are being utilized on upwards of five miles of steel tie construction this Summer. The first renewal has had a two year test.

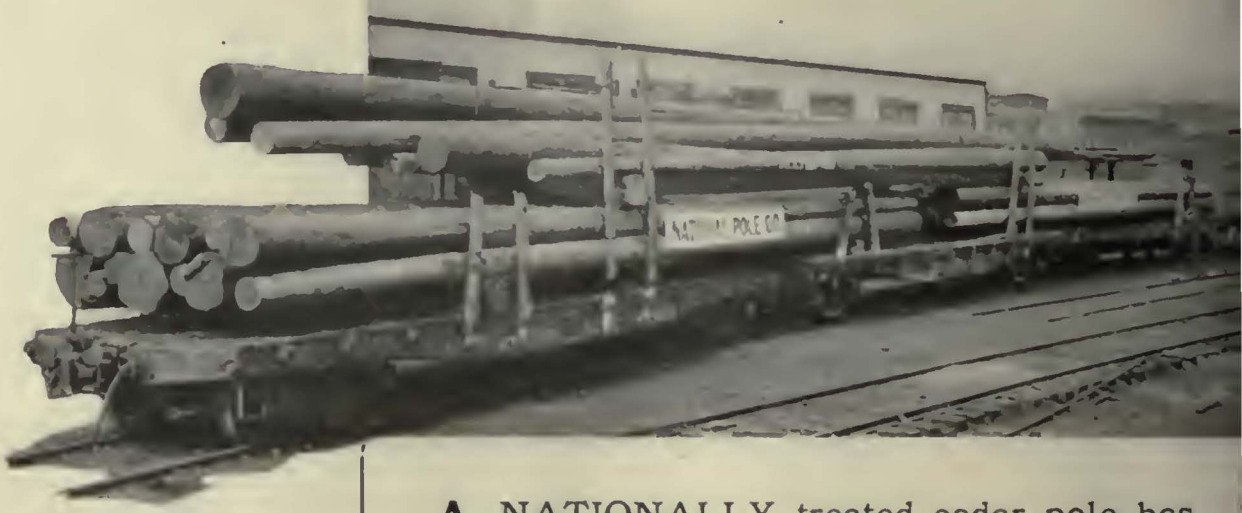
All this data, too voluminous, for this space is included in our folder "Steel Tie Track Construction." Ask for it before settling your 1925 construction plans.

The International Steel Tie Co., Cleveland, Ohio

Steel Twin Tie Track

Renewable Track · · Permanent Foundation

National Poles are Cedar Poles Plus



NPCo

Western Red Cedar

Light, Durable and Strong
Plain or Treated Poles

Northern White Cedar

A NATIONALLY treated cedar pole has little in common with any other cedar pole. It comes from our own vast and unfailing supply of forest tracts. It passes many rigid inspections before it is selected as worthy to bear the N. P. Co. stamp. It has a better opportunity for seasoning, for it's only "one in a million" in the National pole yards. The methods and processes applied to the treatment of a National Pole are as distinctive and superior as years of continued research work on the part of this Company can make it.

And the result of all these painstaking methods is a cedar pole *plus* or, in other words, a National Pole branded with the date of the year of treatment.

NATIONAL POLE COMPANY

Escanaba, Michigan

Distributors:

Western Electric Company

THE long life of Garfords—the freedom from expensive, time taking repairs has been the subject of much comment among tradesmen. The reason for this record is no secret—it is the result of clear cut ideals, well coordinated.

THE ORGANIZATION *assures uninterrupted service.*

Garford believes in looking ahead for the transportation needs of tomorrow.

With resources of over $10,000,000 and an aggressive management, consistent advancement is assured. Every member of the executive staff is imbued with this spirit of progress.

Direct factory branches, distributors, dealers and representatives in principal cities give nationwide distribution. Garfords are operated in 46 foreign countries.

THE FACTORY—*Capacity 700 trucks monthly.*

Covers 35 acres, 10 acres under roof, and comprises fifty individual manufacturing and service rendering departments, including plants for gear cutting, thread cutting, drop forging, heat treating, coach building and progressive assembly.

THE LINE *meets every hauling need.*

While all models are built to minimize need for replacement, each part is readily accessible, permitting quick repairs at low cost. Trucks 1 to 7½ tons. Busses 15 to 35 passengers capacity in four and six cylinder models. And Garford instantaneous service is available for owners everywhere.

If you are interested in trucks or busses from any standpoint, communicate with us.

The GARFORD MOTOR TRUCK COMPANY, Lima, Ohio

Beginning in 1902, Garford is now among the eight leading companies manufacturing 78 per cent of the bona-fide trucks

Busses 15 to 35 passengers

Trucks 1 to 7½ tons

Get around

"Bus Operating Practice" the first engineering, legal and service reference books

The need for such a manual has been great. Bus owners, until now, have had no reference book available that explains from an authoritative standpoint the many different phases of bus operating practice.

Mack has provided such a book, written by carefully selected specialists. For the first time the knowledge possessed by the best men in the field of bus operation has been placed between book covers. Chapters include such topics as Establishing the Service, Picking Profitable Lines, Securing the Right to Run, Incorporating the Company, Physical Property, Operation, Figuring Profits, etc. Get in your request now.

Street Paving Costs with Mack Buses

STREET PAVING is often a financial stumbling block—an investment to be avoided if possible.

Buses get around this problem easily and furthermore eliminate the maintenance of track and overhead construction.

And there's a friendly regard for the modern bus on the part of the riding public that makes the change a profitable one for the railway. Those accustomed to riding in street cars are quickly won over to the luxury, speed and comfort of bus service. They like to ride in buses and particularly the Mack. For the Mack bus is only one step from the ground, its springs float in cushions of resilient rubber and its seats are deep, roomy and comfortable.

The sight of a graceful Mack coming down the street is in itself an invitation to ride. There's a friendly welcome on the running board.

From an engineering standpoint, the advantages of the Mack bus are many. Mack bus engineers have carefully worked out all the features that ensure utmost economy in daily operation and maintenance costs. That these features are skillfully incorporated is safeguarded by the fact that Mack *builds* the things it plans. For example—

The sturdy long-life Mack engine.

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

The Mack transmission with ground gears.

The specially designed low bus chassis.

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

Dual system of brakes on wheels and drive shaft.

The Mack Street Car Body.

From bumper to tail-light the Mack is all bus. Planned by Mack. Built by Mack.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

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

The Mack Bus

25 Passenger, City Type

Performance counts!

Ask The Man Who Knows Us

SOMEWHERE near you there's a Street Railway man who is responsible for keeping down maintenance. His road is buying Texaco Lubricants and receiving Texaco Service.

Ask that man about Texaco Service. He will describe to you the friendly co-operation of Texaco Engineers. He will tell you how they came on the property, investigated, demonstrated and then made some very favorable recommendations. He'll tell you that, as the years roll on, Texaco Lubricating Engineers stand shoulder to shoulder with him and, in a quiet, interested, intelligent way they aided him in keeping down his costs.

He'll tell you that they never tried to assume any superior attitude, or to attempt to run his business, but that they worked with him in overalls, when necessary, to help him hang up a record of reduced expenses.

Possibly he'll tell you that these men knew what they were talking about, because back of them is the practical experience of all the Texaco Lubrication Engineers accumulated on roads aggregating hundreds of millions of car miles.

This man, if he is familiar with all the facts, will tell you that Texaco Lubricants are known, recognized and employed the world over in every branch of industrial endeavor. And so he was able to receive promptly, at all times, the correct grade of lubricant for every kind of equipment, for rolling stock, power plant, shop or truck.

And also Kerosene Burning Oils and Gasoline.

NORTHERN TEXAS TRACTION COMPANY

The Charles A. Coffin Medal awarded the Northern Texas Traction Company Fort Worth, Texas. George H. Clifford, Vice-President and Manager

FOR "THE MOST DISTINGUISHED SERVICE" TO A GREAT INDUSTRY

15,500,000,000 people rode on the electric railways last year. The honor of winning the Charles A. Coffin award to the company which during the year contributed most to the development of electric railway service goes to the Northern Texas Traction Company. This company has been under the executive management of Stone & Webster, Inc., for 19 years.

STONE & WEBSTER

INCORPORATED

DESIGN · BUILD
OPERATE
FINANCE

NEW YORK BOSTON CHICAGO

NORTHERN TEXAS TRACTION COMPANY

Northern Texa

Fort Worth

"Out where the west begins"

The Modern Electric Railway is an essential industry

It furnishes a service that is personal to every individual in the community and it should be sold to him.

The electric railway business, in the last analysis, is fundamentally the same as any other retailing business and it must be MODERNIZED, PERSONALIZED and MERCHANDISED.

The conditions under which we are operating permit of our success unless we keep up with the and this keeping up is not possible if we try to pr transportation service with the same standards w

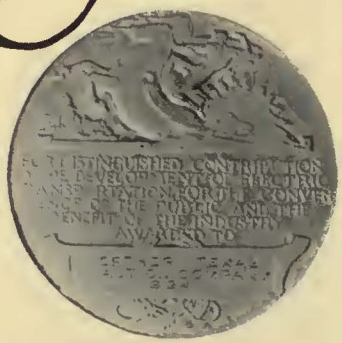
These are

Interurban Limited Train

Interior of Repair Shop

NORTHERN TEXAS TRACTION COMPANY

Traction Company



Dallas

"The City of the Hour"

years ago. We must provide a 1925 service to a 4 age—we must keep ahead.

re are three ways to keep ahead:

d our industrial publications.
Encourage our manufacturers.
Use our electric railway association.

industrial publication is the messenger that brings our offices the latest developments of other com-ies and manufacturers from which may be selected the gs that are best for our needs.

manufacturer, of course, sells his products for a it but we are not getting our money's worth unless we also take advantage of the service he offers with his goods. The manufacturer's representative is not just a selling agent; he is a mine of information from which great good can be extracted in proportion to the time that is spent in knowing him.

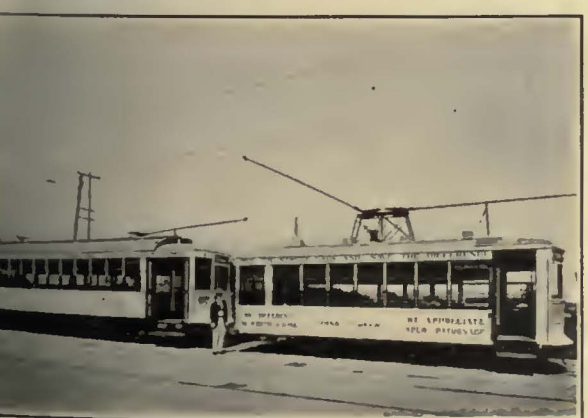
Whatever progress the industry has made and will make is, to a great extent, dependent upon the encouragement we give the manufacturer to produce new and better things.

The "put and take game" applies to our American Electric Railway Association. The value we will take from this association depends upon the time we put into it. The committee work, the conventions, the data sheets and publications, in fact all the association services, are intended to keep us up-to-date and we must do our part to help if we expect the best results.

NORTHERN TEXAS TRACTION COMPANY, FORT WORTH, TEX.

Winner of the 1924 Coffin Medal for Electric Railways.

all modern



The "White Cars"

Typical City Cars

NORTHERN TEXAS TRACTION COMPANY

Sub Stations

Exterior of Northern Texas Traction Company Automatic Substation

WESTINGHOUSE ELECTRIC

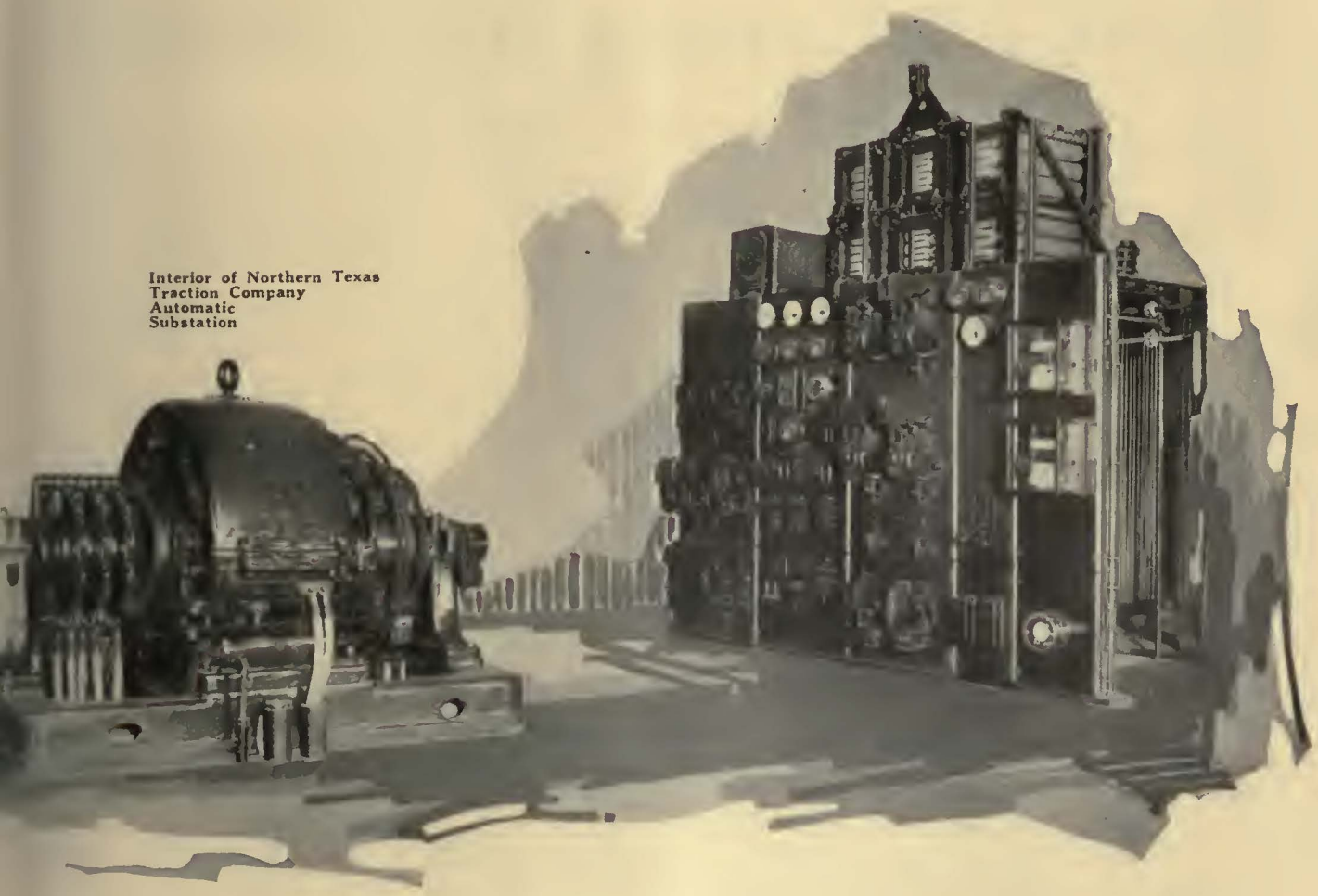
Westinghouse

NORTHERN TEXAS TRACTION COMPANY

9-all Westinghouse

ALL Substation Equipment on the Northern Texas Traction Company's system is Westinghouse.

The entire system is operated from six manually operated and one automatically controlled substations.



Interior of Northern Texas Traction Company Automatic Substation

Westinghouse

NORTHERN TEXAS TRACTION COMPANY

Maintenance

of Way and Structures

reduced 44%

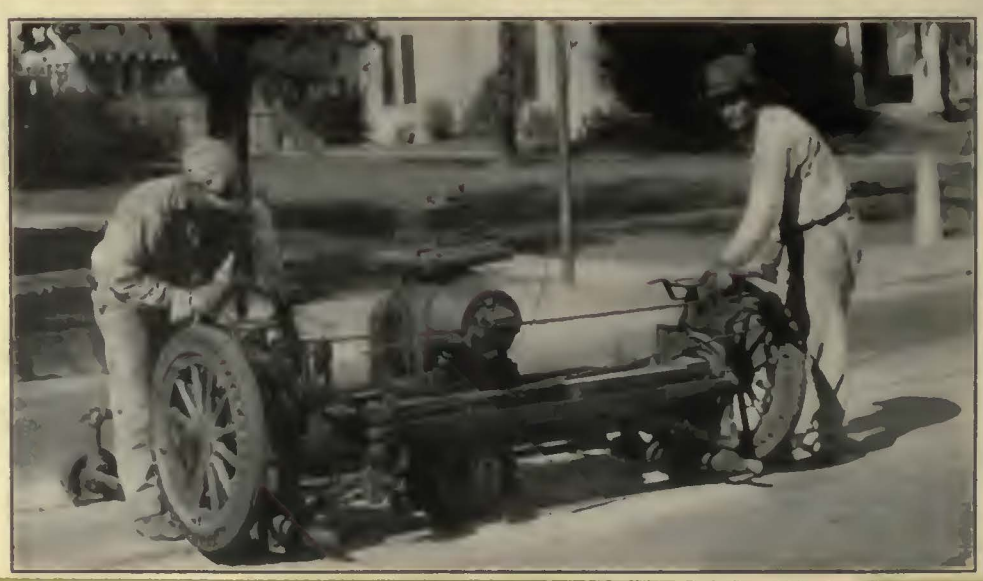
This is what the prize-winning Northern Texas Traction Co. says:

> "The cost of maintenance of way and structures has come down from 2.5 cents per car mile in 1920 to 1.4 cents in 1924. Besides the effect of light-weight rolling stock in this figure, the extensive use of track-welding equipment and modern track tools have had a bearing on producing the results."

The "Ajax" Welder, the "Universal" Grinder and the "Reciprocating" Grinder helped to achieve the result.

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia



Agents

Chester F. Gallor, 30 Church St., New York

Chas. N. Wood Co., Boston

Electrical Engineering & Mfg. Co., Pittsburgh

Agents

Atlas Railway Supply Co. Chicago

Equipment Engineering London

STATION CCH broadcasting a victory for its HEATERS

This is Station CCH, the Consolidated Car Heating Company at Albany, headquarters for electric car heaters.

COFFIN MEDAL winner specifies "CONSOLIDATED"

Down in the Lone Star State, when the "Texas northers" howl, this road is ready!

When the Northern Texas Traction Company bought its modern type Birney Safety Cars and its latest interurbans, Consolidated Electric Car Heaters were chosen as a matter of course.

Like other leading railways from coast to coast, this prize-winning company recognizes Consolidated supremacy.

CONSOLIDATED

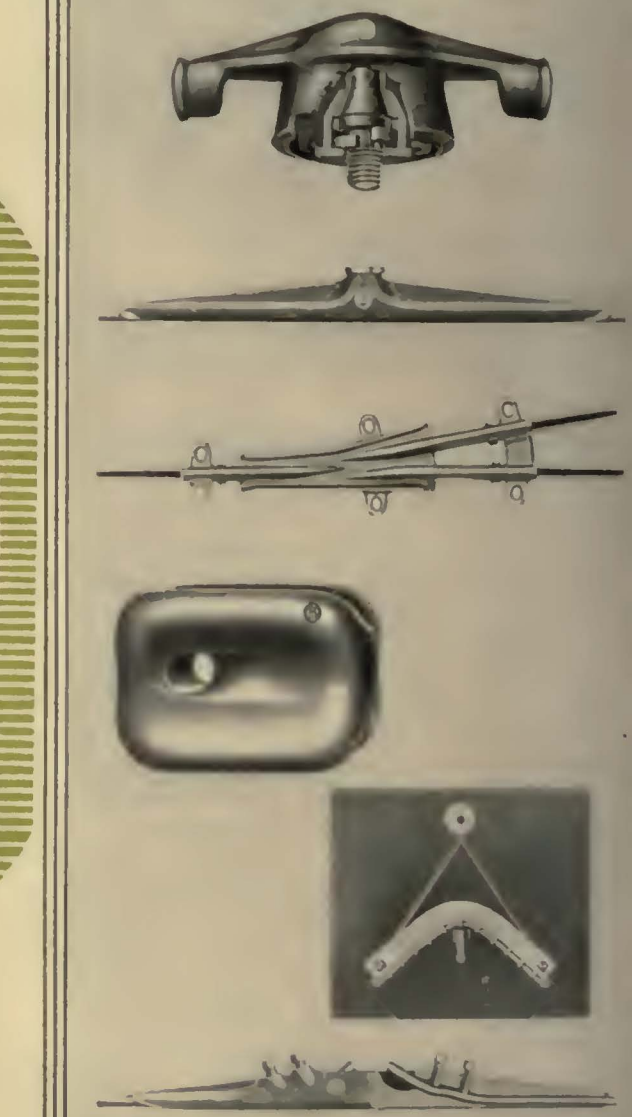
HEATERS

CONSOLIDATED CAR-HEATING COMPANY

New York ALBANY Chicago

NORTHERN TEXAS TRACTION COMPANY

The line material-



NORTHERN TEXAS TRACTION COMPANY

OB of course!

Probably no other single factor of railway operation contributes so directly to the maintenance of efficient low-cost service as does a thoroughly dependable overhead system.

So we are justly proud that all of the overhead trolley line and catenary material used by the Northern Texas Traction Company was supplied by us.

—also TOMLINSON COUPLERS for speed and safety on the interurbans

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

TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS

NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited — Niagara Falls, Ontario, Canada

Texas Traction Company

Won by a well equipped road

Efficient operation goes hand in hand with efficient equipment!

Service to be attractive and *saleable*, must be given with cars that are modern from end to end.

There's no room on the modern car for any piece of equipment or any device that does not help sell the service or increase the efficiency of operation.

So, let's examine the cars of the Coffin Medal winner! See how Keystone equipment has been used—headlights, trolley catchers, destination signs and car signal system.

"Well equipped" means Keystone equipped!

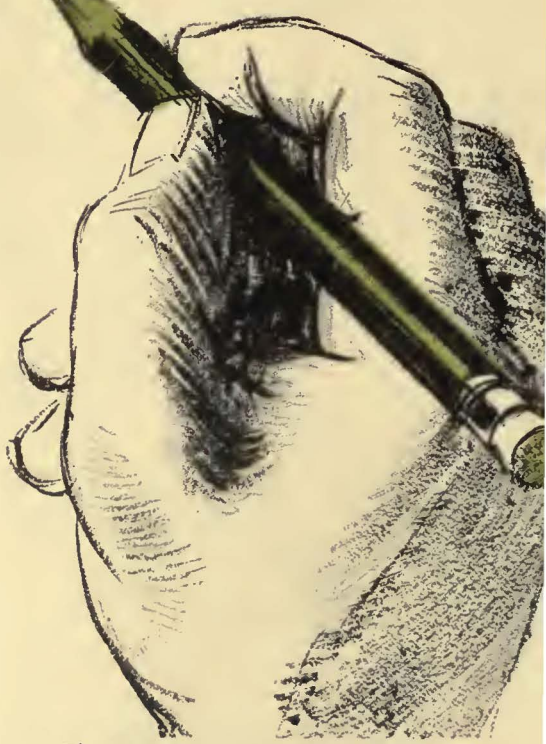
These Keystone devices on Fort Worth's cars are all winners—all well-known—all popular—all efficient equipment! They are salesmen of service, which have helped the Northern Texas Traction Company to win the highest recognition obtainable in the electric railway industry.

NORTHERN TEXAS TRACTION COMPANY

tone

(Written on the record!)

Equipment on Fort Worth's modern double truck safety cars!



Keystone-Hunter Illuminated Destination Signs

Faraday Car Signal Systems

Golden Glow Headlights

Keystone Trolley Catchers

ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadoock Bldg.

BOSTON
88 Broad St.

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

NORTHERN TEXAS TRACTION COMPANY

They modernized

Fort Worth's Pioneer safetie

Leading all other electric railways in 100% adoption the original Birney safety car for city service, the Northe Texas Traction Company early showed a most progress spirit. Its management *grasped Birney's big idea*—speed operation, safer operation and one-man operation! S thereafter, a hustling fleet of little safety cars was busy Fort Worth's streets.

And naturally—National Pneumatic Door Engines, includ as part of the standard Safety Car Devices Company equ ment, are found on all these cars, still operating steadily a satisfactorily.

Of course it's
NATIONAL PNEUMATIC EQUIPMENT

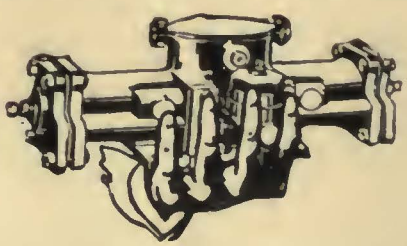
National Pneumatic Co., Inc.

Originators and Manufacturers

Executive Office: **50 Church St., New York**

Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick B
General Works—Rahway, New Jersey

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



NORTHERN TEXAS TRACTION COMPANY

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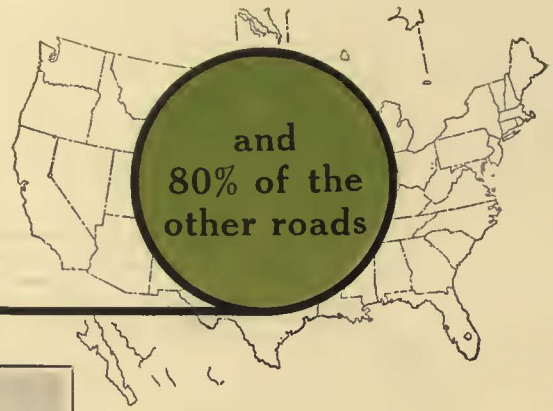


Fort Worth's latest safeties

Modern requirements have developed the larger-capacity double-truck safety car, and the Northern Texas Traction Company has ever kept abreast of the times. A sample of its up-to-the-minute rolling stock is illustrated above.

Asked as to door equipment installed on these most modern cars, the Northern Texas officials' answer came "National Pneumatic door engines on *all* our city cars." Again—these National Pneumatic Door Engines were included as part of the standard Safety Car Devices Company Equipment.

A vast majority of America's electric railways echo—"We do likewise!"

National Pneumatic Co., Inc.

Originators and Manufacturers

Executive Office: **50 Church St., New York**

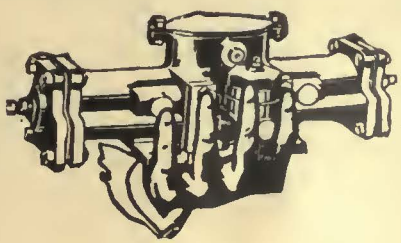
Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick Bldg.

General Works—Rahway, New Jersey

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

Of course it's

NATIONAL PNEUMATIC EQUIPMENT



NORTHERN TEXAS TRACTION COMPANY

The first 100% safety car property in America—

One of the new double-truck cars now being used on the Fort Worth City Lines of the Northern Texas Traction Company, fully equipped with Safety Car Devices.

This single-truck Birney safety car, equipped with Safety Car Devices, is the type that helped build patronage for the Northern Texas Traction Company.

The North Texas Tract Company v the first co pany to op ate 100% B ney Safety C Service A meric These cars ing the sin truck typ Later doub truck Safe Cars were p in service.

SAFETY CAR DEV

OF ST. LOUIS, MO.

Postal and Telegraphic Address:

WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURG

NORTHERN TEXAS TRACTION COMPANY

Now the Coffin Prize Winner

One of the outstanding features of the Northern Texas Traction Company's operating record is the steadily increased number of passengers carried and the consistent decrease in costs per mile. The awarding of the Coffin Prize to the Northern Texas Traction Company is evidence of the soundness of their judgment in the selection of equipment.

ll ways equipped with
SAFETY CAR DEVICES

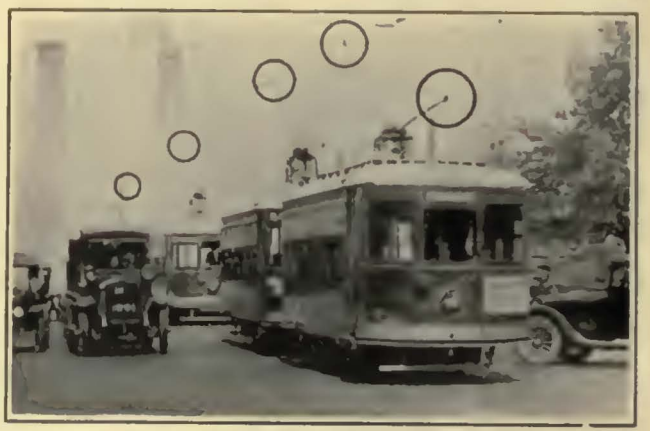
s Co.

TEXAS TRACTION COMPANY

Once mo

MILLER TROLLEY SHOES

on all these cars



Miller Trolley Sho

NORTHERN TEXAS TRACTION COMPANY

vith the winner!

This year with the Northern Texas Traction Company — last year with the Chicago, North Shore & Milwaukee Railroad Company, MILLER TROLLEY SHOES and the Charles A. Coffin prize surely seem to hang together — naturally so, as they are both consistent with progressive railway practice.

Used on all city cars as well as all high-speed interurbans—

The illustrations show cars of the Northern Texas Traction Company, 1924 Coffin prize winner, which operates all the street railway service in the city of Fort Worth, Texas and also interurban service between Fort Worth and Dallas, a distance of 34 miles providing a high-speed, frequent schedule between these two cities.

MILLER TROLLEY SHOES *are used for both the city and interurban cars.* They have proved superior to trolley wheels under actual tests conducted by this Company.

The Company owns 177 miles of equivalent single track, 192 city cars and 58 interurban cars. By paying rigid attention to all details of operation as for example by the adoption of MILLER TROLLEY SHOES, the ratio of operating expense to gross revenue has been kept down to the low figure of 61 per cent for the year.

The necessity of replacing trolley wheels after they had run only 500 to 1000 miles caused the Northern Texas Traction Co. to make a careful study to determine the cause of such excessive wear. At that time trolley wheels were arcing badly because of the irregular shape which they acquired soon after being installed. Increased tension was tried as a remedy but this resulted in an average of 45 trolley wire breaks per month.

As a possible solution it was decided to substitute MILLER TROLLEY SHOES on the city and interurban cars.

After the change the Company kept an accurate record of mileage and performance. It was found that MILLER TROLLEY SHOES gave excellent contact with fewer dewirements. Only 15 lbs. tension was used in the trolley base instead of 25 to 35 lbs. tension, required when using trolley wheels.

An interesting table of comparison of replacement costs is shown in the lower right hand corner. Note the effect of installing MILLER SHOES, even on part of the cars.

Since installing MILLER TROLLEY SHOES the breaks have decreased to an average of two per month.

MILLER TROLLEY SHOES on this line are averaging more than 7500 miles per shoe on city service and better than 3000 miles per shoe on interurban service.

COMPARISON OF REPLACEMENT COSTS FOR COLLECTION EQUIPMENT FOR THE YEARS 1920 AND 1922

Year 1920	Used	Cost
Trolley poles 10 ft. 8 in	128	$363.52
Trolley poles 12 ft. 6 in	95	351.50
Fixtures:		
Bearings	738	287.82
Renewable washers	1,561	93.66
Contact rings	1,476	291.88
Contact springs	1,669	216.97
Trolley harps, type "C"	200	480.00
Trolley rope	1,850	1,377.60
Trolley wheels	1,932	3,272.32
Total replacement costs for year 1920	.....	$6,735.27
Year 1922		
Trolley poles 10 ft. 6 in	44	$161.04
Trolley poles 12 ft. 6 in	63	285.39
Fixtures:		
Bearings	60	23.40
Renewable washers	128	3.34
Contact rings	96	13.24
Contact springs	110	14.30
Trolley harps type "C"	0	.....
Trolley rope	1,399	798.16
Trolley wheels, 6 in	621	838.35
Miller trolley shoes	159	802.95
Miller contacts	1,343	2,377.11
Miller shunts	86	57.68
Miller lockwashers	6	.29
Miller bolts and nuts	469	15.01
Miller center pins	32	18.24
Total replacement costs for year 1922	.....	$5,408.50
Difference in total costs for the two years in favor of the year 1922		$1,326.77
Cost per M.C.M. for collection equipment, 1920, cent		0.751
Cost per M.C.M. for collection equipment, 1922, cent		0.642

Note:—All cars were equipped with 6-in trolley wheels during 1920, while during 1922 a large per cent of the cars were equipped with Miller trolley shoes.

Note:—In the above comparative costs the cost of trolley bases and repairs are not considered.

NORTHERN TEXAS TRACTION COMPANY

From Mules to Kilowatts

SINCE 1875, when General Darnell was carried from a sickbed into the Texas legislature to vote "no" on its adjournment until the construction gang of the infant Texas and Pacific R.R. could rush completion of the remaining few miles into the city, the citizens of Fort Worth have been acutely railroad conscious. Twelve trunk lines now serving Fort Worth add confirmation of this fact.

Only one year after the city was thus linked with the world, the first street railway was built. A historian* describes it as having "cars about the size of an ordinary street omnibus and propelled by one mule something larger than a West Texas Jack Rabbitt." The expanded traction system later gained the distinction of being the first in the country to become entirely electrically equipped.

With such a background, it is not difficult to see why the North Texas Traction System of Fort Worth and environs was given the Coffin award for general improvement and efficiency in 1924.

Nor is it surprising that early recognition was given by that system's management to Phono-Electric Trolley wire with its long-wearing, strong, ductile and non-corroding qualities. Phono-Electric has been used there for nearly twenty years and the management reports satisfaction from every mile installed. It costs more per mile but less per year.

MEMBER AERA

"Bridgeport BRASS TRADE CO. MARK
Phono-Electric

*B. B. Paddock

Bridgeport Brass Co.
Bridgeport, Connecticut

NEW YORK PHILADELPHIA CHICAGO DETROIT

Phono-Electric

NORTHERN TEXAS TRACTION COMPANY

"For reducing the number and seriousness of accidents" Awarded the Coffin Prize—

One of the Northern Texas Traction Company's new Birney Safety Cars on which H-B Life Guards are standard equipment.

H. B. LIFE GUARDS

Manufactured by

The Consolidated Car Fender Company

are included in the safety equipment of The Northern Texas Traction Company, Coffin Prize Winner this year.

Life Guards Manufactured By Us Assure

Maximum Safety—Minimum Maintenance Cost

CONSOLIDATED CAR FENDER CO., Providence, R. I.

Wendell & MacDuffie Co., 110 East 42nd St., New York, N. Y.
General Sales Agents

TEXAS TRACTION COMPANY

Used on the Prize-Winner

SHERWIN-WILLIAMS

PAINTS AND ENAMELS

are standardized on by the Northern Texas Traction Company, Fort Worth, who won the famous Coffin Foundation Award for the past year. This conspicuous example emphasizes the recognition so generally given to the Sherwin-Williams policy of providing "the RIGHT finish for each surface." In a word, every S-W finish supplied to transportation companies is the result of searching study into the surface requirements in the field where these finishes must serve and serve well. No guess work.

Information, recommendations and prices will be given promptly.

The Sherwin-Williams Company, 601 Canal Road, Cleveland, Ohio

Largest Paint and Varnish Makers in the World.

NORTHERN TEXAS TRACTION COMPANY

Quality" Interurbans

Helped Win the Prize

WHEN the Northern Texas Traction Company decided on their FINE interurban cars, St. Louis Car Company filled the order. "Quality" cars on this prize-winning road are further testimonials of the prestige and high standing of "Quality" rolling stock. Their attractive, comfortable riding qualities and superior interior appointments have done their full share toward backing up this progressive road in its campaign for popularizing electric railway transportation and winning for it the Chas. A. Coffin Medal.

St. Louis Car Company, St. Louis, Mo

"The Birthplace of the Safety Car"

NORTHERN TEXAS TRACTION COMPANY

SKF

Skayef Armature Bearings

An Essential For The Modern Car!

ANOTHER indication of the progressive spirit of the Northern Texas Traction Company is indicated in the use of Skayef Armature Bearings on their modern light-weight safety cars.

Ten of these cars were ordered early in 1923, and in October, 1923—or more than a year ago—they arrived and were put in operation. Equipment consisted of four motors per car, with Skayef Ball Bearings on the armatures.

The trend of modern thought in car design is toward the use of anti-friction and roller bearings wherever possible, and when people think of ball bearings the familiar designation **SKF** comes to mind.

THE SKAYEF BALL BEARING COMPANY

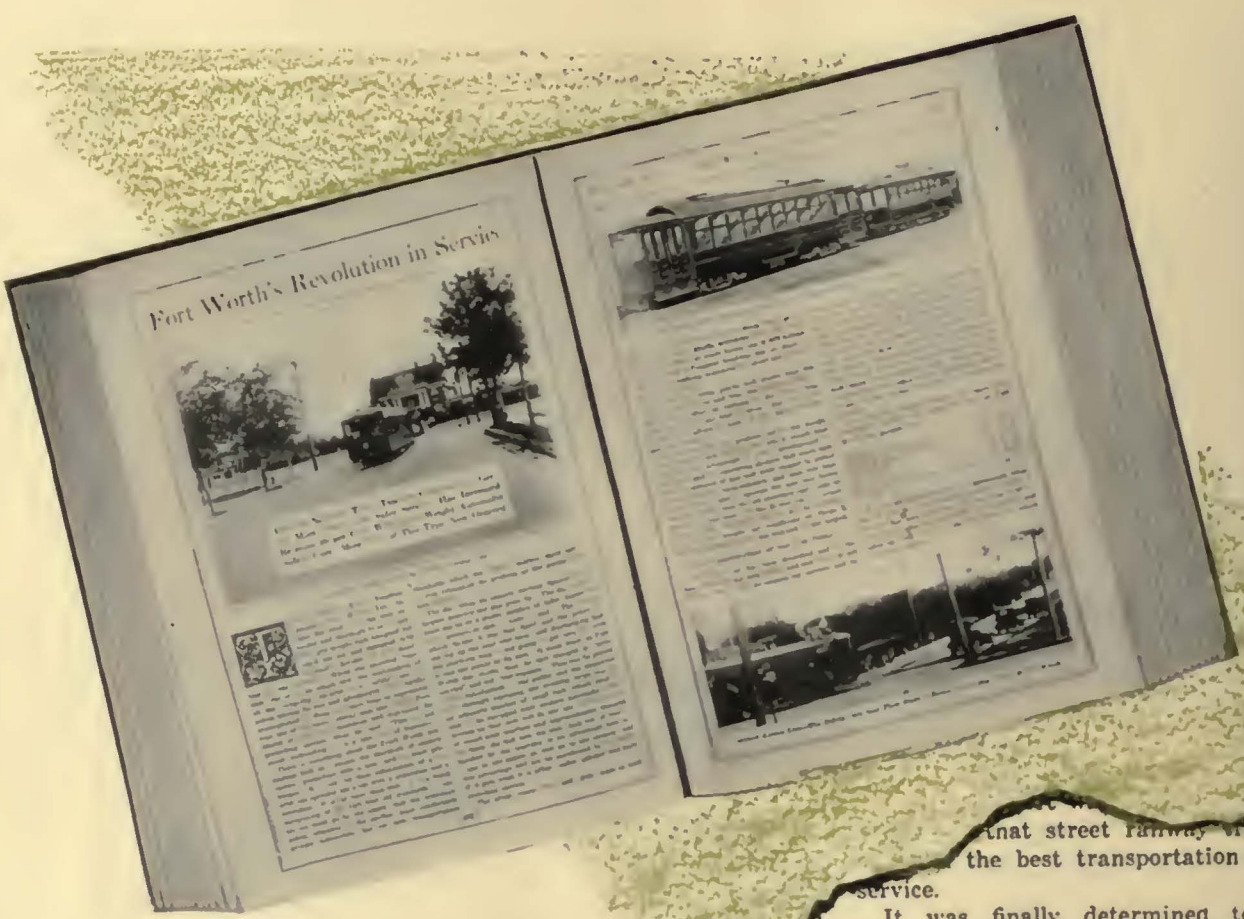
Supervised by **SKF** INDUSTRIES, INC., 165 Broadway, New York City

1301

Normal View *Deflected View*

NORTHERN TEXAS TRACTION COMPANY

Seven Years of th



...tnat street ...nsportatio...
... the best transportation for general c...
...service.

It was finally determined to construct t... cars as a sample or demonstration cars, a... arrangements were made for the bodies to be bu... by the American Car Company of St. Louis, ... trucks by The J. G. Brill Company of Philadelph... the electrical equipment by the General Elect... Company of Schenectady, and the air-brake a... safety-control equipment by the Westingho...

[78]

Turning back the pages of history we find—

whole stories in the *Electric Railway Journal* devoted to this pioneer experiment in Fort Worth—the Birney Safety Car. And linked with the first cars of this type ever built, is the name —*American Car Company*. That they're still operating many of the earliest types of safeties is a tribute to the excellent design and workmanship in this equipment.

And after seven years of unequalled success, the latest development of the Birney Safety Car is helping to bring fresh honors to the Northern Texas Traction Company.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS, MO. — G. C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

NORTHERN TEXAS TRACTION COMPANY

irney Car in Fort Worth

Now the Coffin Medal goes there!

These last safety cars—like the first ones were built by the American Car Company!

Some of the interesting specifications were:

Seating Capacity	48
Body weight	11,542 lb.
Trucks	8480 lb.
Equipment	6978 lb.
Total weight	27,000 lb.
Length overall	40 ft. 1 inch
Body	All steel
Interior trim	Mahogany
Axles—Brill M. C. B.	Forged steel
Bumpers	American Car Company Channel
Center and Side Bearings	Brill Oil Retaining
Couplers	American Car Company Pocket Type
Journal Bearings	Brill
Journal Boxes	Brill M. C. B.
Springs	Brill
Trucks	Brill Type 77-E-1

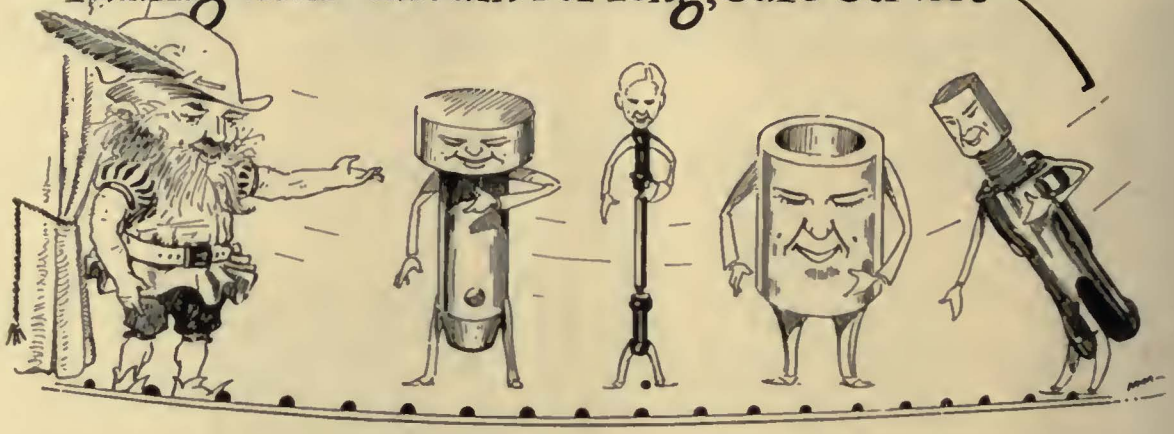
We are prepared to furnish all modern types of rolling stock,—Safety Cars, City and Double-truck City Cars, Interurbans, Railless Cars and Steel Bus Bodies—equipment to meet any transportation requirements.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G. C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

TEXAS TRACTION COMPANY

Taking their 'curtain' for long, safe service



Brake Parts from Fort Worth

They're BOYERIZED

You railway men know 'em well — tough glossy little fellows, hard as glass, full of "fight" to stand up under the hardest service on city car or interurban anywhere. They helped Northern Texas Traction win.

Boyerizing does it,—gives the steel from which they're made a glossy armor-plate surface that outwears ordinary case-hardened steel not once or twice, but three to four times.

The Boyerized list includes—

Brake Pins	**Side Bearings**
Brake Hangers	**Chafing Plates**
Brake Levers	**Manganese Break Heads**
Bushings	**Manganese Truck Parts**
Center Bearings	**McArthur Turnbuckles**

The McArthur Turnbuckle

When you once set it up it stays up! The powerful spring equipped split-clamp device which takes the place of the old-fashioned lock-nut idea, holds with an unshakable grip. Yet it takes only a small monkey wrench and a moment's time to tighten it up. Like all other Boyerized equipment, McArthur Turnbuckles have an unusually long wearing life.

TRY THEM!

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, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

—as you'd expect!

PEACOCK STAFFLESS BRAKES

On their modern safety cars!

Most leading roads are now demanding the Peacock Staffless on both single and double-truck safeties. It becomes a most significant confirmation of their choice, to find that the Coffin Medal Winner does likewise.

Chosen because—

it's *fast, powerful* and above all ample in *capacity* to wind up all the chain and apply full braking power under any conditions.

National Brake Co., Inc.
890 Ellicott Sq., Buffalo, N. Y.
Canadian Representative:
Lyman Tube & Supply Company Limited,
Montreal, Canada

TEXAS TRACTION COMPANY

The Prize Winner says —

Screw Spike Driving *Tie Tamping*

"We use Ingersoll-Rand Company's tie tampers and paving breakers—"

PROMINENT among the factors resulting in *lowered unit costs* for maintenance of way, the Brief lists the *"use of modern track tools."*

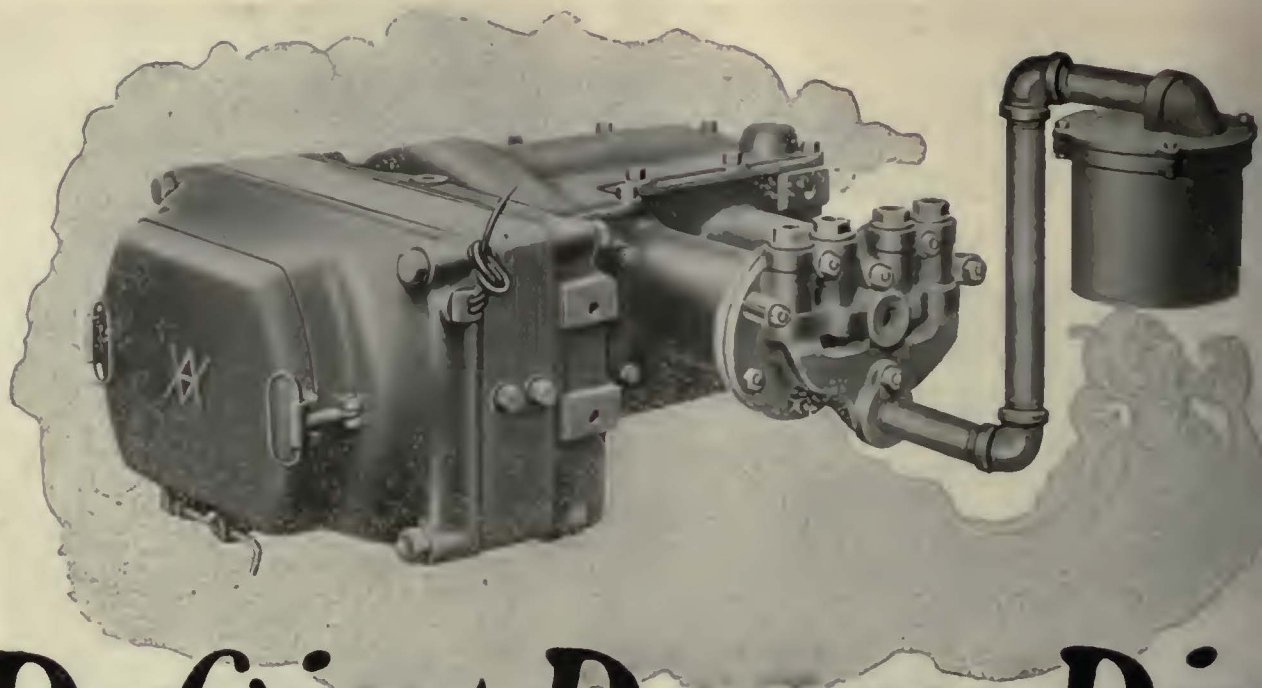
Modernization programs on every railway system can well afford to include Ingersoll-Rand Equipment—tie tampers, paving breakers, rail drills, grinders, riveters, chippers, spike drivers, and portable compressors. They are all time-saving, and work-speeding devices.

INGERSOLL-RAND COMPANY, 11 Broadway, N. Y.

Offices in the Principal Cities the World Over

For Canada, refer Canadian Ingersoll-Rand Co., Limited, 260 St. James Street, Montreal, Quebec

Ingersoll-Rand



Defying Demon Dir

Around every compressor there is a demon lurking in the air —DIRT. It will stealthily, though surely, work havoc if permitted to gnaw at the vitals of the compressor.

Air must, of course, be drawn in from the atmosphere to be compressed, but dirt will also rush in unless an effective barrier is set up against this pernicious enemy of good compressor performance.

If dirt does enter with the intake air, two things are sure to happen. First, proper lubrication will be destroyed, because the dirt, mixing with the oil, forms an abrasive which causes excessive wear on cylinders, pistons, packing rings and valves. Second, the mixture of oil, dirt and ground iron will deposit in passages and on valves, resulting in lower efficiency of the compressor.

You can repulse the attack of this demon of dirt with the 8-*in. Suction Strainer.* It effectually filters out the grit and dust, permitting clean air to pass on into the compressor. Result—better performance, lower maintenance expense and longer life.

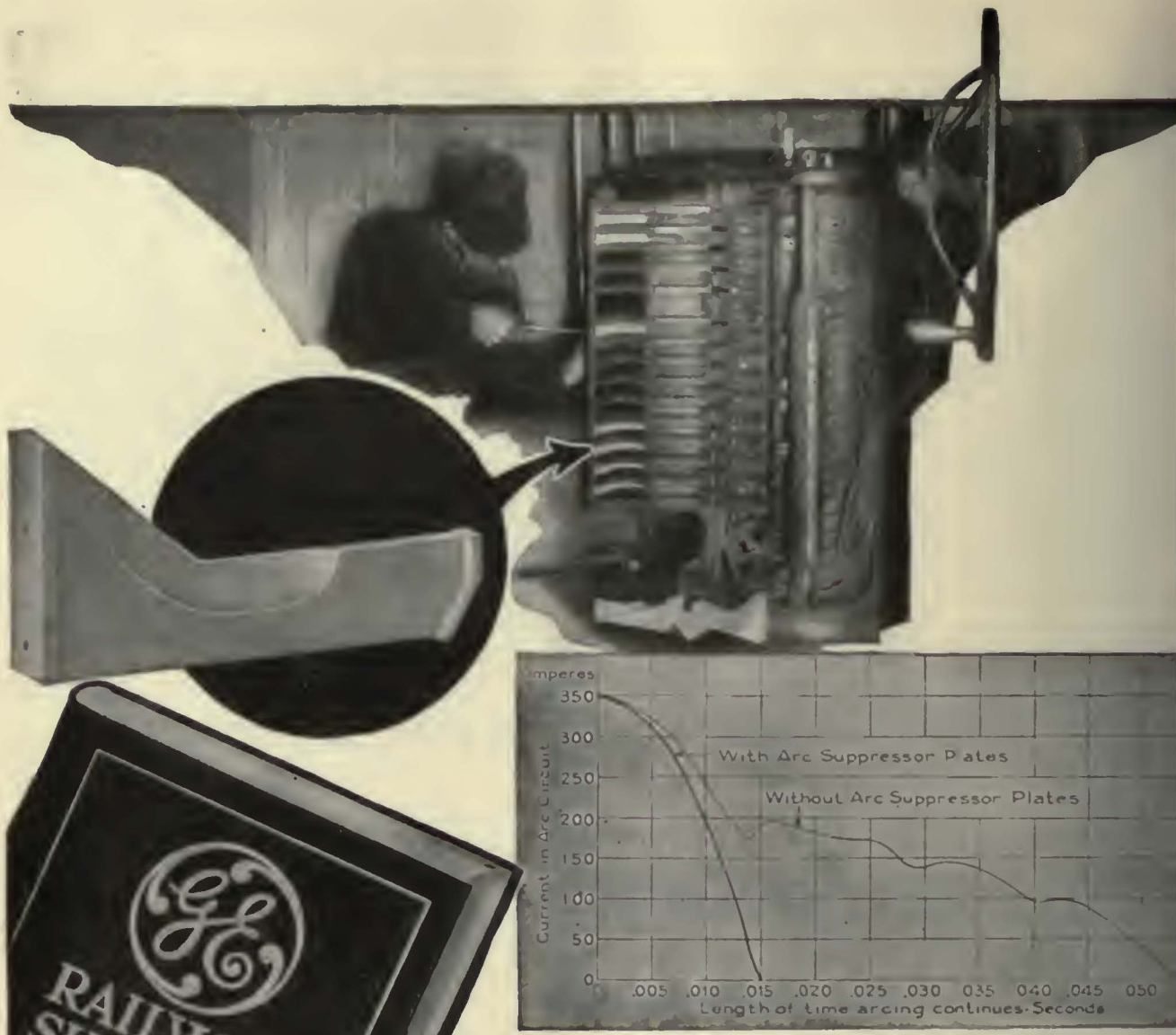
Is *your* compressor thus properly safeguarded against the insidious enemy—DIRT?

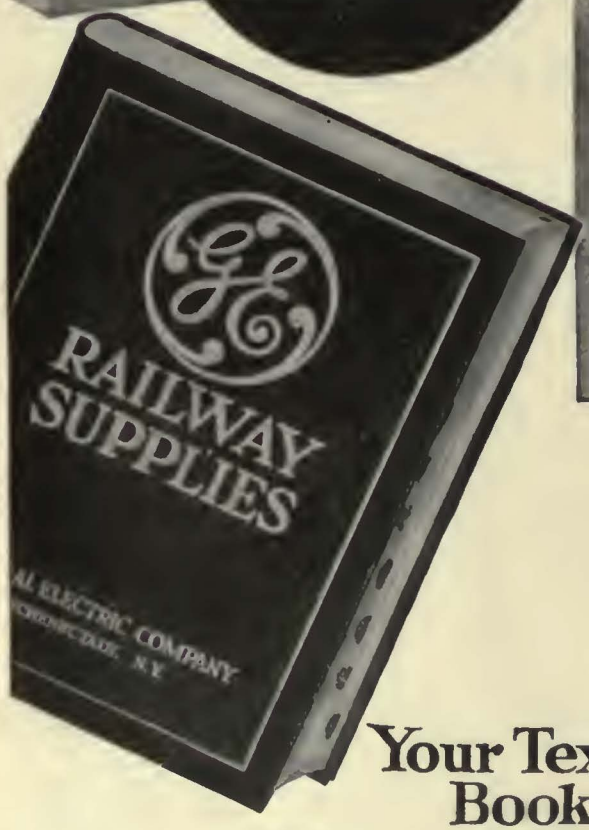
The 8-in. Suction Strainer consists of a cylindrical body with a compact layer of pulled, curled hair between two perforated plates, and is so constructed as to be readily taken apart for cleaning at stated periods.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKE





Notice the Difference

These curves show the difference in time required to disrupt the arc in a K-35 Controller when equipped with G-E Arc Suppressor Plates. They are plotted from actual oscillograph test data.

G-E Arc Suppressor Plates reduce carbonization and eliminate much trouble from pitting of contacts. All new Controllers with individual finger blowouts are equipped with them.

It will pay you to put them in your old Controllers. The plates are inexpensive, and easy to install. Try them.

On page 149 of your G-E Catalog is the list of G-E Controllers for which Arc Suppressor Plates are available, stating the number required and fingers to be protected.

Your Text Book on Equipment Standards

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

GENERAL ELECTRIC

New York, Saturday, November 22, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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

Volume 64
Number 21

hicago Mayor Persists in M. O. Discussion

ROM the results of the recent national election it is evident that the people of the nation do not want ublic ownership of railroads. That decision seems to ave been most emphatically expressed. In Chicago, owever, the Mayor is still endeavoring to work out a an for municipalization of the surface and elevated roperties. Direct negotiations for the purchase of these nes having apparently failed, Mr. Blair, president of the rface lines, has proposed the consolidation of surface id elevated lines into a comprehensive one-city, one-re, transportation system under some form of service--cost franchise. Mr. Insull, chairman of the elevated nes, has offered to finance $23,000,000 of rapid transit tensions if the city will say "go." The Mayor continues to favor municipal ownership as the first consideration in working out a plan for improvement of ansportation facilities.

It is reported that he is carefully waiting for an portunity of splitting off some one part of the local ansportation system to be used as a club to force more vorable terms from the security holders of the remainder, under the threat of extending a competitive ty-owned system. Such a plan would correspond nerally with the method used in Detroit to force the le of the D. U. R. city lines to that city. While considering Detroit methods, it might be well for Chicago's ayor to analyze carefully the results accomplished ere by municipal ownership. Even granting that its unicipal system has been successfully kept largely out politics to date, what advantage has municipal ownerip brought to the car riders? It is hard to find one. fact, such success as has accompanied municipal eration is directly attributable to Detroit's wisdom turning its system over to operating men who tained their training and experience in private enterise. The threat of future political interference is nstantly present and is even more aggravated by the sult of the recent election in that city.

It is generally considered that Chicago's Mayor is ncere in his views on municipal ownership. In that spect at least the present administration, from the ndpoint of the car rider, is a vast improvement over e one that preceded it. He has, however, shown idence of being so absorbed in the hobby of municipal nership as to put acquirement of the lines by the y first, and speedy improvement of the transportation cilities second.

The City Council committee on local transportation is deavoring to work out a plan for submission to the ters in a few months. If that is done, it is to be ped that the people of the city will again express their inion of public ownership as decidedly as was done the national election. Thus the way will be cleared r the speedy adoption of a policy that will permit extension and improvement, just as business in general is responding after the burial of the government ownership bugaboo in national affairs.

Standardization of Contact Line Should Further Electrification

ONE of the most important things in facilitating progress in the electrification of American trunk-line railroads is the adoption of a common system of current supply. Rightly or wrongly, the attitude of the railroads has consistently been that interchangeability of motive power is essential if electrification is to be extended beyond installations where it has been adopted locally for particular reasons. With standardization of supply, say at 11,000 or 22,000 volts, the steam roads can purchase equipment with the knowledge that it can be used on more than a single division of a single railway.

Details of the locomotives to be operated on the various roads naturally will differ with the service requirements, depending on the physical features and the character of the traffic. So do steam locomotives differ. But the feature mentioned most often by steam railroad men is that any standard-gage steam locomotive can be operated anywhere in emergency, and while it may not be particularly well adapted to the load, it can function so as to handle a certain amount of business. For instance, during the shopmen's strike two years ago many roads used freight engines for hauling passenger trains and vice versa. Certainly it was better to get the trains over the road late than not to move them at all.

Leading railroad men and consulting engineers have felt for some time that the highest contact line voltage is none too high, if trainloads are to continue to increase in the future as they have in the past. The New York, New Haven & Hartford Railroad was the pioneer in high-tension distribution, having adopted a single-phase contact line at 11,000 volts nearly 20 years ago. On its system have been operated electric locomotives of nearly every type ever proposed for alternating current. While it is usually admitted that direct-current motors have advantages from an operating and maintenance standpoint, these advantages are not so great as to overbalance the ability to distribute large quantities of electrical energy economically by means of high tension. The latest types of a.c. locomotives employ d.c. motors with the aid of conversion equipment on the locomotive itself.

With greater and greater concentration of train weights and increase in propulsion power, the load factors have become correspondingly poorer. On a large system this can be compensated for to a great extent by increasing the distance served by a single

substation as much as possible, which in turn demands high voltage to cut down the distribution loss. As an example, consider the supply of 20,000 hp. to one train, the amount mentioned as the input for the Virginian electrification. At 22,000 volts a.c. this would require some 900 amp. and at 11,000 volts 1,800 amp. With 3,000 volts d.c., even making allowance for the advantage of power factor, some 5,400 amp. would be needed, or three times as much. At 600 volts d.c. the delivery of this power would require 27,000 amp. Low voltage d.c. is clearly out of the question. Even at 3,000 volts such amounts of current have been collected only as an experiment. On the contrary, collection of the smaller currents for the high-tension systems is not difficult. The advantage in less distribution copper and the ability to space substations farther apart is obvious, as the copper loss varies inversely as the square of the voltage.

The decision of Henry Ford to use 22,000 volts on his road need occasion no concern. In case the demand for very heavy motive power continues this move is entirely logical. The main problem is insulation on the locomotive. Supposing that 11,000 volts is adapted as a standard, interchangeability need not be affected at all, as the same engines can be used on both systems by designing the transformer primaries for connection in series and in parallel, which can be effected almost instantly by a change-over switch under the control of the engineer.

With standardization on a contact line of 11,000 or 22,000 volts alternating current, there seems no reason why the last of the technical difficulties that for so long have stood in the way of a comprehensive electrification of the trunk lines of this country should not be brushed away. The roads can then proceed with confidence, and the problem can be worked out on economic grounds, so that the lines that should be equipped electrically, either to increase capacity or to give an operating economy, can be converted without delay.

The Majority of Shoppers Travel on Trolley Cars

A RECENT check made at 13 leading stores in New York City during a busy shopping hour showed that out of 35,252 customers only 813 came by automobile or taxicab. The others came by street car or subway, by bus or on foot.

In these days of the intensive use of the streets, the tendency will become more and more definite to apply the Darwinian theory of the survival of the fittest to determine what street users to favor, as there is not going to be room for every one. The first street users to go are those who want to use busy highways for storage purposes by parking their cars while they go shopping or are on some other business. Such users have the least excuse for street space, and anti-parking laws are being passed to take care of them.

In some cities the next line of attack will be against the car lines in certain busy streets. Indeed, such an attack has been begun. Mayor Hylan has already said that Forty-second Street and 125th Street, among others in New York, should be cleared of car tracks, and there have been suggestions in Los Angeles and other cities that more automobile traffic could be moved through certain busy retail streets, if the car lines were removed.

It is not surprising that such a plan appeals at first thought to the automobile owner. To him every other user of the street is an obstruction in his path. those who have a real interest in ascertaining the fa like the retail merchants, the situation is quite ferent, and it is not surprising that in both New Y and Los Angeles, the storekeepers on the str affected protested against any proposal to abolish lines. In New York the protest would have been m louder if the suggestion had been taken seriously, as it emanated from Mayor Hylan it was looked u only as a part of his plan to pester "the interes

In any contest in which a railway may be enga over its right to serve the public, such evidence the above should make the discriminating local m chants its strongest supporters. They are the first feel the effect of any diminution in service of the l transportation system, and should realize that the gr majority of their customers must reach their stores trolley.

What Causes Traffic Congestion and How to Relieve It

PROBABLY no phase of the work done during past year by the Transportation & Traffic Asso tion is more important than that dealing with st congestion. This cannot well be denied when vehic congestion is causing a reduction in speed from average of 10 or 12 m.p.h. in the suburbs to so where between 1 and 4 m.p.h. in congested str during the rush hours, as was brought out durin meeting at the recent convention.

Three major causes of congestion mentioned there first, the concentration of large business popula within a small area, a situation resulting from development of the steel frame building; second, increasing number of private vehicles on the str and third, automobile parking.

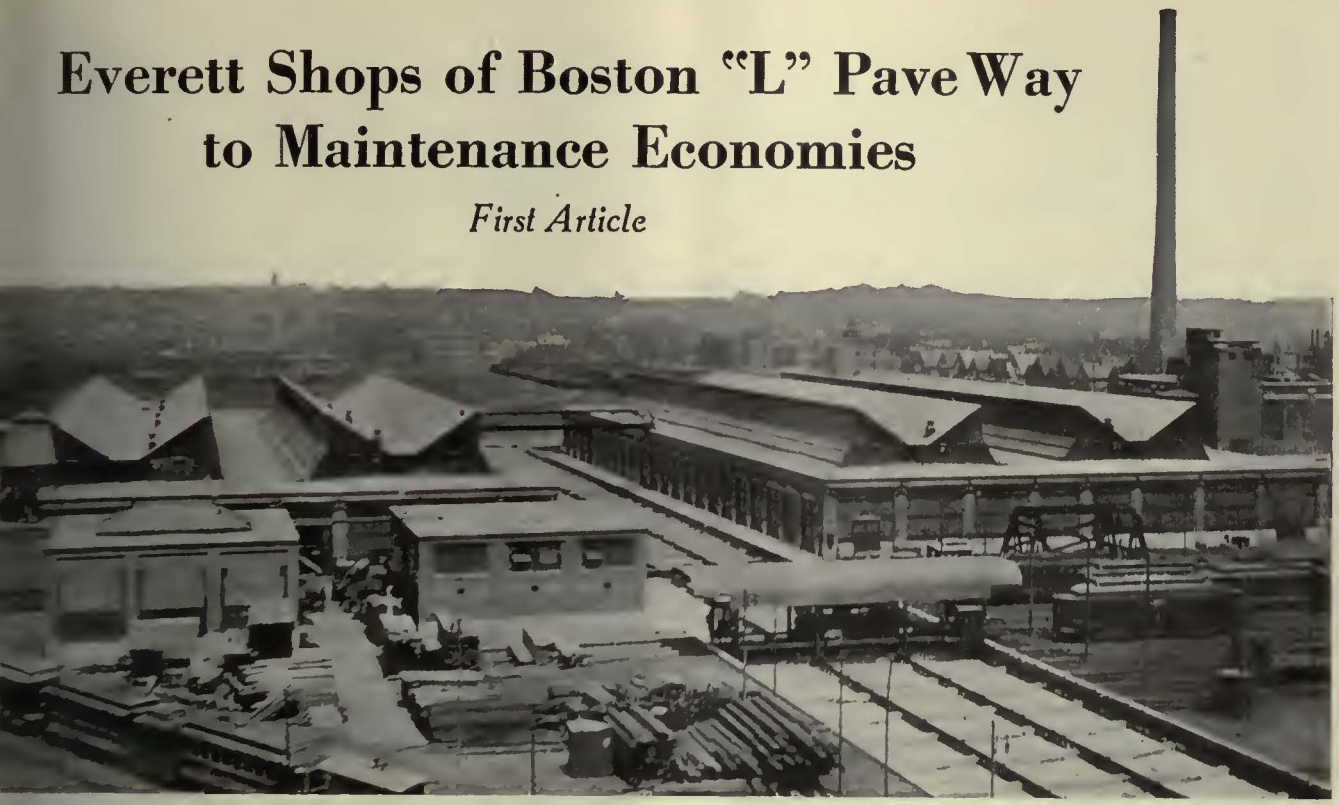
Suggested remedies fall into two groups. The consists of methods to increase the area available traffic, i.e., street widening, etc., and the second ways to increase the usefulness of the existing tr area. The first group the committee finds unsatis tory because of the likelihood that the increased will immediately attract increased traffic in suffic amount to nullify any advantage.

In the second group of proposed remedies the eli nation of auto parking, especially during the r hours, is the most important. To accomplish anyth along this line it will be necessary to secure the operation of the general public. How best to do is quite another thing.

A committee studying this subject has recommen the appointment of a permanent committee. Good res are likely to come by such a step. Here is a prob that affects vitally not only every railway, but ev street car rider, every automobile or truck driver, ev merchant, every property owner—in fact, every resi of every city worthy of the name. The problen all the more difficult because it is so widespread, e person having more or less well defined opinions the subject. The thing to do is to keep at it, to out as many plans as seem to have any merit an study the results carefully. Progress in the relie traffic congestion has been made in some cities, in ways that will apply to the rest of the country. collecting and disseminating information as to how is being done, undoubtedly a better understandin the problem will result, and real congestion relief be obtained.

Everett Shops of Boston "L" Pave Way to Maintenance Economies

First Article



The New Shops of the Boston Elevated Railway Occupy a 22½-Acre Site Adjacent to the Everett Terminal of the Elevated Line

The New Layout, Which Provides for All Equipment Repairs Except for the Cambridge Subway, Was Decided On After Careful Survey of Requirements—Growth of the System Dictated Concentration of Facilities for Rolling Stock Maintenance—Comprehensive Provision for Mechanical and Electrical Services

STRATEGICALLY located to reduce dead mileage to the minimum, designed to meet the increasing demands of rolling stock maintenance on this ransit system for years to come and finely equipped vith woodworking and paint shop machinery and indi-idually motorized tools, the Everett shops of the Boston Elevated Railway mark a distinct advance in traction epair facilities and point the way toward substantial conomies in administration. Preliminary drawings f these shops were published in this paper March 19, 921, and in the issue of Feb. 10, 1923, a general lescription was given of the layout of the buildings nd the proposed routing of the work. Thus far the ompany has built only the paint shop, lumber storage, ry kiln, boiler house and wood shop, with related ard facilities as mentioned in the latter article. The teel-working shops or general machine shops have not et been begun, as appropriations for these have not een available. Consequently there has been no oppor-unity as yet to secure the full economies anticipated rom the ultimate layout, but on the woodworking and ainting sides of rolling stock maintenance material ains in convenience have already been attained.

Need for Increased Facilities Recognized Early

For many years the company has needed proper shop acilities for taking care of rolling stock maintenance, hough large investments have been made for new and mproved cars, heavier tracks and for power generation nd transmission equipment. Many of the shop facil-ties used up to the occupation of the new shops were relics of the horse car days. The principal shop was located at Bartlett and Washington Streets, Roxbury, in an old horse car barn, which after electrification was converted into a car repair shop by making such improvements as were possible without a general re-modeling. The greater part of the surface car repairs, except work on trucks and motors, was done there.

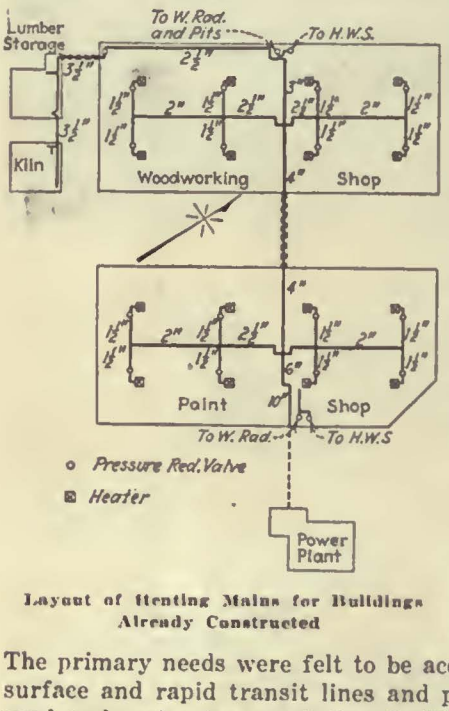
This arrangement worked fairly well for a while, but as the number and the size of the electric cars increased, this shop became more and more inadequate and inefficient. While there was considerable land avail-able at the Bartlett Street site, there were no railroad facilities, so that expansion at this point was deemed inadvisable. Another shop which was in use for many years was a remodeled building on Albany Street, 1¾ miles away, and also without railroad facilities, which was purchased in 1889 as part of a site for the electric railway power station, and which was remodeled as a truck and blacksmith shop. The upper floors of this building were destroyed by fire in 1912, and an adjoin-ing building was leased to provide additional space for the machine shop.

As the amount of rolling stock continued to grow it became necessary to handle at the individual carhouses much of the heavier maintenance as well as some paint-ing. Then, too, a considerable area of the Bartlett Street shops became unusable since the transferway, elevators and track clearances were too small to permit the move-ment of the larger cars. By cutting notches in the col-umns some of the cars could be handled, but without suffi-cient room between tracks for good work. There was no

space for lumber storage near the mill room, and frequently lumber had to be handled 200 ft. to be finished.

Beginning with rapid transit service in 1901, it was necessary to provide shops for the elevated cars. The first shop was built at Sullivan Square, all the work being done there except for the inspection and cleaning done at first in a small shop at Guild Street, adjoining the Bartlett Street surface car shop, and later in an inspection yard and shop at Forest Hills. With the construction of the Everett extension the inadequacy of repair facilities for the elevated was aggravated, since the construction of the main line tracks necessitated the removal of a portion of the shop.

The Cambridge subway was constructed independently of the remainder of the rapid transit system, and the cars are so large that they cannot be operated over the remainder of the tracks. Accordingly a modern inspection and repair shop was built at Eliot Square, Cambridge, adequate to provide for this division and for the East Boston tunnel cars. An inspection loop is also planned in connection with the electrification of the Shawmut branch of the New Haven Railroad which will be operated under lease as a part of the Dorchester tunnel extension.

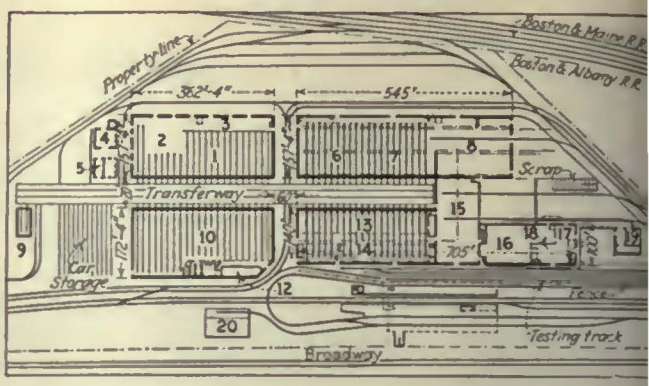


Layout of Heating Mains for Buildings Already Constructed

For a number of years the company has been investigating the selection of a proper site for repair shops. The primary needs were felt to be accessibility to both surface and rapid transit lines and proper steam railroad and water transportation facilities. Such a site was chosen on a 22½-acre plot adjoining the Everett terminal of the rapid transit and surface lines. This site borders on the Mystic River and is within a 15-minute ride of the center of Boston.

Owing to the unsatisfactory conditions at Bartlett Street, particularly lack of room for car painting, it was decided that the first unit at Everett should replace those facilities. This unit, work on which began a year and a half ago, consists of a woodworking shop, paint shop, lumber building and dry kiln, with transferway and track connections to elevated and surface lines. There also are freight sidings and a connection to the steam railroad. In the first unit are also included the permanent heating plant and necessary electrical equipment common to the entire project. This first unit was put into partial operation in December, 1923.

The mechanical and electrical service supply of these shops centers in a combined steam boiler plant and substation located on the Broadway, Everett, side of the property. This plant is a brick and steel structure 84 ft. x 79 ft. 6 in. and containing one story and a basement. The ground floor is divided into a boiler



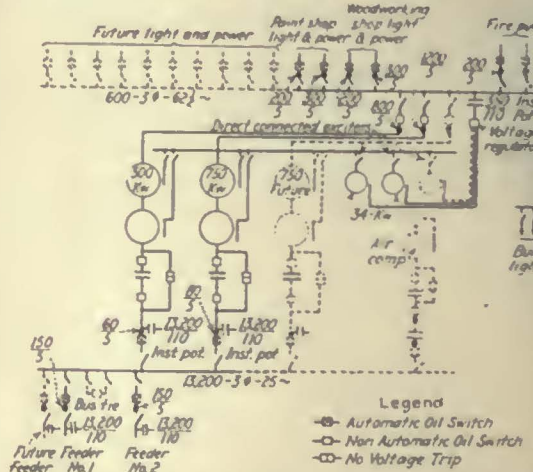
Completed Layout of the Everett Shops

1. Wood shop.
2. Mill room.
3. Carpenter shop.
4. Lumber storage.
5. Dry kiln.
6. Equipment, piping and wiring.
7. Steel car repairs.
8. Blacksmith shop.
9. Sand blast.
10. Paint shop.
11. Paint room.
12. Glass room.
13. Repair shop.
14. Truck shop.
15. Wheel and axle shop.
16. Storehouse.
17. Receiving.
18. Shipping
19. Oil house.
20. Boiler house.

room and an electrical operating room, the basemen being occupied by ash-handling facilities and by low tension electrical control equipment. The electrical ba on the operating floor extends the entire length of th building and is 29 ft. wide. A spur track connects th company's system with the north side of the boile house for the convenient handling of fuel, ashes an equipment.

The exposed location of these shops on an open plai in the lower valley of the Mystic River and the exten of the ultimate installation of shops led to the selectio of water-tube boilers fired by mechanical stokers fo the steam heating plant. The paint shop and woo mill are of concrete, brick and steel construction, wit butterfly roofs. The paint shop is 362 ft. 4 in. lon x 172 ft. 4 in. wide, the wood mill being of the sam length and 157 ft. 4 in. wide. There is space in th boiler house for four boilers set in two batteries in single row, but the present installation consists of tw 369-hp. cross-drum type Babcock & Wilcox unit equipped with Taylor stokers and burning bituminou coal. B. & W. superheaters raise the steam 50 deg. F above saturation temperature. The boilers are designe for 160 lb. pressure, but about 125 lb. will be used fo the present.

Two turbo-driven Sturtevant forced-draft fans ar



Schematic Wiring Diagram for Power House, Including Provision for Future Additions

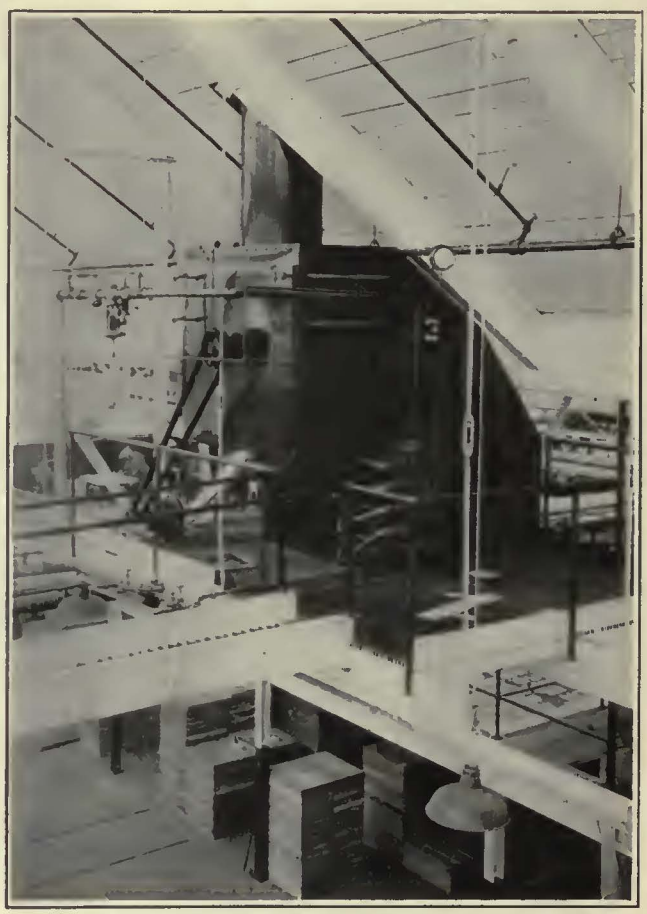
installed on the operating floor of the boiler room to supply air to the furnaces. The boilers are equipped with concrete ash hoppers fitted with rolling gates. Ashes are discharged by gravity from the hoppers into an ash car and trackage system in the basement which connects with an automatic skip hoist on the outer side of the building. By pressing a button this hoist elevates the ashes above the boiler houses and discharges them into a 10-ton overhead hopper from which gravity delivery is made into cars on the spur track.

Coal crushed at the company's main generating station is brought to the boiler house in company cars and is dumped into a track hopper under the ash chute, so that when desired the same car can be used to deliver coal and remove ashes. From the track hopper the coal is carried by a belt conveyor to an elevated tower which forms part of a 200-ton storage bunker at one end of the boiler room, whence it is delivered to the stoker hoppers by a motor-driven lorry of the weighing type. The coal and ash handling machinery was installed by the Underwood Machinery Company, Boston.

Two Lee-Courtney two-stage turbo-driven feed pumps constitute the major equipment of this type, but to obtain more economical operation at times of light load on the heating system a Union Iron Works reciprocating pump capable of supplying feed water to one boiler has been installed.

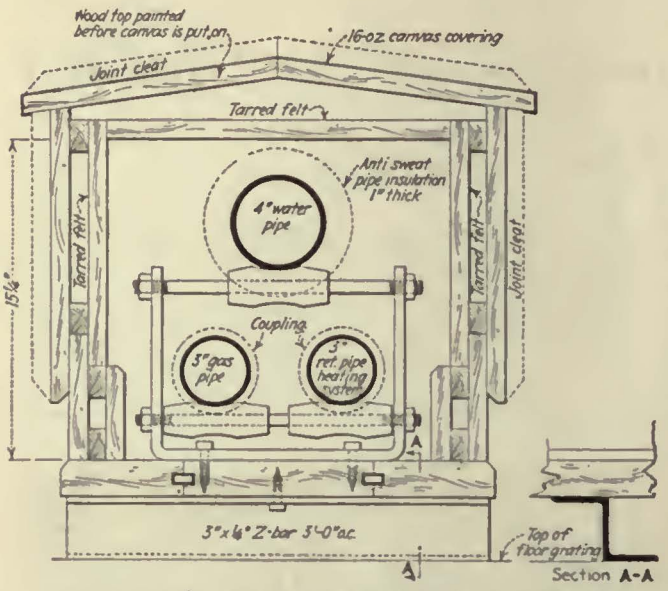
Electrical energy is being supplied temporarily to these shops by the Malden Electric Company, but the installation is designed so that in the near future it will come from the main generating plant of the Boston Elevated Railway. Energy will enter the substation at 13,200 volts, 25 cycles. Two No. 0000 three-phase underground feeders will serve the initial installation, with space provided for a third. These cables enter the substation basement and pass through disconnecting switches, current transformers and General Electric FH-103 500-amp. oil switches and further disconnects to a high-tension bus structure in this room. From the high-tension bus, cable connection is made through similar oil switches on the operating floor to starting compensators and switches controlling two General Electric synchronous frequency converters located in the operating room and designed to transform the 25-cycle, 13,200-volt energy into 60-cycle, 550-volt, three-phase energy for local distribution. One converter is rated at 500 kw. and the other at 750 kw., space being provided for a third unit of the larger rating. Two 34-kw. direct-connected exciters, with room for a third of the same size, are included.

Switchboard for Feeder Circuits, with Fuses Inclosed in Cabinets Beneath



The Ventilating Fan in the Wood Mill Is Installed on a Gallery

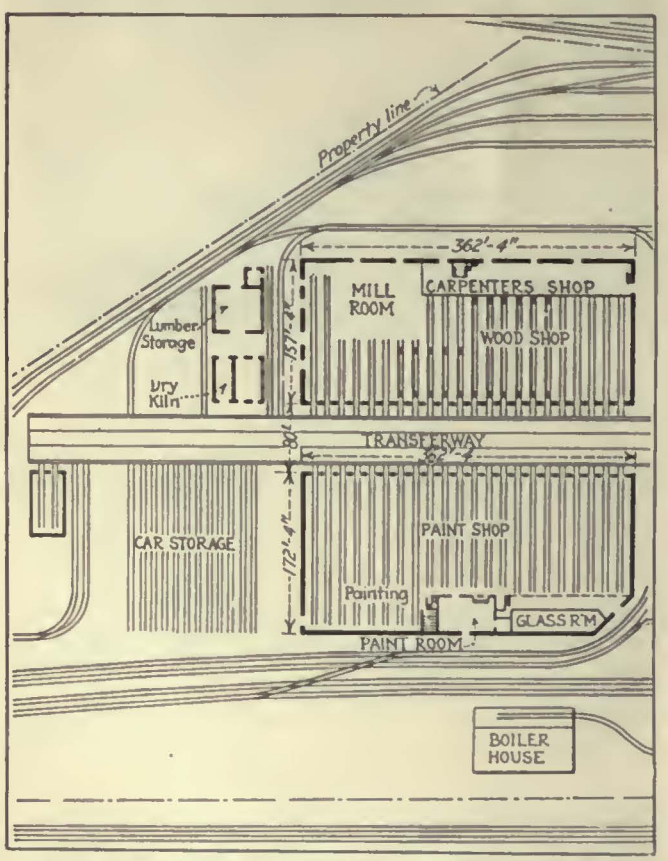
From the generators of the frequency converters connection is made to a 550-volt, 60-cycle, three-phase bus located in the basement, whence feeders are run to the various shops. The switchboard controlling the various equipment, including frequency converters and feeders, is located in the operating room and is of the remote-control type. An "E-9" Exide storage battery of 55 cells supplies direct current for oil switch operation and emergency lighting through an automatic switch installation. The battery is charged from a small motor-generator set in the substation. Space has been assigned in the operating room for a motor-driven air-compressor, but at present air is secured



The Piping Is Carried Over the Transferway on a Bridge in an Inclosure

from the company's pipe line system. An Underwriters' fire pump of 1,000-gal.-per-minute capacity is installed, with space for a second unit. The substation is served by a 20-ton Whiting electric crane.

In general the paint shop and wood mill are heated by hot blast fans which force the air across steam coils and discharge it through outlets into the room below at the rate of 1,000 cu.ft. per minute per fan unit. In each of these buildings eight fan and heater coil units are installed. Steam is carried to the paint shop by an underground 10-in. line, with a 4-in. continuation to the wood mill. The latter pipe is carried in an insulated inclosure across a bridge clearing the transferway between the paint shop and the mill. Reducing valves are installed on the supply side of each set of heating coils.



Layout of Wood Mill and Paint Shop, the First Units of the Everett Shop to Be Completed

The heaters operate on from 30 to 35 lb. steam pressure. In certain inclosed spaces such as offices and lavatories direct radiation supplements the fan system. The heater units are mounted on the skylight sections to leave the supply of natural light as free as possible. The air in this system can easily be recirculated and fresh air can be introduced freely from outside the shops. The heaters are of the Sturtevant inverted type, 8 ft. 3 in. high x 7 ft. wide, each unit having four discharge outlets at the bottom of the casing and located 18 ft. 6 in. above the floor. The heaters are supported by steel members spanning the space between roof trusses and also by hangers attached to the roof girders. A steel platform around each heater makes inspection and repair work easier. The fans are all motor-driven. A 6-in. return line brings the drips from the heating system to the boiler house for recirculation in the feed water system.

The lumber storage building, two stories high and about 55 ft. x 52 ft., is served by a 3½-in. steam line. The second floor is divided into a series of warm rooms arranged in tiers along two sides of the building with an open space between. In each one of six rooms two sets of heating coils are installed. Each set of coils consists of 168 linear feet of 1¼-in. pipe, affording 72 sq.ft. of heating surface per set, and each set is served by a 1-in. live steam lead and has a ¾-in. return lead to the drip piping.

The dry kiln is heated by the direct two-pipe steam vacuum system. The heating unit is sufficient to build up and maintain a temperature of 150 deg. F. in the kiln while changing the air five times per minute. The fan installation has been made in connection with supply ducts leading from the fan discharge down the center of two trucks of lumber which are run into the kiln loaded on tracks at right angles to the transferway. The return ducts are along the sides of the kiln. A humidifying system provides for the entry of live steam sprays between the heating unit and the fan intake. There are also two lines of pipe extending under each line of tracks so that the lumber may be steamed before beginning the drying process. Various instruments used in testing the moisture content of the lumber, temperature and humidity are installed, with an electrically controlled charging oven for use in studying moisture present in small samples of lumber.

The standard pipe coloring schedule approved by the American Society of Mechanical Engineers is followed in these shops.

Atlanta Buys Steam from Incinerator

THE Georgia Railway & Power Company has just agreed to buy the excess steam of the garbage and refuse incineration plant in Augusta. It is expected that during the winter months the steam thus bought will be used in the commercial steam-heating system of the company and during the summer months it will be used in the commercial gas plant of the company. The contract is for ten years and provides that the city shall supply 80,000,000 lb. of steam a year, with a set minimum average per day and per hour at 170 lb. pressure.

Storeroom Improvements at Richmond Save Time and Money

Stock Has Been Completely Rearranged and New Cases Provided —Heavy Material Is Kept on Raised Platforms—Lift Trucks Save Much Time—Cost of Installing New System Was $5,400

By John Y. Bayliss
Director of Purchases and Supplies Virginia Railway & Power Company
Richmond, Va.

AFTER careful consideration of various methods of providing and conserving materials and supplies for current use, the Virginia Railway & Power Company has adopted the so-called stock-book system, and has installed it in one of its large storerooms. The installation involved not only changes in making and keeping the record of stock, but also a complete rearrangement of the stock itself.

The stock-book form is printed with columns for the usual descriptive information about each article and has also space for recording the amount of each article in stock for each month of the year. Each sheet holds the record for four years. The system depends upon a complete inventory once a month, so that requisitions can be made with definite knowledge of the amount of each article on hand. To make possible such an inventory with reasonable expense, the stock must be visible on the shelves and must be stored in such shape that to a large extent it can be counted without handling. Although annual inventory has always loomed as an ominous cloud on the storekeeper's horizon, the monthly inventory can be made in a comparatively short space of time and without extra help. Paradoxically, what was a great bugaboo once a year, now that it comes once a month scarcely makes a ripple on the smooth surface of the affairs of the storeroom.

Material Is Piled in These Cases so It Can Be Counted Without Handling. The Stock in the Two Cases Here Shown Can Be Counted in 40 Minutes. Gas Steam Radiators Are Used for Heating the Storeroom.

The Richmond storeroom contains supplies for both railway and light-and-power service. For convenience in arranging the stock and keeping the records, the materials have been classified according to use and physical characteristics. There are 77 classes of material in this storeroom. The material is listed in the stock book and placed on the shelves and floors in comformity to this classification.

The typical material case is made of dressed lumber and is 22 ft. long and 10 ft. high. It is 4 ft. 4 in. wide at the base and 2 ft. wide at the top. At a height of 3 ft. from the floor there is a shelf 8 in. wide on which the men stand to reach the bins at the top. The case is divided equally by a galvanized wire partition of ¾-in. mesh and No. 14 gage running lengthwise and from top to bottom through the middle. From this the shelves open on both sides. Such a design admits plenty of light and makes it possible to see through the shelves from one side to the other. The case is painted white inside and out with two coats, the last coat being enamel for a hard, glossy finish.

Each bin or pocket has a small galvanized metal card holder, on the front in which is inserted the number and description of the contents. The cases are separated by aisles 3½ ft. wide. Experience has proved the aisles should be not less than 4 ft., or better still 4½ ft., in width if the space is available. As far as practicable, the materials are piled in multiple units to facilitate counting and handling. Small articles are put up in packages containing the amount usually issued on requisition. The articles are packed thus by the makers, if the material in that form can be purchased economically. If that cannot be done, packages are put up by the storeroom clerks when they are not otherwise engaged. This method has advantages over the unit-piling system, because it not only facilitates the inventory, but also aids the issuing of the material.

Appearance of the Richmond Storeroom of the Virginia Railway & Power Company After Rearrangement

No. 1. Material cases for storing boxes of glass.

No. 2. How gear wheels and galvanized pole-line hardware are stored at Richmond.

No. 3. An average of 100 requisitions are filled over this disbursement counter daily involving approximately 250 pieces of material.

No. 4. Steel tubing and sheet steel are stored in these racks.

No. 5. Receiving room where all freight, express and small shipments are received. The overhead hoist is a spur-geared block with chain fall, supported from the roof timbers.

No. 6. Machine of 2,000-lb. capacity used for stacking heavy packages. Note the aisle marked by white lines.

Concrete Platform for Storing Heavy Reels of Cable and Large Transformers. Two-Ton Reels and Large Transformers Can Be Easily and Quickly Loaded and Unloaded from This Platform

A section of the storeroom has been set aside for receiving and checking material delivered. It is inclosed by a partition, the lower part of which is of wood and the upper part of wire-mesh screen. It can be locked off from the remainder of the storeroom. Here deliveries are received and inspected before the material is placed in stock. Such a section adds to the orderly operation of stock receiving and prevents premature issues of materials that have not been accepted and accounted for. A locker section also is provided for articles in suspense, such as goods rejected, incorrectly shipped, or not identified by proper shipping papers.

Another section has been built for issuing materials on requisition. It consists of a wooden counter surmounted by a wire-mesh partition. The man with a requisition presents it at this counter and the clerk brings him the material required. There is a gate with a latch which can be opened to pass out bulky articles not easily issued over the counter. The tendency for men from other departments to enter or pass through the storeroom, either on business or otherwise, is thus prevented.

Special cases have been built for storing pole-line hardware, gear wheels, glass, sheet metal, tubing, etc. Such articles, being bulky or inconvenient for shelf storage, heretofore were piled on the floor, resulting in wasteful use of floor space and improper protection of the property. Putting the material in cases saves storage space, makes it more accessible, and presents withal such an improvement in the appearance that even the men who handle the stock have more respect for its importance and value.

Transil oil is stored separately in an isolated metal house with concrete floor. The drums are thus protected from moisture, and small transformers can be filled under cover. Lead-covered cable and heavy transformers are placed on a concrete platform level with the body of the delivery truck. This convenience has greatly reduced the time, labor and cost of receiving and issuing these heavy stores. Fiber duct for underground conduit, although expensive material, has usually been piled on the ground, resulting in damage and inconvenience. It is now stocked neatly in racks made of cedar posts 12 ft. high, with the tops tied together by wire.

Reels of weatherproof cable and other heavy supplies for inside storage are unloaded on small, portable platforms and moved to position in the storeroom by lift trucks. When the lift truck is removed, the platform rests on the floor with the load on it, where it remains until issued for service. The lift trucks have a capacity of 3,500 lb. and cost $150 each. By their use a carload of heavy reels, each weighing 1½ tons, can now be received and stored without extra help in less than an hour. Formerly, it took half the day for a gang of men to do the same work. Moreover, the stock is in such position that one man with a lift truck can wheel it to the door of the storeroom, where it is quickly lifted to the delivery truck by an overhead hoist. A reel or transformer can thus be issued almost as quickly as a hand package.

Improvements in Handling Methods

Heavy cases of electric equipment, kegs of track material, barrels of insulators, and similar packages which can be stacked, are piled one upon another by a stacking machine or portable elevator, which costs $334. By this means floor space is saved and the property is better protected against damage. The floor for such heavy stores is divided into sections, and aisles 4 ft. wide lined off by white paint give access to the stock.

The time and expense required for installing the

Lift Trucks Having a Capacity of 3,500 Lb. Each Are Used to Handle Heavy Material. When in Position the Truck Is Lowered and the Platform Left in Place with the Load on It

Fiber Conduit Is Stacked in Open-Air Racks. These Are Made of 12-Ft. Cedar Posts Having the Tops Tied Together with Guy Wire

Main Storeroom Showing "Daylight" Cases for Material. The Unit System of Piling Is Used to a Limited Extent. Cases Are Painted White

system were moderate. In the Richmond storeroom a period of 17 months has been taken to lay out the work, tear out the old shelves and material cases, make and set up the new cases, rearrange all the stock, and write up the stock books. With this ample time allowed the change was made gradually. A few cases were built, or a small section was remodeled, at a time, thus avoiding disturbance of the regular routine in the storeroom. After each new case was installed, the material was placed in order on the shelves, following as closely as possible the adopted classification. When the cases had been in use long enough to insure satisfactory arrangement of the stock, the items were written up in the stock book in the order found on the shelves, and the work of installing the new system was done.

CHANGE MADE AT SMALL COST

In this storeroom about 5,000 different articles of stock are carried, of which 4,800 are stored in the building and 200 outside in the open air. The total value of the stock is about $260,000. The cost of installing the stock-book system, including new hoisting and trucking equipment, new material cases, and the salary of an additional clerk for part of the time, is $5,400, distributed as follows:

Taking out old material cases and setting up new cases complete	$3,95
Stock books and forms	1
Portable elevator, lift trucks, etc.	87
Additional clerk for six months at $70 per month	42
	$5,40

Locker Used for Storing Materials in Suspense, Such as Articles Rejected on Delivery or for Which the Proper Identification Has Been Delayed

This system has not been in service long enough to draw final conclusions as to the economy and other advantages realized. It is probable the benefits will not be reflected fully in the operating figures when available. It is nevertheless confidently expected that the new system will enable the stores department to supply the needs of the company more effectively, with a smaller investment in general supplies and with no greater expense in operating the storerooms. Some indirect benefits already appear evident. There is a better arrangement of the stock in the storeroom with smaller floor space occupied. Quicker service is given in receiving and issuing supplies, with better provision for protecting the stock from damage. The discovery and disposition of obsolete and surplus stock are made more frequently and effectively than heretofore. The good effect on the minds of the personnel, because of more perfect order and a better system of storing and handling materials, is apparent.

Overhead Test Material Painted Red

THE Department of Street Railways, Detroit, is following the practice of painting red all overhead material on test. This color attracts the attention of the line crew, which may remove this particular article so that it will be brought into the office for examination and reinstallation. Another advantage noted is that, as all test material is checked periodically until worn out or a condition is reached which makes replacement desirable, the red color makes identification easy and positive. A brief reference to this practice was published on page 88 of the issue of this paper for July 19, 1924.

D. U. R. to Operate Co-ordinated Rail-Bus System

Bus Lines Now Paralleling Interurban System Will Be Co-ordinated with Rail Service to Give Alternate Bus and Electric Car Service on Frequent Headway

PLANS of the Detroit United Railway to co-ordinate with its railway service the bus lines which operate on the highways paralleling practically all of its routes are rapidly nearing completion. The consummation of these plans will mark the end of the destructive competition which followed the completion of paved state highways, and which became very serious during the first half of the current year. Acquirement of the bus lines by the railway will permit bus and rail schedules to be staggered so as to give maximum frequency of service without the useless and wasteful duplication that has existed up to this time.

Along with these plans relative to service outside of Detroit, a novel and interesting terminal project within the city is expected to be in operation within a short period. In this case buses will be used to haul interurban passengers between terminal stations at the outskirts of the city and the present downtown interurban terminal. An earlier brief outline of this terminal plan was given in this paper, issue of Nov. 15.

Bus competition with the lines of the D. U. R. started in 1919, shortly after the completion of the paved road, between Mount Clemens and Detroit. Another bus line was put into operation, paralleling the division from Pontiac to Detroit. Although this competition began to be felt almost immediately it was not serious, due to the higher bus fares and also to the character of equipment operated by the bus men. As bus operation was extended so that these vehicles paralleled other divisions of the railway, passenger revenue continued to fall off. However, this loss was partially offset by increased earnings from intensive development of freight business.

The continued pressure resulted in various operating economies on the railway. Chief among the measures adopted was the increased use of one-man operation on local lines and within some of the communities served. Some of the existing equipment was remodeled for one-man operation and additional new cars of this type were purchased. When the changes, which are still under way, are all completed, there will be between 150 and 175 cars of this type in use on the property. It is estimated that this program alone will make a saving of approximately $500,000 per year.

In the spring of the current year, the situation arising from the bus competition became acute. Improved bus equipment and more frequent service made more serious inroads on the railway receipts. As this more frequent bus service was met by increased service on the rail lines, a fare war ensued, which rapidly brought matters to a climax. In some cases, bus fares were cut as low as 1 cent per passenger-mile, and these cuts were met by the railway. Such low fares induced some additional riding, but the increase was far from enough to compensate.

Improved bus equipment and more frequent service were also put in on some of the long-distance routes paralleling the railway lines between Detroit and Port Huron, Flint, Toledo, and Ann Arbor. A further loss in railway revenue resulted, and during the first 5 months of the current year the railway receipts were no more than sufficient to pay actual operating expenses and fixed charges only.

Practically all of the competing bus routes had been granted certificates of convenience and necessity which amounted to franchises. Although the Michigan Supreme Court has ruled that the commission must ignore the service of existing steam and electric railway lines in determining the public convenience and necessity in connection with the granting of bus permits, the existing bus route is taken into consideration in passing on an application for a second bus line on the same route. Consequently, purchase of the bus lines seemed to be the only course left open to the D. U. R. to offer some assurance of eliminating destructive competition and give a co-ordinated service.

A subsidiary company, known as the People's Motor Coach Company, has been chartered to operate the railway buses. New financing to the extent of $2,000,000 has been approved by the commission, and this money will be used to cover additions to railway equipment, purchase of existing bus lines and extension of routes to give through bus service between the important cities of the state.

Where bus routes parallel the railway lines, a staggered headway will be arranged so that alternate bus and car service will be given. On the lines between Mount Clemens, Pontiac and Detroit, both cars and buses will be operated at intervals of 30 minutes, so that there will be 15-minute headway between alternate cars and buses. Thus a very convenient service will be given, but present needless duplication of service will be eliminated. The economies expected from the elimination of wasteful duplication are estimated to amount to $500,000 per year. Thus the combined result of one-man operation and the co-ordination of cars and buses is expected to make operating savings of approximately $1,000,000 per year.

Although bus and rail fares on some of the shorter lines were on the same basis and were very unprofitable, those charged by the buses on some of the longer lines were higher than rail fares. On the line between Flint and Detroit the railway fare is $1.58. Parlor cars are operated on this line and also on some of the other important divisions of the railway, and an additional charge of 50 cents is made. This parlor car service has proved to be both popular and profitable. The bus fare for a trip between Flint and Detroit has been $2. The company considers these fares to be on an equitable basis, but the fares on some of the shorter routes where competition forced the rates down to a basis 1 cent per passenger mile are not sufficient to meet the costs of operation even after the service is co-ordinated. On these routes application has been made to the commission for increased rates.

The terminal situation at Detroit has for some time been the source of considerable loss to the D. U. R. Within the city the interurban cars operate over the tracks of the city-owned street car system, and the speed is necessarily slow, with frequent stops that are annoying to through passengers.

During the year 1923, 9,250,000 passengers were carried into the city on the D. U. R. cars. This is considerably less than the total number of passengers that are brought in to the city limits, as many people leave the cars at the outskirts of town and ride the jitneys to the business district because of the saving in time that can be made. Others take the city street cars at the

city limits, so as to be able to transfer to other points than the business district for the same fare, and with no loss of time over the interurban cars.

The D. U. R. collects a 6-cent fare for the ride from the city limits to the downtown terminal. Operating expenses on the cars average about 27 cents per car-mile, and the fare collected just about meets this cost. During the year 1923 this operation within the city amounted to about 2,000,000 car-miles. The charge made by the city for the use of its tracks amounted to $500,000, and as this was in addition to other operating costs, it represented a net loss on the operation of the interurban cars in the city area.

To avoid this loss, buses will be used to haul passengers from the outskirts to the center of the city. Four terminals are under construction, one on each of the main divisions of the D. U. R. lines. At these terminals, passengers will be transferred to the buses. In this way, a saving in time for the trip of between 20 and 30 minutes will be made, and it is expected that many people who now use the jitneys to make this saving will transfer to the buses. The revenue from the bus operation is expected to pay the entire cost, and thus a material saving will be made in comparison with the operation of interurban cars to the center of the city. The buses will operate express between the terminals and the business district and will do no local business.

The installation of the terminal bus service will be made gradually. For the present, parlor car trains will continue to operate into the center of the city over the street car tracks, so that passengers will have the option of transferring to the buses or continuing on the cars to the downtown terminal.

Hearings before the commission on some of the phases of the new plan are set for the latter part of November, and it is expected that if the commission approves, the co-ordinated operation will be started during the month of December.

Accident Costs Reduced 1.56 per Cent of Gross Earnings*

The Plan Adopted by the Memphis Street Railway a Year Ago Has Already Resulted in a Saving of Approximately $50,000, of Which the Trainmen Have Received Half

THE management of the Memphis Street Railway after trying various accident reduction plans, such as individual bonuses, prizes, etc., became convinced that the best plan would be one by which the savings in the cost of accidents would be divided between the company and its employees. Plans based on individual performance were thought to have a tendency to discourage the making of full reports of all accidents. On the other hand, a plan based entirely on the actual reduction in accident cost was thought to be free from this objection.

To make such a plan successful it was necessary to devise a method of determining accident costs within a short time after the occurrence of the accident. Previous experience indicated that damage claims were ordinarily settled or a lawsuit was brought within 60 days. Moreover, statistics running back over a period of years showed that the ultimate cost of all litigati was 6 per cent of the amount sued for.

With this experience in mind a new plan was into effect on June 1, 1923. The actual amou expended each month in the settlement of claims, p 6 per cent of the amount sued for during that mon was considered to be the accident cost for the mon For two years prior to June 1, 1923, accident co had averaged 4¼ per cent of the gross earnings the railway. The difference between this figure and accident cost, figured as described above, would the savings under the new plan and would be divid on a 50-50 basis between the company and the men.

It was decided to make the award periodically eve three months, the men's share to be prorated on basis of hours worked, no man participating who w not in the service of the company on the last day the three months' period. If at the expiration of a period the cost exceeded the 4¼ per cent of gross, t excess was to be absorbed during the next period bef any dividend was paid. Under this arrangement bonus was paid unless there was an actual saving to t company.

The results obtained during the past year have be as follows:

Period Three Months Ending	Total Saving	Trainmen's Share
Sept. 1, 1923	$12,244	$6,122 or 1.75 cents per man-h
Dec. 1, 1923	8,762	4,381 or 1.27 cents per man-h
March 1, 1924	10,128	5,064 or 1.45 cents per man-h
June 1, 1924	15,240	7,620 or 2.10 cents per man-h

During the year ending June 1, 1924, the total nu ber of accidents was 2,716 or a reduction of 7½ per ce from the number the preceding year, which was 2,9 The total cost of these accidents was 4.03 per ce of gross earnings, as against 5.59 per cent the ye before. This reduction in the number of accidents w obtained in spite of the fact that the number of au mobiles on the streets of Memphis increased to per cent.

It has been found that this plan not only lesse the number of men requiring disciplinary action, b also makes the administration of discipline much eas and more satisfactory. On the first Tuesday of ea month a meeting of the officials of the transportati department, the carmen's union and the claims depa ment is held. All matters pertaining to safety operation are then discussed. On the second Tuesd two meetings are held, one for the day trainmen a one for the night trainmen. At this time a discussi is held of the operation during the preceding mon good work of certain individuals is commended, a failures pointed out in a manner calculated to impro the operation. About three-quarters of the total nu ber of employees attend these meetings.

The chief advantages of this plan have been fou to be that it encourages the full reporting of all ac dents or happenings, no matter how trivial. It al encourages politeness and courtesy on the part of t employees and stimulates their efforts to increase t gross revenue of the railway. Moreover, it promot friendly feeling between the trainmen and the co pany and makes the administration of discipline eas as the majority of the men do not wish to have carele indifferent or incompetent men retained in the service

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

Bus Making Connection with Car Under the Co-ordinated Service Plan of the West Chester Street Railway

Transportation Service Co-ordinated in Southeastern Pennsylvania

The Acquisition of 11 Bus Lines and 8 Miles of Rail Route Has Enabled the West Chester Street Railway Greatly to Extend Its Operations and Population Contact — The Company Has Been Relieved of Paving Obligations—Railway Is the Backbone of the Bus Development

DURING the past 18 months the West Chester Street Railway, West Chester, Pa., has added to its system 8 miles of electric railway lines ormerly belonging to other companies, and has cquired nearly 200 miles of non-competitive interurban notor bus routes. The unified system serves approxinately 1,000 square miles of populous and fast-rowing territory in southeastern Pennsylvania and orthern Delaware. A map f the system appears on nother page.

By the acquisition of hese bus and rail lines the ompany has added subtantially to its earning ower at comparatively mall expense, by bringing arge sections of populous erritory, heretofore isoated, into direct contact ith its railway system. lthough the unified system s shown on the map has een established only a few months, the company is obaining regular traffic on its ailway lines from territory hich in the past, without us connections, yielded nly occasional revenue. udging from these satisactory results, it is thought that with proper co-ordination of service and the use of comfortable and attractive equipment and adequate advertising to inform the public of facilities afforded, the volume of traffic carried on both railway and bus systems will be further increased.

In addition to the income from scheduled bus service, considerable revenue is derived from the sale of gas and oil, private automobile storage and from the hire of buses by private parties for sightseeing trips and other purposes. The company considers the latter class of business susceptible of large and profitable development on account of the flexibility of the bus and the character of territory, which is rich in points of historical and educational interest and gridironed with concrete and hard-surfaced roads.

Some of the Picturesque Territory Through Which the West Chester Street Railway Operates Its Interurban Service

The West Chester Street Railway was incorporated in 1890. It owns and operates two interurban lines aggregating about 37 miles of single track. One extends north and west from the Borough of West Chester, the county seat of Chester County, to Downingtown and Coatesville, a

distance of 15 miles. The other extends south and west from West Chester to Kennett Square, Avondale and West Grove, a distance of more than 21 miles. Connection is made at West Chester with the Philadelphia & West Chester Traction Company, giving direct and frequent service to Philadelphia.

The northern division of the railway serves an important industrial section of Chester County, centering in Coatesville and Downingtown. Between these points the route is along the Lincoln Highway and parallels the main line of the Pennsylvania Railroad. Because of the present housing shortage and the character of territory, this district seems destined to have considerable residential development. The southern division, operated from West Chester through the Brandywine Battlefield district and Lenape Park, a popular summer resort, to Kennett Square and West Grove, serves not only the local interborough traffic in southern Chester

Railway and Bus Routes, Locally Known as the "Chester Valley Lines," Serve an Area of 1,000 Square Miles

County centering in Kennett Square, but also the through traffic to the county seat and to Philadelphia.

Prior to 1923 the railway's southern division terminated at Kennett Square. In that period the Kennett & Wilmington Electric Railway, an independent company, operated two divisions, one extending west from Kennett Square, a distance of 7½ miles through a well-developed section to the neighboring towns of Toughkenamon, Avondale and West Grove, while the second extended south a distance of 14 miles through rural territory to Brandywine Springs on the outskirts of Wilmington. Losses on this rural division more than offset the gains on the interborough line between Kennett and West Grove, with the result that service was abandoned in the spring of 1923.

About this time Kelly, Cooke & Company, engineers, Philadelphia, for many years associated with transportation work in southeastern Pennsylvania, acq control of the West Chester Street Railway. The management promptly took steps to secure the p able section of the railway formerly in operation Kennett to West Grove, and by this means to o not only the local traffic between these points, but the additional through six-fare business to the co seat from points in the southern part of the co The property was taken over in October, 1923, reconstruction work was immediately undertaken

Traffic on the West Chester-Kennett division was duced primarily by the terminal populations at Chester and Kennett Square, and secondarily, by connecting railway lines to West Grove and Brandy Springs. This feeder service for years had been h capped by irregular operation, due to derailm and other causes. Unsatisfactory as this conne service had always been, it was utilized as a matt necessity and brought conside "county seat traffic" to the Ke division of the West Chester S Railway.

The line from Kennett to Grove has now been reconstru through service having been ina rated in July, 1924. The anno necessity of transfer at Kennett been eliminated and a great imp ment in the regularity of service the character of the equipment been effected. The company equipped nearly all of its cars luxuriously upholstered seats bu order by the Hale & Kilburn pany. Seating accommodations clude swivel armchairs, which proved a popular innovation. marked increase in pleasure ri which has occurred is attribute the management to the pleasant ing qualities of the new seats. interior view of the improved c shown in an accompanying illus tion. Present indications are the increased passenger revenu the extended Kennett division wi approximately three times the crease in operating expenses fixed charges.

Another important phase of situation is that under ordina enacted by the city of Coatesville and the Borough Downingtown, West Chester and Kennett Square company has been permanently relieved of former ing obligations in these communities. Typical sect of paved track, which has practically all been re with heavier rail sections in concrete or permanent are shown in accompanying pictures. Except in t towns the tracks are nearly all on private righ way and are unpaved.

Recently the company has also acquired abou mile of paved track extending from the terminu its line in Coatesville, south on First Avenue to plant of the Bethlehem Steel Company. This exten will permit the operation of a more frequent se along the main street in Coatesville, and will en the company to gain considerable local revenues he fore lost on account of the 30-minute headway of

nterurban service and of its inability to handle the ndustrial traffic to its final destination.

The First Avenue track was formerly the property f the Coatesville Trolley Company, organized to con- ruct an electric railway from Modena (about 3 miles outh of Coatesville) north through Coatesville to oney Brook. About $80,000 was spent in constructing ne First Avenue track before funds were exhausted nd the project abandoned. The track, which has never een in operation, is constructed of 90-lb. girder rail et in concrete, with a diamond turn-out centrally ocated, and was obtained by the West Chester Street ailway on most favorable terms.

When and How Bus Lines Were Acquired

On account of the location of the railway system n relation to the communities which it serves, and o connecting highways leading to near-by population enters, the inauguration of a supplemental bus service as seen to be necessary to increase and stabilize ailway revenues through an enlarged and diversified opulation contact. While the management considered hat the construction of new electric railway lines con- ecting certain sections of the territory would in the nd be more profitable than buses, it was found that his would have required extensive construction along arts of the primary concrete highways for which ranchises would be difficult, if not impossible, to btain. For this reason decision was made to utilize he bus as the most immediately available substitute.

As an initial step in the execution of its plan for a o-ordinated railway and bus service the West Chester treet Railway in June, 1923, bought control of the eoples Transportation Corporation. This was a small ompany organized in 1920 to operate buses on the altimore highway between Media, the county seat f Delaware County, and Kennett Square, and also etween Concordville and the city of Chester. In pur- hasing the Peoples Corporation, the railway accom- lished several objectives at one stroke. A going ompany was thus acquired through which to operate he railway's buses, and control obtained of routes ntering the populous Chester district from the north- est via the Concordville concrete highway. The ailway was also placed in a good position for acquiring us routes into Wilmington.

In October, 1923, the routes from Kennett south to he Delaware and Maryland lines, together with others n the city of Wilmington, were granted to the Peoples ransportation Corporation, thereby placing under one

Parlor Cars Equipped with Revolving Armchairs Are Inducing Pleasure Travel

management all bus transportation between the boroughs of southern Chester County and Chester and Wilmington.

In northern Chester County the same company also acquired by purchase a route extending from Downingtown east on the Lincoln Highway to Exton, thence northeasterly through several small villages to Phœnixville, an important industrial center. Pending the acquisition of other routes in this territory, this resulted in a franchise covering the entrance to Downingtown (a railway terminal point) and also to the principal borough in the northeastern section of the county.

Acquisition of Other Franchises Has Extended Population Contact

Franchises have also been obtained covering the Lincoln Highway from Downingtown through Frazer, Malvern, Paoli and Devon to Strafford, connecting there with the Philadelphia & Western Railway, operating a 20-minute high-speed electric service to Philadelphia. The route from Strafford to Valley Forge National Park and Phœnixville has also been secured to develop pleasure travel to that historic point. This route, passing through a region of great natural beauty, offers a very attractive and convenient means of reaching Valley Forge from Philadelphia.

Other franchises granted to the company are those between Norristown and Phœnixville and between

Coatesville, Terminal Point of the Railway System

A Section of the Railway in Downingtown

Phœnixville and the near-by boroughs of Spring City and Royersford, which gives to this important district the advantages of a permanent and unified bus transportation system. Following the acquisition of these franchises the corporation obtained the right to extend its Phœnixville line and also its Chester line into West Chester (the railway terminal), thus completing the unified system. The effect of this has been to bring large sections of population, heretofore isolated, into contact with the railway, thus aiding materially the development of long-distance riding on the railway. It has taken about 18 months to establish the various bus lines and the railway extensions.

As of November, 1924, the Peoples Transportation Corporation owned and operated 21 motor buses of seating capacity ranging from 12 to 30 passengers. It is planned by the West Chester Street Railway still further to improve its equipment and extend its facilities to permit of more economical centralization of maintenance work.

Extensive Use of Advertising

While each route has been placed in operation as acquired, it has only been within the past 2 months that the company has been in a position to advertise the service as a whole, due to the necessity of first modifying the original schedules of each route and coordinating them with the requirements of a unified system of operation. The management estimates that it will take about a year of "cut and try" to fit these to the public need and fully to develop the traffic potentially tributary to the lines.

One form of advertising which has produced results is shown in an accompanying illustration. As another means of informing the public of its service facilities, the company publishes a standard form of time-table for each railway and bus line with a map of the system, and giving telephone numbers throughout the territory through which further information can be obtained. These booklets are placed in multiple pocket schedule boxes located at advertised points and in all railway cars and buses. Large numbers of schedules are also being constantly sent through the mails upon request, it being considered that every inquiry or schedule taken represents a probable patron. The company has also issued an attractive illustrated folder describing many points of historic and educational interest in the territory served by its lines, which is particularly rich in its Colonial history.

Public Relations

One of the interesting results of the company's constructive program has been the complete reversal effected in public sentiment. Whereas formerly this had been decidedly antagonistic, there now appears to be a friendly feeling and a good word on every hand for what the company is accomplishing in the way of property and service betterments. An editorial in the Coatesville *Record*, entitled "Pleasing the Public," shows how the public responds to genuine efforts to make traveling more pleasant and comfortable. This editorial said in part:

> Credit must be given officials of the West Chester Street Railway for the manner in which it is serving the public.
>
> The present management of the trolley company apparently realizes that it prospers most when it gives the best possible service, and there is plenty of evidence that it is spending both energy and money in its plan to render such service. Improvement in tracks and roadbed, remodeling and renovating of trolley cars, additions to service through more cars and better schedules—these have gone a long way toward bringing to the company a hearty public support which it must be admitted was entirely lacking only a few years ago. This condition is shown also on the motor bus lines operated by the same company.

Large Tributary Population

The total population of the territory in contact with the bus system is 336,423, and with the co-ordinated railway and bus system 359,517. Of this 93,194 is in Chester County; 68,352 in Delaware County; 70,83[illegible] in Montgomery County, and 127,137 in New Castle County, Del. This population is only that of the territory in direct contact with the railway and bus lines and does not include any part of the large populatio[illegible]

Advertising the Special Trip Service

between that territory and the western boundary of the city of Philadelphia. The latter district is directly connected by seven high-speed electric lines with Philadelphia, containing more than 2,000,000 people. All these lines enter the Union Terminal Station at Sixty-ninth Street, which is also the terminus of the Market Street subway and elevated lines of the Philadelphia Rapid Transit Company. There are about 190,000 people living in the intermediate territory west of Philadelphia, which is the most rapidly growing district adjacent to the city. A large part of this population lies immediately to the east of the bus terminal and is tributary in varying degrees to the bus lines by reason of connecting railways which traverse this territory en route to Philadelphia. The population per mile of route for the bus system is 1,780, and for the railway alone, 1,320, which indicates the extent of possible future development of the traffic.

Demands for service to accommodate parties for special trips for distances varying between 10 and 20 miles are frequent and increasing. It has been impossible heretofore, owing to lack of equipment, to furnish this service except in occasional instances, but plans are going forward actively to provide for it. With the intercommunity activities in this territory and its richness in points of historical and educational interest, it is believed that revenues from this class of service are subject to considerable development.

Association News & Discussions

Iowa Association Discusses Maintenance

Track Construction, Automatic Substations, Bus Operation, Equipment Maintenance, Electric Welding and Lubrication Furnish Subjects for Fall Program and Lively Discussion

APPROXIMATELY 100 members of the Iowa Electric Railway Association assembled at Des Moines on Nov. 13 and 14 for a busy two-day session devoted to a discussion of many operating and maintenance problems. Comparison of practice and exchange of experiences helped to make the meeting particularly valuable to the operating men present from the standpoint of furnishing fresh inspiration and many practical ideas for modernizing.

In addition to strictly railway subjects, the bus also was taken up in one paper, and the discussion showed plainly that many of the railway men present are actively interested in this vehicle for the transportation of passengers, and are rapidly accepting the idea that the electric railway companies of Iowa are the logical agencies to control and operate transportation lines on the highways of the state.

The meeting was opened by chairman John Sutherland, master mechanic Tri-City Railway. Track construction, automatic substation operation and maintenance and bus operation occupied the first morning session. The afternoon was spent inspecting the various departments of the Des Moines City Railway and the Des Moines & Central Iowa Railway. The second business session took up the subjects of equipment maintenance, welding practice and lubrication. The entire association was entertained at luncheon as the guests of the management of the Des Moines City Railway, and an evening banquet completed a full entertainment program.

A paper by M. W. Freund, superintendent of way and structures Tri-City Railway, Davenport, on the construction and maintenance of street railway track, is abstracted elsewhere in this issue. In the discussion of this paper, R. H. Findley, superintendent of track and roadway Omaha & Council Bluffs Street Railway, said that in Omaha the railway company is trying to unload its paving burdens. He cited some examples of maintenance problems in Omaha, and said that the tendency toward lighter rolling stock equipment was giving the track department relief in two ways: First, in making it possible to construct at less expense new track that seems to stand up satisfactorily under lighter equipment; second, in cutting down the wear and tear on track now in the street. He also said that the use of modern tools like pneumatic tamping equipment, by improvement in tamping, make it possible to cut down somewhat the thickness of ballast required. He favored a sand cushion only in preference to sand and cement under brick pavement, but pointed out that the results obtained depended largely on the local drainage conditions.

Some results obtained from the use of a new quick-hardening cement called Lumnite were described by W. L. Wilson, chief engineer maintenance of way Des Moines City Railway. Mr. Wilson said that this material was extremely handy for patchwork and for concreting short stretches where quick hardening made it possible to allow traffic on the new material after a very short interval. Later in the program, the chairman, at the suggestion of Mr. Wilson, called on Mr. Campbell of the Atlas Lumnite Cement Company to describe some of the properties of this new material which it is putting on the American market.

Track joints were held to be the critical part of the track construction by C. M. Feist, master mechanic Sioux City Service Company. He said that the receiving rail gets a severe hammer blow unless the joint is perfectly level and smooth, and stressed the importance of grinding joints until they are in this condition after welding. Mr. Jameson, of Jameson-Ross Company, said that most track men considered it good practice to grind all joints when laying new rail. Mr. Freund said that the practice in Davenport is sometimes to make the joints slightly above the rest of the rail and then to grind them level.

In a discussion of the use of fillers in brick pavement near the rail, F. V. Skelley, assistant manager Tri-City Railway, cautioned against the use of materials that would flake off and cause derailments. Mr. Findley thought that pitch had been used in the case cited, as he held that it would flake off in cold weather, but that a good grade of asphalt filler would not cause trouble from this source.

"Experience in the operation and maintenance of automatic substations" was the subject of a paper by D. H. Nail, superintendent of power Des Moines City Railway, which is abstracted elsewhere. In the discussion it was pointed out that relief from labor difficulties, as well as elimination of the expense of attendants, was one of the most outstanding advantages of automatic operation.

W. G. Lamb, master mechanic Waterloo, Cedar Falls & Northern Railway, read a paper giving the experience of his company in the operation and maintenance of buses. In 1922 the Johnson Motor Bus Company, operating on the paved road between Waterloo and Cedar Falls, was taken over by the railway and modern 25-passenger buses were put in service on a 30-minute headway between 6:30 a.m. and midnight. A new garage was erected adjacent to the car shop with facilities for the proper inspection and maintenance of the bus equipment. The bus fleet averages between 800 and 1,000 miles per day. The master mechanic has charge of the maintenance of buses as well as railway equipment, and the operation of the new service was placed in charge of a supervisor of bus operation, reporting to the superintendent of the property. The careful records kept give a complete history of the performance of each bus. Facilities for filling the buses when they go out in the morning were installed. Special tanks of 40 gal. capacity enable the buses to operate the full day without refilling.

Attention is given to the appearance of the buses and the drivers are trained in courtesy. Co-operation between the operating and mechanical departments enables small operating troubles to be remedied before they become serious and tie up equipment. Maintenance cost between Jan. 1, 1924, and September 30, 1924, amounts to approximately 7.1 cents per bus-mile, made up as follows:

Superintendence of maintenance..	$0.00161
Repairs to bus bodies	.00381
Repairs to chassis	.00854
Repairs to transmission	.00073
Repairs to engines	.01023
Repairs to ignition and lighting.	.00285
Painting and varnishing.....	.00168
Tire renewals	.01283
Bus depreciation	.02828
Maintenance of garage	.00049
Total	$0.07105

Total operating expenses of the bus fleet per bus-mile were placed at 15 cents.

Tire performance is watched closely and an average of 23,000 miles, with a maximum of 48,000 miles per tire, is obtained. Bus overhaul periods are fixed by the condition of each bus after a careful inspection rather than on a predetermined mileage, and wide fluctuation in the mileage between overhauls is obtained on different individual pieces of equipment of the same manufacture. Buses that have been overhauled and have made a total of close to 200,000 miles are still found to be in first-class operating condition, Mr. Lamb said. He emphasized the importance of careful attention to the little items of maintenance as the best precaution against serious damage to the equipment and consequent heavy maintenance expense. Proper lubrication was held to be an important factor in avoiding high maintenance and serious interruptions to service.

Mr. Skelley reported that the opera-

tion of buses by the Tri-City Railway to date was costing 15.2 cents per bus-mile. The buses are used as feeders only and the service is very light. Income averages about 12 cents per mile, making a net loss on the bus operations of about 3.2 cents per mile. Pull-ins due to failures are about one per 3,000 miles of operation and are all due to minor defects such as fan belts, punctures, etc.

A. E. Johnson, supervisor of bus operation Waterloo, Cedar Falls & Northern Railway, said that the bus is a legitimate means of transportation, primarily because it is popular with the public. He felt, however, that the use of reduced fares in the battle for business is all wrong, and sets a dangerous precedent which is very liable to make it extremely difficult to adjust fares to a profitable point when the use of the new vehicles becomes stabilized. First-class equipment, careful supervision, courteous drivers and the maintenance of safe operating conditions and reliable service were held to be the proper weapons for a railway bus operator to use in a fight for business with competing lines. As an example of the safety of properly supervised bus operation, he cited the experience of his company, which has hauled more than a million passengers without an accident to a passenger except where one was hurt in a slight scuffle when the bus was standing still at the curb. Careful selection of drivers and comfortable and attractive equipment were held to be of paramount importance in fullfilling the modern conception of good transportation service. In special party service he said that his company made a flat charge of 50 cents per running mile.

Some sidelights on the bus operating insurance situation in Iowa were given by M. A. Welsh, superintendent and traffic manager Waterloo, Cedar Falls & Northern Railway. Mr. Welsh explained the provisions of the motor carrier law of the state which required every operator of motor buses to carry insurance in a company approved by the commission. Under the mandatory provisions of this law, the cost of insurance for liability only would amount to about $707 per year per bus, according to Mr. Welsh. He said that his company finally succeeded in getting relief from this heavy burden by convincing the commission that the prior lien provisions of the Iowa laws which give an injured passenger a prior lien on all the property of the company was protected by the large fixed investment of the railway within the state. To satisfy mandatory provisions of the motor vehicle law relative to the filing of a bond by a motor bus operator, a nominal bond was finally accepted by the commission, thus materially reducing the cost.

A paper by W. M. B. Brady of the General Electric Company dealt with the many applications for electric arc welding in salvaging electric railway materials. Mr. Brady listed a large number of items which could be profitably salvaged by welding, and gave comparative figures to show the savings which had been made in several instances from reclaiming worn parts. He described some of the applications for automatic welding apparatus manufactured by his company, with particular emphasis on the economies which could be made by welding rolled steel wheel flanges by this method. He said that preheating and annealing of welded wheels was not successful, and in addition was very expensive. This is unnecessary in welding flanges with automatic equipment, according to Mr. Brady. He attributed the lack of trouble from cracking, when the automatic welder is used for building up flanges, to the uniformity of the work as compared with hand welding, which has not proved successful in some instances. He opposed attempting to weld worn treads, as he said this produces severe and injurious strains in the material due to the extremely high temperature resulting from laying on such a large amount of material.

Mr. Lamb said that hand welding of 36-in. wheels on his property had given no trouble. J. G. Munson, master mechanic Cedar Rapids & Iowa City Railway, reported that his company has been building flanges on interurban equipment with hand welding equipment for 7 or 8 years and has experienced no difficulty. The use of welding for building up flat spots in wheels was also reported on favorably by several of those present. Welding of worn axles and armature shafts was not recommended, as it was felt by some that these parts should be scrapped when they have become so worn as to require building up the journals. Mr. Feist described the practice on his property of using a pit grinder to keep the tread diameters of mating wheels the same, and attributed freedom from sharp flanges to this practice. Mr. Munson concurred in the conclusion that the practice of keeping wheels ground to the same diameter gave freedom from sharp flanges and cited an example from his experience of wearing out rolled steel wheels completely on single-truck safety cars without turning, by putting on wheel-truing brake shoes whenever the wheel diameters became slightly different.

Mr. Skelley read a paper prepared by T. E. Wood, master mechanic Omaha & Council Bluffs Street Railway, on the maintenance of equipment. In this paper Mr. Wood pointed out the need for reduced maintenance cost to meet the materially decreased revenue of many electric railways, and held that increased efficiency of maintenance men, the adoption of the most improved methods of doing work and general raising of employee morale through good management by the head of the department were the methods by which this result can be accomplished. Mr. Wood said that the car inspector plays one of the most important parts in the maintenance of equipment and emphasized the importance of selecting and training these men with extreme care. A blueprint form used by the Omaha company for sending a comparative statement of equipment failures to the various carhouse foremen helps materially in getting more careful inspection by inspiring a spirit of rivalry among the various foremen. He said that systematic inspection is the first step in getting good inspection and reported that all of his company's cars are equipped with Economy meters, whi help materially in assuring inspecti at proper intervals.

Another method of helping the va ous foremen to do good work, accordi to Mr. Wood, is to furnish them wi copies of blueprints showing car wiri diagrams, part numbers of car equi ment for ordering purposes and a other information which will help th in making repairs or replacements parts. Keeping a complete file foreign prints which is always ava able to shop foremen and from whi information can readily be furnished carhouse foremen was also considered help in getting good results in Omal Mr. Wood said that dipping and baki of armatures had been a distinct su cess in reducing armature maintenan He also described the Omaha company method for cutting the cost of painti by minimizing on labor and material.

Mr. Feist called attention to t trolley wheel as a source not only maintenance cost, but also of pow loss. Mr. Anderson said that his ro had obtained average mileages of b tween 20,000 and 22,000 miles fr wheels of the type designed by M Feist. With this type of wheel, Mr. A derson also said that it had been al to do away with one night inspector each of its stations. In answer to question Mr. Wood said that it was t practice on his property to have t Economy meters read by the transpo tation department. Mr. Sutherla said that the savings during the fi year after the installation of Econon meters in Davenport amounted $12,000. In answer to a question also said that the average number pull-ins for all mechanical causes the cars of the Tri-City Railway, i cluding fenders and broken glass, w 6,400 miles per pull-in.

John S. Dean, Westinghouse Electr & Manufacturing Company, read paper prepared by C. Bethel of t railway motor engineering departme of his company on the subject of lubr cation of railway motors. In th article Mr. Bethel not only outlin some of the high spots in correct lubr cation practice, but also gave char and curves illustrating in detail son of the reasons for these conclusions shown by careful tests conducted his company. A complete article Mr. Bethel on this subject was publish in ELECTRIC RAILWAY JOURNAL, issue April 19.

The paper was received with intere by the Iowa men, and many sidelig on lubrication practice were brought o in the discussion. Mr. Feist said th he believed in the use of plenty of o and although this material should n be wasted, he felt that the loss of o armature through insufficient lubric tion would more than offset all the sa ings made through restricted use of o The most important item in lubricati procedure, according to Mr. Feist, to make sure that the man in charge the work does not miss a bearir through carelessness when going over car. Mr. Welsh of the Viscosity C Company said that if every operat followed closely the suggestions co tained in Mr. Bethel's paper the would be very few lubrication failur on electric railway equipment. M

Feist attributed most equipment troubles to the vibration caused by poorly lubricated and worn parts. Mr. Dean described various methods used by railways for making bearings fit tight in the motor housing after they have become worn. One method described was that of driving a drift through the shell to expand the outside diameter, and the other consisted of copper plating the outside of the worn shell until the desired diameter had been obtained. In this latter method the bearing is first babbitted and then copper plated, after which the babbitt is bored out to the correct diameter to fit the shaft. He said that the cost of the process averaged about 30 cents per bearing. Mr. Dean also described a new type of oil seal housing which is being perfected by his company, but is not yet on the market.

At the conclusion of the meeting, a nominating committee consisting of C. M. Feist, John Lewin and W. G. Lamb brought in a recommendation for the membership of next year's convention committee, which was unanimously approved. The members elected to this committee are as follows: W. L. Wilson, engineer maintenance of way Des Moines City Railway, chairman; R. H. Findley, Omaha; R. C. McMahon, Des Moines; W. G. Lamb, Waterloo; W. A. Clough, General Electric Company; F. R. Grant, Westinghouse Electric & Manufacturing Company, and H. R. Sampson, Ohio Brass Company. John Sutherland, master mechanic Tri-City Railway, was re-elected chairman of the meeting for next year.

Maintaining Street Railway Track*

By M. W. Freund
Superintendent of Way and Structures
Tri-City Railway, Davenport, Iowa

IN ANY track repair job the procedure depends on the condition of the rail, joints, ties and the foundation under the ties. One stretch of track in Davenport approximately 1,800 ft. long on a 4 per cent grade was 18 years old. This was built of 7-in. tram rail, ties 2½ ft. center to center, and was in very bad condition. The rail in this track was worn down to such an extent that there were two, and in some places three, grooves in the tram. These grooves were so deep that the wheel flanges could not slide sidewise from one groove to the other, and as a result cars were being derailed at the rate of one per day. Relief at minimum cost was obtained by renewing one rail of the track with a tram rail which had sufficient depth to permit the flanges of the wheels on one side of the car to slide sidewise on the head of the rail. This track has been operated more than 3 years without a derailment.

We have renewed the rail on several other stretches of track at comparatively small expense. These stretches were built new in 1903 with 7-in. tram rail, ties 2½ ft. centers, ballast under the ties. In 1912, on account of street paving by the city, it was necessary to reconstruct these stretches of track. The old rail and joints were used, but 50 per cent of the ties were replaced. The ballast was removed and 6 in. of concrete placed under and between the ties. By 1924 the rail and joints had become very poor in condition. The brick paving concrete foundation and the ties were still good. In this case, 10 in. of paving on each side of the rail was taken up, and the rail was carefully shimmed with steel and wood shims and was then spiked to the old ties.

Rail joint repair practice varies with the conditions encountered. When the joints are tight, whether welded or bolted, and there is a very slight cup, it is our practice to grind the joint to a perfect surface with a reciprocating grinder. When the joints are tight and the cups are deep, the rails are built up with an arc welder using hard steel, and are then ground with a rotary grinder. If the joint plates become loose but are still in good condition, they are rebolted, and usually are welded to the rails. When the joint is loose and plates are also badly worn, new plates are welded to the rails provided both rail ends are in good condition. In the case of joints on Lorain section 80-316 rail—we have experimented with welding the old continuous joints after the base support has been cut off, making them fish plates. These plates are set in close to the web of the rail at the base. The top of the outside plate is set ⅛ in. out from the head of the rail. The joint is then bolted with six bolts and welded to the base, the outside plate being welded only at the top. As it is very difficult to weld the inside piate at the top, the welding is omitted. When the joints are loose and the rail ends are broken, it is necessary to cut out the broken rails and insert a piece of rail with two new joints. The length of the rail cut in depends on the tie spacing, varying from 4 ft. to 14 ft., the latter being used when ties are on 6-ft. centers. The new joints are always placed over ties.

New joints that are being put in are ¼-in. machine plates with four-hole drilling. These are welded to the rail at the head and base by either the carbon or metallic arc. There are three welds made on tram rail, and four on tee rail. Rails are cut through the head with a hack saw and the remaining part of the cut is made with an oxyacetylene torch.

When repairs are necessary to manganese centers in special work, they are built up with a special manganese welding rod, which gives satisfactory results providing the welding is done according to instructions. Loose hard centers are not welded until after they are tightened. This is done by removing bolts and raising the center on shims to the proper elevation and then replacing bolts and tightening. After the center has been reset and the cars have operated over it for a few days, it is again tightened and the bolt holes filled with hot asphalt.

New track in Davenport is constructed with 8-in. stone ballast, creosoted oak ties spaced 2 ft. center to center, 7-in. 80-lb. tee rail, 25-in. four-hole machine joints and tie rods spaced 10 ft. The joints are opposite and are welded by the carbon-arc process to the head and base of the rail, mild steel insert being placed between the rail ends before welding. All new track is ground with a reciprocating grinder.

In the reconstruction of old track the best of the old bricks are saved. The rails are then jacked up from the ties and removed, the ties remaining to be removed by the steam shovel. After the grading is completed, the sub-grade is rolled, and 6 in. of stone distributed and rolled. The ties are spaced on 2-ft. centers, the rail distributed and spiked, after which sufficient stone is placed in the track to raise to grade and tamped with Ingersoll-Rand pneumatic tie tampers. After tamping, the cars are permitted to operate over the track in order to hammer it down thoroughly. It is then raised to grade and retamped, the interval between tampings depending upon the frequency of the car service, the average time being four days. After the second tamping the track is lined and is then ready for the concrete paving base, which is placed during car operation. Brick paving is laid on a 1-in. cement mortar cushion mixed 1:4, and is filled with 1:2 grout. Vehicular traffic is not permitted on the paving for at least 4 days.

Where the old track is in solid concrete other methods are employed to do the excavating. Air hammers are equipped with chisel points and are used to loosen the ties from the concrete and cut a channel along the edge of the excavation. Where the concrete is 10 to 12 in. thick it is necessary to use steel tipped wooden prys 4 in. x 6 in. x 12 ft. long to raise the concrete, which is then broken with heavy sledges. This concrete is crushed by a portable crusher and used as ballast in the new track.

During the winter of 1923 and 1924 the Tri-City Railway made a number of track changes in Davenport on account of the rerouting of the cars. The work was done in the most severe weather, the temperature on many days being below zero. In making the excavations, it was necessary on a few jobs to remove 21 in. of frost. After this was completed, the building of the track, including tamping, was done with very little difficulty. Concrete was placed on days when the temperature was higher than 20 deg. F. We did not have much success heating the materials for concrete before putting them in the mixer, as the amount of material needed for concrete for one day was considerably larger than could be heated. We used a mixer that could deliver 6 cu.yd. of concrete per hour, and heated the materials after they were placed in the mixing drum with a Hauck concrete heater. After being placed, the concrete was covered with straw on the top of the rail. and the straw in turn was covered with a cheap grade of tar paper to prevent the wind from blowing it away and also to help retain the heat in the concrete. When the weather was not too cold, the straw and tar paper were removed after 48 hours. The concrete was then swept clean and heated with large paving heaters and paving lard. The sand for the paving cushion was heated on old junk boilers. Steam from a portable

*Abstract of a paper presented before midyear meeting of the Iowa Electric Railway Association, Des Moines, Iowa, Nov. 13, 14, 1924.

boiler was used to heat the water that was used for making the mortar paving cushion and the cement grout. Immediately after grouting, the paving was covered with the straw and tar paper, and was thus protected for at least a week when the weather was moderate, and longer when it was very cold.

Experience with Automatic Substations*

By D. H. Nail
Superintendent of Power Des Moines City Railway, Des Moines, Iowa

AUTOMATIC substations do not require a great deal of attention other than periodic cleaning and inspection. In the early use of these stations in Des Moines they were inspected twice each month. Later on we found that this time could be extended to once each month without any trouble occurring to the equipment. The buildings in which these equipments were installed are fireproof and well ventilated. When inspections are to be made the station is shut down after the morning peak load is over, the machine is blown out and the switchboard and the station are cleaned up. Compressed air is furnished by a portable air compressor operated by a 600-volt d.c. motor. This compressor is transported in a truck to each station when inspections are made.

After the station has been blown out the maintenance men inspect each part of the apparatus separately, clean the machine, interlocks and relay contacts, and go over all nuts and terminals on the back of the switchboard to see that everything is clean and making good contact. All protective devices are next tried out to be sure that they are working properly. This is done by starting up the machine but not letting it go on the line. The inspector then operates each protective relay or electric interlock by hand in the same manner as they would operate normally.

After all these protective devices have been thus tested out, all line and control switches are closed so that the machine may come on the line normally. The time required for two men to clean and inspect a one-unit station is about 6 hours. This allows plenty of time for the station to be back on the line in time for the evening peak load.

The Des Moines City Railway was among the first to install automatic controlled substations exclusively for city railway power, having begun in the year 1916 and continued with this work until the entire system is now fed from this source. At the same time the Des Moines & Central Iowa Railroad began to use automatic controlled substations for interurban service. Up to the present time the Des Moines City Railway has 10 and the Des Moines & Central Iowa Railroad has 5 substations operated by automatic control. These rotary converters range from 300 to 750 kw. each. The Des Moines City Railway was also among the first to build a portable substation automatically controlled. This station is of 500-kw. capacity and the equipment is installed in a steel car. The power transformer is designed for 4,500 or 22,500 volts as the city transmission lines operate at 4,500 volts, while the transmission lines feeding the substations for the Des Moines & Central Iowa interurban system use 22,500 volts. Two sets of operating and instrument transformers are needed for the different voltages. The time required to change the station from 4,500-volt to 22,500-volt operation is about 4 hours. This arrangement makes this portable substation very handy in case of trouble with either a city or an interurban station.

Data on the efficiency of automatic substations, and a comparison of the relative economy of automatic and hand-controlled stations, are furnished by the following figures for one year:

OUTPUT AND CONVERSION LOSS OF AUTOMATIC SUBSTATIONS, DES MOINES, IOWA.

Location	Substation Capacity Kw.	Annual D.C. Output Kw.-Hr.	Conversion Loss Per Cent
City Lines			
12th and High Streets.	500	1,884,700	10 27
E. 2nd and Walnut Streets.	500	2,435,150	8 66
Interurban Lines			
Brennan..	300	197,050	22 01
Hyperion. .	300	240,320	23 45
Interurban Lines, Hand-Operated			
Mitchellville.	300	235,420	37 45

The last two stations both having the same kilowatt capacity showed a difference in d.c. output of 4,900 kw.-hr., but a difference in conversion loss of 14 per cent for the period of one year. Aside from the saving due to the low conversion loss there was the additional important saving resulting from the elimination of operators in the automatic stations.

Comparison of the costs of operating the same single unit 750-kw. station automatically and by hand for a period of a year as taken from our operating data shows the following results:

	Hand Operation	Automatic Operation
Conversion loss, per cent .	22	12
Conversion loss, kilowatt-hour	475,000	259,000
Loss at $0 0125 per kilowatt-hour.	$5,712 50	$3,237 50
Maintenance labor, materials and supplies..	450 15	450 15*
Wages of three operators working 8 hours per day at 50 cents per hour .	4,380 00	
Total operating cost per year	$10,542 65	$3,687.65
Saving from automatic operation..		$6 855 00

* Taken at actual cost of hand station.

Conversion losses in per cent for two-unit automatic substations, taken from actual records for a period of 6 months, were as follows:

	Machine No. 1	Machine No. 2
Station at 12th and High Streets, loss, per cent..	5 47	7 15
Station at 2nd and Walnut Streets, loss, per cent.	6 81	5 66

Under conditions where the leading machine is carrying light load part of the time, and the trailing machine comes on the line during the peak only, when it is not subject to light load conditions, the leading machine naturally shows the highest proportion conversion loss. This condition does not exist when the two machines are more uniformly loaded.

Comparison of inspection and cleaning costs for nine automatic substations of 500-kw. capacity each operated by the Des Moines City Railway shows the following results for one year:

	Total Cost for 9 Stations	Av. Cost per Station
Inspection and cleaning labor.	$1,623 96	$180
Maintenance labor .	2,238 76	248
Supplies, including brushes for machines, rags, oil, fuses, aluminum arrester electrolyte, sweeping compound, floor brooms, etc	885 62	98
Maintenance materials and parts	927 05	103
Totals.	$5,675 39	$630

The use of automatic substations in Des Moines has not only proved economical from the standpoint of operation and maintenance costs, but, due to the fact that an operating force is not required, has permitted the use of more stations giving more feed-in points on the system. This increased number of feed-in points has reduced the amount of d.c. feeder necessary and has resulted in providing a very uniform trolley potential throughout the system, permitting higher schedule speeds and lower power losses.

For interurban service automatic substations can be located along the line where it would not be convenient to use the hand-operated substation as some companies find it necessary to locate hand-operated stations near points where they can furnish living quarters for the attendants.

*Abstract of a paper presented before midyear meeting of Iowa Electric Railway Association, Des Moines, Nov. 13, 14, 1924.

Subways in the Air

TAKING as his subject "Traffic and Transit," Mayor Hylan of New York City addressed a joint meeting of the American Society of Civil Engineers and the American Society of Mechanical Engineers on Nov. 19. He told how under his administration the city had spent huge sums of money for the purchase of street cleaning equipment and praised the efficiency of the New York Fire Department. Incidentally, he repeated his well-known ideas on the benefits that would result to the city from the removal of "worn out" street railway tracks, "antiquated" elevated structures and the inauguration in their stead of a swiftly moving "modern bus system."

He spoke in glowing terms of the benefits which resulted from the removal of the elevated spur on upper Sixth Avenue and prophesied the early removal of the rest of the elevated railway in that street. To care for the present traffic he wants the much-discussed Sixth Avenue subway to be built by the city. The Board of Transportation is now working on plans to accomplish this. No intimation was given, however, as to how it is proposed to construct a new subway at Thirty-fourth Street, where three underground lines at different levels are already in existence, nor where the money is to come from to carry out the city's ambitious projects.

Following the talk by Mayor Hylan

Fire Chief John Kenlon told how the construction of elevated railways in various parts of the city had destroyed property values. He expressed the opinion that no more such structures should be built. The difficulty of moving fire apparatus through the congested streets was also mentioned by this speaker.

Major Elihu Church, transportation engineer Port of New York Authority, in a snappy talk told of the growing popularity of horse-drawn vehicles for heavy trucking in New York City. He cited actual counts showing more than 70 per cent of the vehicles carrying freight to and from certain terminals being drawn by horses. The proportion is steadily increasing, he said. Time, not distance, being the measure of expense in heavy trucking, the superiority of the cheaper vehicle is notable where congestion exists. With the average speed of traffic movement in the city streets being from 3 to 4 m.p.h. and with one-half to two-thirds of the time of the truck spent standing still, it is more economical to use horses. Major Church explained how a system of trunk line motor highways and by-passes around cities would relieve this severe congestion.

Utilities Commissioners Discuss Bus Regulation

THE annual meeting of the National Association of Railroad & Public Utilities Commissioners was held at Phoenix, Ariz., Nov. 11-15. Most of the time of the meeting was given over to discussion of matters not especially pertinent to electric railways. The new president elected was William D. B. Ainey, chairman of the Public Utilities Commission of the Commonwealth of Pennsylvania, who is well known in electric railway circles, as he has several times addressed the American Electric Railway Association. James B. Walker of New York was elected secretary.

J. N. Shannahan, president of the A.E.R.A., addressed the commissioners, primarily on the subject of proper regulation of the motor bus and motor truck. Mr. Shannahan's address was published in this paper last week. It was enthusiastically received at the convention. One of the members stated that Mr. Shannahan had given some very helpful suggestions on one of the most pressing problems of the day. He also suggested that the commissioners' association should give more attention to this subject, that not enough study and discussion had been given the report of the committee on motor vehicle transportation presented last year, and urged that the commissioners devote more attention to this important subject during the ensuing year.

Among resolutions passed by the convention on the subject of national legislative matters was one of interest to the electric railways. This was "that Congress be respectfully urged to make such amendments to the existing (transportation) law as shall clearly exclude from the jurisdiction of the Interstate Commerce Commission the regulation of rates and service of electric railways carrying on local street railway transportation."

A report of particular interest to electric railway men was that of the committee on motor vehicle transportation, an abstract of which follows:

Report of Committee on Motor Vehicle Transportation

The fees thus far required in the various states from auto transportation companies may be roughly divided into three classes: (1), fees applied toward the expense of regulation; (2), fees of the nature of compensation for the use of public highways; (3), fees exacted in exchange for franchise rights.

Fees to Cover Regulatory Expense.—The committee believes that the exaction of fees to cover the expense of regulation is sound in principle. The regulation of motor vehicle transportation is more expensive in proportion to its volume than is the regulation of other kinds of transportation, and the benefits from efficient regulation accrue more directly to the persons engaged in such enterprises. The auto transportation companies, as a rule, do not object to the payment of reasonable fees when they feel that they are getting value received in the form of fair and efficient regulation.

Fees or Taxes to Cover Road Construction and Maintenance.—Motor vehicle transportation is in a class by itself in respect to the roadbed or way over which its vehicles operate. Steam and electric railroads are required to purchase rights-of-way, construct roadbeds, lay ties and steel, and maintain such structures at their own expense, and in addition thereto, pay taxes thereon.

Motor vehicles operate over highways constructed by the public, and as long as no compensation for the use of such highways is exacted of auto transportation companies, they are indirectly subsidized at the expense of the public. It would be manifestly unjust, however, to exact fees from auto transportation companies subject to regulation, without at the same time exacting similar fees from all vehicles making commercial use of the highways. Most of the states which have statutes regulating auto transportation apply them only to stages and trucks operating between fixed termini and over regular routes. By amending statutes covering the regulation of auto transportation companies operating between fixed termini and over a regular route so as to create and regulate a new class of auto transportation companies embracing practically all other vehicles using the highways for commercial purposes, they could be brought under some form of regulation and could be required to make reports upon which equitable fees could be based. As a general rule trucks used by private industries in the transportation of their own products, which are not operating for hire in a strict sense, are more heavily loaded and do more damage to the highways than those of any other class. Yet they are in a position most likely to escape fees or taxes exacted as compensation for the use of the highways, except the gasoline tax.

Gasoline Tax.—A large number of states are now exacting a gasoline tax, amounting to either 1 or 2 cents per gallon in most instances. This form of tax operates equitably upon all users of the highways in proportion to the use they make of the same. It is the only tax yet devised which is fair and equitable to all. Objection to the gasoline tax on the ground that it falls equally upon those who use the highways for pleasure and those who use them for profit, is answered by the suggestion that those who use the highways for pleasure should be willing to contribute their just quota toward building and maintaining the highways. Pleasure cars are usually lighter and the mileage less than with commercial vehicles, so the amount paid by their owners is much less. It is estimated that, in the state of Washington, for instance, the amount contributed by stages in license money and gasoline tax will average about 60 per cent per mile of travel more than that contributed by private cars. In any fee system involving vehicles using the highways, the gasoline tax should be a part of the system, and additional taxes might reasonably be imposed from those making commercial use of the highways.

Other Forms of Taxation. — Other forms of taxation designed to compensate for the use of highways and for the protection which the certificate of public convenience and necessity affords includes the gross operating revenue tax and wheelage or mileage tax. The states of Washington, California and South Dakota require, in addition to the fees imposed upon all other motor vehicles, a gross revenue or gross earning tax. In Washington, under the present law, this fee cannot exceed 1 per cent, and is designed for the sole purpose of covering the cost of supervision and regulation. In California, the amount imposed is 4 per cent of the gross receipts, less the amount paid as municipal fees and taxes. In South Dakota, the tax is 2 per cent of the gross, in addition to motor vehicle tax and personal property tax. In the state of Washington, this tax amounts to approximately $50,000 per year. In South Dakota, the tax is represented as yielding about $4,000 the first year, with prospect of considerable increase in later years. In California, the 4 per cent gross revenue tax yielded for the first quarter about $100,000. It is expected to produce at least $125,000 per quarter or $500,000 per year.

Flat Fees.—Alabama, Arkansas, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Michigan, Minnesota, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Wisconsin, and the District of Columbia have widely varying flat fees, based in most instances on the passenger seating capacity as applied to passenger cars and on weight or

capacity as applied to freight carrying trucks. This form of taxation is so new that the committee was unable to secure information regarding experience with this form of tax or its desirability.

Wheelage Tax.—Other states, including Iowa, Maryland, Oklahoma, Virginia and West Virginia, impose certain taxes based upon ton-mileage. There is a wide variation, both in the method of computing the tax and in the amount of the tax imposed. In Iowa, the tax for motor vehicles having pneumatic tires is ½-cent per ton-mile of travel over and along the public highways. For motor vehicles having hard rubber or solid tires, the tax is ¾ cent per ton-mile. The statute also includes the method of figuring the ton-miles of passenger travel, the passenger weight being taken at the full seating capacity figured at 150 lb. per passenger, plus the weight of the vehicle, multiplied by the number of miles operated, which, however, cannot be considered as less than the number of miles required to maintain the schedules filed. When figuring ton-miles of freight travel, the freight carrying capacity of each truck or unit, including trailers, plus the weight of the vehicle, is used in calculating the ton-miles. The Iowa law applies to persons or corporations operating a motor vehicle for delivering merchandise other than farm products, except those operating wholly inside of city limits, as well as passenger and freight carriers operating for compensation over their regular routes or between fixed termini. The amount of revenue from this tax for the year ending July 4, 1924, was estimated at $50,000.

In West Virginia, passenger carriers operating over regular routes, where the vehicle weighs less than 3,000 lb., are required to pay 1/20 cent for each passenger seat-mile; over 3,000 lb. and less than 7,000 lb., 1/15 cent per passenger seat-mile; and over 7,000 lb., ⅛ cent per passenger seat-mile. Property carriers over regular routes pay for a capacity of 3 tons or less ⅛ cent per ton-mile; over 3 tons and less than 5 tons, ¼ cent per ton-mile. Passenger carriers not running over regular routes or between fixed termini pay a flat rate of $75 yearly. Property carriers under the same condition pay a fee double that of trucks not used for hire. The above law became effective on July 27, 1923, and the revenues collected thereunder up to June 30, 1924, were approximately $306,000. A feature of the law is that vehicles operating over a regular route are required to pay the full year's tax in advance.

No Special Taxation Imposed in Some States

Some states, such as Michigan, Nevada, New Hampshire and Vermont, impose no state tax other than the ordinary fees required of all motor vehicles, but the various counties and other local subdivisions are permitted to impose certain fees in widely varying methods and amounts. The committee believes that such a system is wrong in principle and is illogical and inequitable. All fees should be uniform throughout the state and should be collected by state agencies, with the possible exception of a municipal fee for vehicles operating wholly within city limits.

Arizona, Delaware, Kansas, Kentucky, Mississippi, Missouri, Nebraska, South Carolina, Utah and Wyoming impose no taxes or charges upon auto transportation companies or vehicles other than those applicable to all other motor vehicles, unless such legislation has been very recently enacted.

In the discussion by correspondence between the various members of the committee, it was suggested that the mileage tax or other fees exacted should be based somewhat upon the character of roads over which the operation is conducted. After considerable discussion, it was agreed that it was impracticable to base a tax upon the type of road traversed.

George H. Pride, president of the Heavy Haulage Company of New York City, speaking on the subject of cost accounting in highway transportation operation not long ago, made this statement:

The Public Pays the Cost of Motor Transportation

"The public as a whole pays for the construction and maintenance of the highways in the form of taxes, and, although it is not generally realized, it also defrays the entire cost of the motor truck transportation which passes over the highways in the price for the commodities it buys, for it can be unqualifiedly stated that practically everything purchased has been transported by motor truck one or more times during its process of fabrication."

Mr. Pride also states that eleven times as much money is spent in operating motor trucks over the highways yearly as is spent in building the highways themselves.

In imposing taxes upon motor vehicle operation in any state, careful consideration should be given to existing statutes, so as to avoid pyramiding taxes to the injury of motor transportation and ultimately to the inconvenience of the public. In the state of Washington, for instance, the stage is subject to regulation by paying $56,522 a year license money and about $35,000 per year gasoline tax, or $91,522 per year for the use of the highways. The trucks, subject to regulation, pay about $25,000 per year license money and about $15,000 per year gas tax, or about $40,000 per year for the use of the highways. The same stages pay about $65,000 per year and the trucks $25,000 per year personal property tax. Thus it is seen that the stage is at present operating under regulation by paying to the state under the various statutes about $220,000 annually besides the gross operating revenue tax of 1 per cent, designed to cover the expenses of regulation, which amount to approximately $50,000 per year. The total for the state of Washington, $270,000 per year, is equivalent to about 5.4 per cent of the gross operating revenue of auto transportation companies. No doubt similar situations exist in other states.

In California, the license fee is a flat sum of $3 per year against an average license fee in Washington for stages of $91.74 and an average fee for the type of trucks used by transportation companies of a $77.50. In California, all munic fees and taxes are deducted from gross revenue tax. It is doubtfu the auto transportation companie California pay a greater per cen their gross revenue under the 4 cent law than is required of such panies in the state of Washin under the various tax and license visions of that state.

Seven General Principles Propo for Taxation

At present the time of opera under the various laws has beer short that it is impossible at this to determine, from the standpoin operation and experience, the practicable and feasible method of ing auto transportation compa The announcement of a few fu mental principles, the committee lieves, should be helpful in the en ment of any fee statute.

1. A reasonable gasoline tax sh be imposed, applicable to all veh using the highways.

2. All taxes imposed upon m vehicle common carriers should be posed and collected by the state, a possible exception of city taxes u vehicles operating wholly within city limits.

2. An equitable franchise tax m properly be imposed upon vehicles o ating between fixed termini and a regular route under certificate public convenience and necessity, to exclusion of vehicles not so operatin

4. Taxes or fees on motor veh common carriers, the proceeds of w are limited to the construction maintenance of highways, should imposed upon all stages, trucks "for hire" cars, whether operating tween fixed termini and over a reg route or otherwise, or whether o ated for hire or by private indust in the transportation of their own c modities.

5. In states where the imposition fees and taxes would cripple or dest small stage or truck operations ren ing useful service in sparsely set communities, any revenue tax impo should apply only to revenues over above a reasonable return to the m vehicle carrier.

6. Statutes which provide for regulation of auto transportation c panies operating over regular ro and between fixed termini should amended so as to include motor veh common carriers not so operating; in any case fees for the use of highways, whether flat or in the f of mileage tax or revenue tax, sho apply to all motor vehicle common riers, whether subject to regulation not.

7. Any new or supplementary fee tax statute should take into conside tion all fees and taxes paid un existing laws, so that the total for one purpose or as a whole shall not unjust, unfair or unduly burdenso

The report was signed by E. V. K kendall, chairman; T. E. McKay, H Harding, Gen. J. F. O'Ryan, I Bowen, J. F. Harper, O. W. Ru H. V. Osborne and G. R. Shelby.

Southwestern Association Convention at Houston Next May

THE executive committee of the Southwestern Public Service Association, at a recent meeting, set the 1925 convention of this association for Houston, Tex., May 19-22. W. E. Wood, Houston, heads the convention committee.

New York State Dinner on Jan. 22

THE New York State Railway Association will hold its next convention in New York City on Jan. 22 at the Commodore Hotel. There will be a morning and an afternoon session and an informal dinner in the evening.

American Association News

Executive Committee

THE executive committee of the American Association met in New York on Nov. 21, with the following members present: President J. N. Shannahan, R. P. Stevens, W. H. Sawyer, L. H. Palmer, R. I. Todd, F. R. Coates, A. W. Brady, L. S. Storrs, C. E. Morgan, T. C. Cherry, C. H. Clark, W. L. Davis, M. B. Lambert, E. P. Waller, B. A. Hegeman, Jr., C. S. Hawley, A. A. Hale and Secretary Welsh.

R. P. Stevens, chairman of the finance committee, presented the annual audit of accounts, which was accepted. He also presented the budget for 1926, which anticipated receipts of $321,000 and expenditures of $318,000. This was approved. An appropriation of $2,500 in support of the street and highway safety program of Secretary of Commerce Hoover was approved.

Mr. Coates reported briefly for the policy committee. He was authorized to draw up a resolution giving the indorsement of the association to the work of the Better Business Bureau and the National Vigilance Committee, and urging co-operation of member companies with these organizations in their own cities. The committee on policy was also instructed to draw up a statement expressing more definitely the position of the association with respect to the motor bus. Similarly, the question of proper regulation of interstate highway carriers was referred to the committee on national relations.

A communication from Gen. Guy E. Tripp, chairman of the Committee of One Hundred, was read, which requested a termination of this committee's activity on Jan. 1, 1925, in view of the fact that the association is now financially able to carry on this work on the same scale. This action of the Committee of One Hundred was recorded and President Shannahan directed to write a letter on behalf of the executive committee to General Tripp, thanking the Committee of One Hundred for the splendid work it has done in the interest of the association and of the industry.

At the suggestion of President Shannahan and on motion of Mr. Sawyer, the president was authorized to appoint an advisory council of the association, whose membership will be made up of the principals representing ownership of electric railway properties. The function of the advisory council will be to carry on the work formerly done by the Committee of One Hundred and such other matters as it may consider desirable to act upon. President Shannahan expressed the thought, reiterated by Mr. Sawyer, that the American Electric Railway Association has not had the co-operation of the owners of the properties to the extent desired. It was felt highly desirable to create some arrangement which would bring to the association the benefit of their interest and active support.

Mr. Palmer reported for the committee on company and associate membership that one railway had applied for membership, this being the Bamberger Electric Railroad Company, Salt Lake City, Utah. Bonbright & Company, investment bankers, New York, had applied for associate membership. These applications and those for twelve manufacturer members were approved.

Mr. Morgan reported for the company and community section and individual membership committee. The main point of interest was that the membership of the Metropolitan Section in New York has now reached 693. Mr. Morgan spoke briefly of the great interest shown in the meetings of this section and also of the fact that many of the members had shown a new interest in industry problems as a result of attendance at the first two meetings.

Mr. Clark, president of the Engineering Association, asked for and received the approval of the executive committee, to invite certain railway companies to send engineers as members of a committee which will make a special study of the causes and cure for rail corrugation. This committee will make a tour of inspection of the conditions on a number of properties. Each company will be requested to pay the expenses of its own representative and a portion of the expense of the secretary of the committee, who will probably be a professor of some university which takes an active interest in electric railway matters. This secretary will compile the report. Mr. Storrs for the Connecticut Company, Mr. Morgan for the Brooklyn City Railroad, and Mr. Emmons for the Baltimore company, agreed to send a man on this trip and Mr. Clark was authorized to send out his letters inviting other companies to do likewise.

In the absence of J. P. Barnes, Secretary Welsh read the report of the committee on public relations. This will appear in next week's issue of this paper.

Mr. Sawyer reported the recommendation of the committee on location that the Midyear Meeting be held at Washington on Tuesday, Feb. 17. This was approved.

President Shannahan spoke on the fact that the lease on the headquarters office expires shortly and that the association will have to face a considerable increase in rent as the present lease was made 10 years ago. On motion he was authorized to appoint a committee consisting of the chairman of the finance committee, Mr. Stevens, the chairman of the policy committee, Mr. Coates, himself, and such other members as he may direct, to consider this matter and with power to act.

On motion the president was authorized to appoint a committee on customer ownership, the suggestion having been made in a letter from Past-President Britton I. Budd.

Mr. Coates read a report on the American committee on inductive coordination and requested an appropriation of $250 to support the work of this committee. This was approved.

A letter from C. L. Van Auken, vice-president and managing editor *Electric Traction*, was read requesting President Shannahan to make a place on the program at next year's convention for the award of a certificate of merit and a silver cup to the company showing the highest operating speed and asking him to make the award. The president was instructed to thank *Electric Traction* for the spirit and motive behind the suggestion but to disapprove it.

As a matter of information, Secretary Welsh pointed out that the National Industrial Conference Board is now engaged in making a study of the weekly earnings of public utility employees. One of the executives stated that executives in other industries are beginning to ask why street railway wages are going up while all others are going down. This trend is putting the electric railways in an unfavorable light among other industries.

The next meeting will be held in New York on Wednesday, Jan. 7.

Location of Midyear Meeting

"AT WASHINGTON, Tuesday, Feb. 17" were the place and date selected by the committee on location at its meeting in New York, on Nov. 20, for the Midyear Meeting and dinner of the American Electric Railway Association. Members of the committee present were Chairman W. H. Sawyer, President Shannahan, Charles Castle, A. A. Hale, S. J. Cotsworth, J. H. Hanna, E. P. Waller, E. C. Faber, Harry L. Brown and Secretary J. W. Welsh.

The committee also discussed the question of the location of the annual convention next fall and whether or not there should be exhibits. Mr. Brown reviewed to the committee the wishes expressed by some 40 manufacturers in various parts of the country. The expression of these manufacturers was almost unanimous in favor of having exhibits with the convention.

Young's Pier in Atlantic City is becoming increasingly inadequate for the electric railway exhibition and a sub-committee was, therefore, appointed to make a thorough investigation as to a more suitable location and also to determine whether any improvement in facilities at Atlantic City may be possible. This sub-committee will report back to the main committee at the time of the Midyear Meeting in Washington.

Maintenance of Equipment

Overhead Rail for Handling Armatures

By J. G. JEFFERY

Director of Public Relations Los Angeles Railway, Los Angeles, Cal.

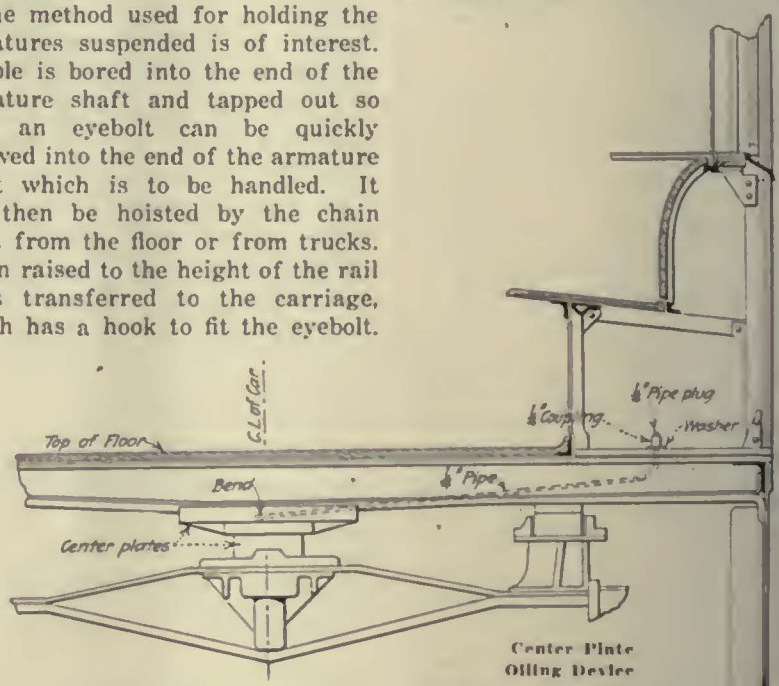
THE use of an overhead rail for moving armatures in and out of the new preheating and electric baking ovens at the shop of the Los Angeles Railway is proving a great time and labor saver as well as providing a more convenient method than the use of trucks for rolling these armatures about. The overhead rail extends for a considerable distance in front of the preheating oven. Armatures are hoisted to the overhead rail and are suspended from carriages which travel on the rail, which extends entirely through the oven. They are preheated for 12 hours at a temperature of 205 deg., after which they are pushed out the opposite end of the preheating oven, which has a semi-circular extension of the overhead rail. On this end the armatures are dipped in insulating varnish. A tray is placed underneath to catch the drippings, and the armature with the tray attached is then pushed into the baking oven, where it is kept at a temperature of 195 deg. for 48 hours.

At present the armatures are dipped by lowering them into a stationary tank, but the company is considering building a tank for the insulating varnish with provision so that it can be lifted by an air hoist. With this arrangement it will be unnecessary to remove the armatures from their hooks on the carriages for dipping.

The method used for holding the armatures suspended is of interest. A hole is bored into the end of the armature shaft and tapped out so that an eyebolt can be quickly screwed into the end of the armature shaft which is to be handled. It can then be hoisted by the chain hoist from the floor or from trucks. When raised to the height of the rail it is transferred to the carriage, which has a hook to fit the eyebolt.

Convenient Method of Oiling Center Plates

IT IS extremely difficult to oil center plates on most types of car, and as a result the greasing or oiling at this point is frequently neglected. The Boston Elev Railway experienced difficulty getting the center plates apart. order to overcome the trouble, it installed oiling pipes as shown in accompanying illustration. T

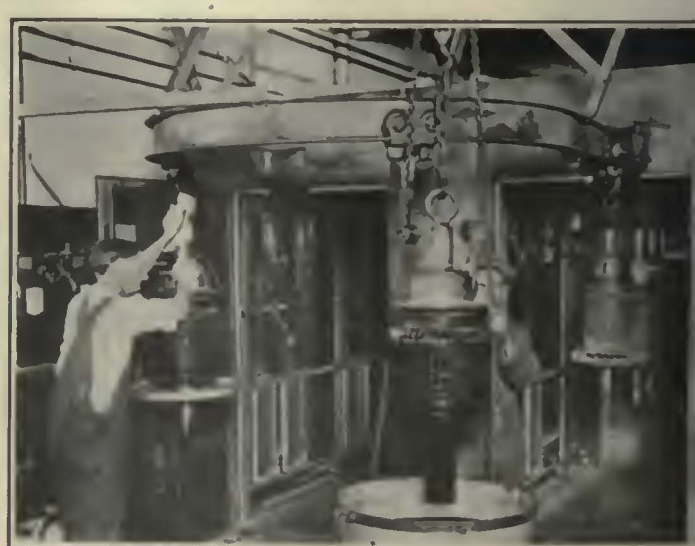


Center Plate Oiling Device

are now being used on all of Main Line rapid transit type car

The device consists of a wrought-iron pipe, bent to pr shape and leading from underne one of the longitudinal seats to center plate at that end of the

Hoisting Armatures to Overhead Rail After Eyebolts Have Been Screwed Into Armature Shaft. They Are Then Pushed Along Rail Into Preheating Oven.



At the Right an Armature Is Being Hoisted from the Dipping Tank. Armature at the Left Is Being Pushed Into the Bak'ng Oven A Tray Has Been Placed Underneath to Catch the Drippings

The lower or center plate end of the pipe fits tightly in a hole drilled in the center plate. The end underneath the seat is fitted with a standard ¼-in. coupling and with a plug on top. When oil is placed in the pipe it works its way down to the cored chamber in the body of the center plate. From this point it passes through a small hole to the bearing surfaces of both plates. The present method consists of adding oil about once each month and the installation of these devices has entirely eliminated the trouble previously experienced.

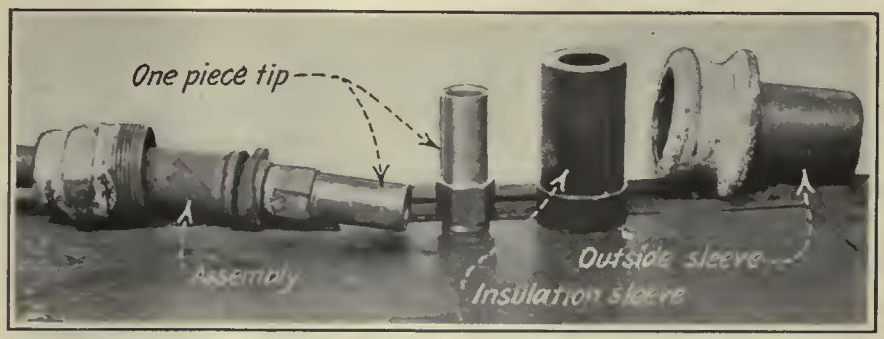
Making Controller Segments from Flat Stock

A SPECIAL machine designed and built by the mechanical department of the Twin City Rapid Transit Company enables this company to make controller cylinder segments for repair work, out of flat bar copper stock by an automatic and semi-continuous process.

Controller Segments Are Formed from Flat Bar Stock In This Special Machine Developed by the Twin City Rapid Transit Company

The flat bar copper is fed into the machine between a pair of power-driven rolls, one of which is knurled, so that it grips the stock and forces it through. A third roll at the back of the machine guides the bar, so as to form the segment of a circle. This segment can be formed to any desired radius, within certain limits, by adjustment of the position of the roll. In the illustration the curved strip of copper is shown below, after it has passed through the machine.

An automatic trip stops the machine when the end of the bar makes contact with it. By setting the trip in any desired position, the machine is stopped when a predetermined length of segment has been rolled. The horizontal saw, which is shown at the extreme right of the illustration, is then operated by the hand feed, and cuts the rolled segment off to the proper length. Another segment is then rolled and the operation repeated.



Assembly of Bus-Line Jumper Cable Includes Solid Connector Tip in Place of the Two-Piece Tip Formerly Used

Improved Bus-Line Jumper

AN IMPROVED bus-line jumper connection has been devised at the Wheaton shops of the Chicago, Aurora & Elgin Railroad. This design eliminates the possibility of the connection burning away due to excessive arcing. The standard type of jumper used had a two-piece threaded contactor receptacle. One end was soldered to the jumper cable and the other end received the spring prong attached to the car. Although the object of this type of connector is to facilitate the changing of this latter part in case it becomes badly burned, it has led to difficulty, because a trainman in breaking the connection is apt to give the jumper a twist tending to unscrew the receptacle from the fastening on the cable end.

To eliminate the possibility of this occurring, a new design of connection was perfected. This consists of a solid brass piece taking the place of the two pieces previously used. It is fastened to the cable jumper and has sufficient brass between the jumper and the connector plug so that any heat of arcing will be dissipated sufficiently to leave the solder unharmed. The new brass plug fits into the standard insulation provided for the two-piece plug, and in every way answers the purpose of the two-piece plug with the exception of ease of renewing the end tip. It is found, however, that this one disadvantage is greatly offset by the desirability and permanency of the connection between the jumper cable and the connector tip.

Collecting Sample Rail Sections for Forge Shop

BY J. L. ROGERS
Forge Shop Foreman Kansas City Railways

THE forge shop of the Kansas City Railways is called on to make up various parts for use in

Stored Conveniently in a Special Rack, These Sample Sections of All Rails In Use in Kansas City Enable the Forge Shop to Check Track Parts by Fitting Them to the Actual Sample Piece of Rail

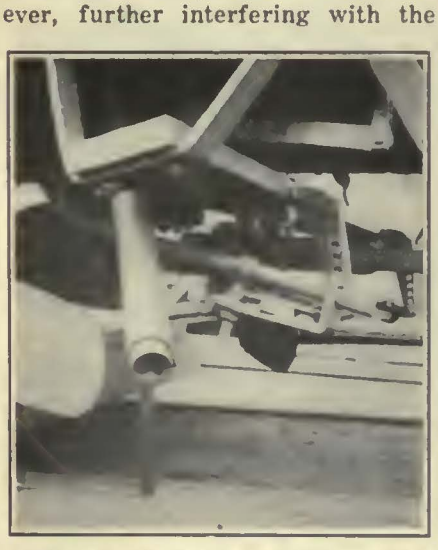
trackwork. Among other things, the making of compromise plates runs into a considerable volume of work.

As the practice on the system has been revised from time to time, various forms and sizes of rail sections have been used. This has made it very important that orders for plates be carefully checked in order to make sure that they are properly made to fit the different rail sections.

Short sample lengths of rail are maintained in an appropriate rack where they are always accessible, and are not allowed to leave the forge shop. Each piece is known by its section number, and when forging work such as the making of joint plates is to be started for any particular section of rail, the workman can always check with a piece of rail of the proper section, to make sure no error has been made in the selection of the proper die before a large quantity of material is made up. In addition, any other questions regarding the correctness of forging work for the track department can always be checked by fitting to the actual rail sections in the shop.

Rubber Cover Prolongs Life of Sand Hose

SOME time ago trouble was experienced by the Eastern Massachusetts Street Railway on account of moisture getting into the sand boxes of its cars and interfering with the proper flow to the rail. Wire hose was at that time in use for the outlets from the sand boxes. In service the wire hose had become somewhat damaged and bent, however, further interfering with the flow of sand. It was then decided to slip a piece of rubber hose over the wire hose, thus at the same time effectually closing the openings through which moisture was entering and straightening out the pipe. This arrangement is shown in an accompanying illustration. In the photograph the rubber covering has been pushed back slightly in order better to illustrate the arrangement. In reality the rubber and wire hose are of the same length. This procedure has resulted in making the flow of sand more reliable.



Wire Sand Hose Has Been Reinforced and Protected by a Rubber Hose on the Outside

Die for Forming Sand Hose Brace

MANY operations in the forge shop lend themselves readily to the use of simple dies that effect comparatively large savings in time and labor. A device of this type is represented by the die shown in the accompanying illustration, which was developed by the mechanical department of the Twin City Rapid Transit Company for forming sand hose braces from round bar stock.

Two operations are necessary in order to form the circular loop at right angles to the supporting rod, as shown by the completed brace lying on the bench in the illustration. The first operation consists simply of making a right-angle bend in the piece. This is done by the vertical lever at the front of the die in the

This Simple Tool Speeds Up the Work Forming the Sand Hose Brace Shown the Left, from ⅝-In. Round Bar Stock

illustration. The condition of piece at the end of this operation shown by the sample.

After the bend is made the piece set between two rollers, as shown the rear of the illustration. A le having a hook at one end is set o a pin projecting through one of rollers, and by rotating this le in a counter-clockwise direction, piece of work is forced between rollers so as to form the loop on end. This brace is made of ⅝ round stock in one heat.

New Equipment Available

Fire-Fighting Machine Perfected

A 40-GAL. portable foam chemical engine has been developed which uses the principles of operation employed by the Foamite system of the Foamite-Childs Corporation, Utica, N. Y. The new engine has substantially the same outward appearance as the type previously used, but the internal construction has been redesigned. With this new meter-type engine, a medium pressure is generated at the start, which gradually decreases during the period of effective discharge. The volume of fire-foam generated is almost double the quantity delivered by the old type engine from the same quantities of chemical solution. In addition, the quality of the foam produced is superior to that of the old. Extensive tests have been made by manufacturer with the new engi and it has been submitted and proved by the Underwriters' Labo tories as effective on both class and class B fires.

Pressed Steel Forge Hear

A ONE-PIECE hearth, 24 in. x in., constructed of heavy ga pressed metal, has been brought by the Buffalo Forge Compa Buffalo, N. Y., for its standard li of forges. This new pressed me hearth takes the place of the ca iron construction previously us Advantages claimed for the press steel hearth are elimination of ru decreased weight and improv appearance. Breakages of the ca iron type, which occurred frequent cannot occur with the new constru tion.

The News of the Industry

Necessity for P. R. T. Revaluation Up to Expert

The Pennsylvania Public Service Commission, at its meeting in Harrisburg, on Nov. 17, formally requested Milo R. Maltbie, public utility expert, to determine whether a revaluation of the Philadelphia Rapid Transit Company property was necessary. The commission decided that upon his decision would rest the question of reopening the revaluation proceedings. Mr. Maltbie said he would review the testimony in the former valuation case as well as a number of other questions involved, and added that his conclusions would be ready for the commission "sooner than many expected."

Following the meeting the commissioners made it clear that the inquiry by Mr. Maltbie would in no way interfere with the hearings in the P. R. T. higher fare case. They indicated that they would be ready to go on with hearings relative to the advisability of continuing the "temporary" 8-cent fare order which they recently issued when the Superior Court hands down its decision on an appeal taken by the city.

The question of the valuation was reopened by the recent opinion of Attorney-General Woodruff, who held that a real valuation of the P. R. T. property did not exist. In that statement he quoted an opinion of the Supreme Court, which stated that "an indeterminate valuation" was not an effective or legal valuation. This opinion written recently by Attorney-General Woodruff to W. D. B. Ainey, chairman of the Pennsylvania Public Service Commission, stated that the commission might legally make an investigation which would enable it to determine whether the valuation of the Philadelphia Rapid Transit Company property was necessary and proper in connection with the pending 8-cent fare case. The opinion did not specifically direct the commission to begin the work of valuation, but it practically indicated that the work could be undertaken. The document was written in reply to three brief questions of law submitted by Commissioner Ainey on Oct. 27 and suggested by Governor Pinchot.

Court Instructs Kansas City Railways to Submit Bus Plan

Judge Stone of the federal court at Kansas City, Mo., on Nov. 18 adjourned to Dec. 2 the final hearing as to the installation of bus service by the receivers of the Kansas City Railways. The receivers were instructed to hear all interested parties, including the civic bodies, and to prepare a report for submission on Dec. 2 embodying recommendations as to routes, type of equipment and investment required for bus service. The receivers have announced public hearings at the railway headquarters each day until Nov. 25.

Various interests, including attorneys and others representing creditors, attended the hearing on Nov. 18. They agreed to the general proposition that the installation of bus service by the receivers was necessary to protect the property from competition. These interests, however, reserved final consent until the extent of the installation and the amount of receivers' funds that would be used could be definitely ascertained. Meanwhile a decision is expected from Judge Van Valkenburgh of the federal court responsive to a petition by the receivers for an injunction against Moore and others operating a bus line in alleged violation of ordinances of Kansas City, Mo.

On Nov. 17 Judge Stone definitely instructed Prof. Harry Earl Riggs to proceed with the valuation of the property. Attorneys and others interested were heard, but no objection was raised except a general one from the attorney for personal injury claimants. He said he was opposed to any proceeding that might tend to delay a final settlement with his clients.

Proposes Extension of Public Control

Chairman of the Boston Trustees Urges Ten Years More Under the Present Arrangement—Other Suggestions Offered at Meeting Include "Customer Ownership" and Restoration of Five-Cent Fare, with Public Taxed for Deficit

JAMES F. JACKSON, chairman board of public trustees of the Boston Elevated Railway, proposes an extension of the time of public control of that company. He is of the opinion that the property will never be turned back to the stockholders, but that it will go from public control to public ownership.

Many other suggestions were made by various speakers before the members of the special legislative recess committee at a hearing held during the week ended Nov. 15. Some speakers suggested "customer ownership," others that the equipment should be privately owned but the structure should be owned by the public; there were suggestions that the 5-cent fare should be restored and the public taxed for the deficit, and that there should be more economy in the use of tickets.

The legislative committee is required to report on Dec. 15 what additional legislation ought to be enacted next year regarding the Boston Elevated.

A statement of the imperative needs for capital expenditures to improve the service of the railway was recently submitted to the committee by the trustees. It covered the completion of general repair shops at Everett, improved facilities at carhouses in Medford, in Arlington, in Brookline, and at Lotus place and City Point in Boston, additional boiler equipment at South Boston to make available the full capacity of that plant, underground conduits required by law, purchase of additional cars, lengthening of platforms at elevated stations, track betterments and miscellaneous additional tools and appliances, all aggregating $24,500,000. It was said at that time this program of improvement ought to be inaugurated at once and completed within ten years. It was pointed out that they mean practical economies, elimination of waste and safer and better accommodation for the riding public.

In his plea Mr. Jackson said that each item in that statement has since been re-examined for the purpose of making it conservative to the last degree. That examination led him to believe that the aggregate outlay can be reduced from $24,000,000 to $20,000,000, to be expended from time to time for purposes named by the Legislature and specifically supervised by the Department of Public Utilities. Mr. Jackson said:

> As the state policy prohibits the issue of stock at less than par value and prohibits the issue of bonds in excess of outstanding capital stock with premiums paid upon it, the trustees are facing and have faced during the past year an impassable barrier to the proper performance of their official duty.
>
> They therefore presented the situation to the Legislature, assuming that the Commonwealth in undertaking a trial of public control must have had in mind a genuine and satisfying test of the ability of public management to accomplish better results than private management is likely to secure in the conduct of this metropolitan service. They believe that no such test is possible without available capital for the purposes which have been named.
>
> The public control act informs investors that at the end of the ten contract years or at any time thereafter the Legislature may end this lease and return the railway to the lessee. It makes it plain, too, that after the ten years have expired the Legislature only can terminate public control. They may feel very sure that public control will continue indefinitely, but they realize the fact that there is always the chance that this expectation may not be realized; uncertainty prevents investment. To meet the situation the trustees have suggested the advisability of determining at this time whether or not public control under this lease between the State and the company is to continue beyond 1928. In doing this they have refrained from expression of opinion as to what the decision upon this fundamental question should be, believing it a legislative question and one upon which they should not be heard. Certain questions, however, have been asked which I desire to answer.

Mr. Jackson further said he thought the trustees agreed that if the present experiment in public control is to be

given a full test there should be legislation to extend the period of ten years named in the act with preservation of the right of the State to take over the property at any time, with appointment of trustees by the Governor for the same term of office, one member to go out of office every two years and to be ineligible for reappointment, and with generally the provisions for administration of affairs that are now found in the public control act.

He also said that the trustees agreed in the belief that this property will never be returned to stockholders; that any change from public control will be to full public ownership.

Bus Proposal Revived for Cleveland Railway

Legislation designed to have the Cleveland Railway establish three bus lines in Cleveland, Ohio, has been introduced into the Cleveland City Council by Councilman Fielder Sanders, former city street railway commissioner.

Under this legislation the Cleveland Railway would operate three lines, one from the extreme east end of the city to the Public Square and two other feeder lines in the suburbs. The type of bus used would be that of the Fifth Avenue double-deck variety. A 10-cent cash fare would be charged with 1-cent transfer charge from the buses to the street cars, and a 4-cent transfer charge from the street cars to the buses.

It is hardly likely that the Cleveland City Council will act on the legislation until the State Supreme Court has decided the question of whether the Ohio Public Utilities Commission or the Cleveland City Council has the right to grant bus franchises and regulate bus operation in Cleveland.

A decision from the State Utilities Commission on the application of the Cleveland Railway to run buses in Cleveland under the jurisdiction of the State Commission is expected soon. If this decision takes away the right of the Cleveland City Council to regulate buses in Cleveland, the case will be appealed to the State Supreme Court.

C. M. Ballou, City Street Railway Commissioner, has recommended bus operation in Cleveland as "feeder" lines to the main arteries of the Cleveland Railway. In his report to the Council Mr. Ballou said that it is hardly necessary to restate the principle that in any community such as Cleveland all local transportation should be operated under one management.

Officials of the Cleveland Railway have expressed their willingness to undertake bus operation or extensions of the company's present system if the City Council will devise some means of financing expansion by the company. Under the present service-at-cost grant the Cleveland Railway is not permitted to sell stock except at par to obtain new capital. The company's stock is quoted in the local market at about $86 a share, a price which would make it prohibitive for the company to finance a program of extensions or expansion.

The company has asked the City Council to allow it an additional 2 cents a car-mile for operation, so as to bring the allowance for operation up to 28 cents a car-mile. If the Council does this it will increase the company's operating allowances approximately $700,000 a year.

Municipal Subway Suggested

Mayor Hylan of New York City Makes More Promises—Transit Commission and Mayor Still at It

The Board of Transportation of New York City, of which John H. Delaney is chairman, hopes within a few weeks to have ready for public consideration plans for Mayor Hylan's project of an independent municipally owned and operated subway system. Announcement to this effect was made on Nov. 18.

An important feature of these plans is that the trunk line of the system in Manhattan leading to Washington Heights is to be under Sixth Avenue and not under Eighth Avenue, as the Transit Commission had decided.

In undertaking to drive this new subway under Sixth Avenue, it was said, the Board of Transportation has found it necessary to effect some arrangement with the Hudson-Manhattan Railroad, whose tubes run under that thoroughfare between Ninth and Thirty-third Streets. The arrangement, it is believed, provides either for the virtual forfeiture of the franchise of the Hudson tubes uptown extension of one mile and a quarter or, as is thought to be more probable, embodies a joint traffic agreement under which some compromise may be effected looking to utilization of the level now used by the Hudson tubes by the new municipal subway also.

State Transit Commissioner Harkness says that a separate municipally owned and operated subway system, such as Mayor Hylan proposes, would mean three systems instead of two as there are today, and instead of one as there should be. He says it would also mean a triple fare instead of a double fare as there is today and a single fare as there should be. Further, Mr. Harkness said:

> Yet Mayor Hylan attempts to pose as a champion of the 5-cent fare. What the city needs to catch up for Mayor Hylan's long delay in subway construction is to build new lines as rapidly as possible and to build them so as to use every existing agency of transportation to the utmost. Expressing it in another way, the Transit Commission's plan of combination and consolidation will get in terms of added service about $1.50 for every dollar spent while Mayor Hylan's plan for a new independent system will get about 50 cents for each dollar spent.

In this connection it is interesting to note that the Transit Commission has recently made public the following chronological table of the more important moves made by it looking toward action by the city to secure adequate transit relief:

Commission promulgates new subway routes	May 15, 1922
Adopts Brooklyn Crosstown Route	Aug. 30, 1922
Adopts first Central Park West Route	Oct. 3, 1922
Adopts Staten Island Tunnel Route	Oct. 3, 1922
Adopts St. Nicholas Avenue extension of first Central Park West Route	Oct. 6, 1922
Board of Estimate rejects Crosstown Route	Nov. 10, 1922
Board of Estimate rejects other three routes	Nov. 9, 1922
Commission adopts six routes comprising proposed Eighth Avenue-Amsterdam Avenue Line	Nov. 28, 1922
Board of Estimate rejects above six mentioned routes	Dec. 22, 1922
Commission resubmits altered Brooklyn Crosstown and Washington Heights Routes	May 15, 1923
Board of Estimate considers routes at public hearing, and joint conference committee of Commission and Board of Estimate authorized	June 2, 1923
Joint conferences held	June and July, 1923
Main portions of Washington Heights and Brooklyn Crosstown Lines approved by Board of Estimate at special meeting	Aug. 3, 1923
Long Island City portion of Crosstown Line approved by Board of Estimate	Aug. 17, 1923
Transit Commission has engineers prepare subway plans, and joint conferences continue between Board and Commission	Aug. to Dec. 31, 1923
Chairman McAneny announces Board of Estimate and Commission substantially in full accord on Brooklyn Crosstown and Washington Heights Routes	Jan. 1, 1924
Work on plans, specifications and forms of contracts for new subways, continued by Transit Commission	Jan. to June, 1924
Board of Estimate takes definite stand rejecting all work of Transit Commission on Washington Heights and Brooklyn Crosstown Lines	June 7, 1924
All construction powers transferred to Board of Transportation	July 1, 1924

On Nov. 14 Chairman McAneny of the Transit Commission received from the secretary of the Board of Estimate a copy of the amended draft of the Mayor's "charges" against the Transit Commission, referred to in a resolution of the board adopted Oct. 24. It will be recalled that Mr. McAneny had warned the Mayor that he would be held accountable for libelous statements. In the revised version the amiable charge of homicide, which the Mayor first made against the members of the Transit Commission, and which, until challenged, he seemed quite willing to employ as a part of his political campaigning, has disappeared, along with other libelous things. The statements that remain relate almost wholly to subjects that are matters of record. The Transit Commission will now lay before the Governor, without expurgation, the complete record of what has occurred in its three years' effort to give the people of New York City transit relief.

While all this has been going on G. M. Dahl, chairman of the board of the Brooklyn-Manhattan Transit Company, has issued under his own name a volume of 117 pages entitled "Transit Truths." Mr. Dahl has taken for his text "Truth Is Mightier Than Abuse." Mr. Dahl has spread before the public the complete record of the attitude of his company with respect to transit matters. There is a 9-page index to make reference to any particular subject easy. There are maps and plates and ads. If any doubt still remains with any member of the public in regard to where Mr. Dahl's company stands it is due to the fact that the doubter either has not got a copy of the book or cannot understand a situation such as that with which Mr. Dahl deals even when the matter has been reduced to its simplest terms.

Electric Railway Exonerated for Chicago Grade Crossing Accident

Complete exoneration for the Chicago Surface Lines was contained in a coroner's jury report on the collision of a street car and a switch train recently in which 10 lives were lost. The case was made an issue in Chicago over the grade crossing peril and interlocking devices were studied by the jurors.

The accident occurred just after midnight of the night of Nov. 1, when the street car, heavily laden with passengers, was struck near an unlighted cut by a coal car at the end of a train of 55 cars pushed by two locomotives.

Inquiry revealed that safety gates across North Avenue were down when the street car stopped. A crippled switchman, later found to be of subnormal mentality, was on the job. When the gates went up several autos passed the car and proceeded across the track. These drivers saw nothing approaching on the railroad, and they recalled that the conductor of the street car had walked across the crossing, looked both ways and signaled the motorman to come on. Midway of the crossing and without any warning the train hit the car.

The jurors unreservedly censured officials of the Chicago, Milwaukee & St. Paul Railroad and ordered that three employees, a brakeman, the yardmaster and the assistant superintendent of terminals be held to the grand jury for manslaughter.

Former Governor Edward F. Dunne was one of the jurors and the others were Chief Justice Harry Olson of the Municipal Court, Henry Barrett Chamberlain, superintendent of the Chicago Crime Commission; County Clerk Robert M. Sweitzer, John Terborgh, vice-president of the Foreman National Bank and a capitalist, and Robert Eitel, proprietor of the Bismarck Hotel.

The verdict was rendered on Nov. 11.

Wage Fight in Dayton

Officials and employees of the Dayton Street Railway and the People's Railway of Dayton, Ohio, are in the midst of a wage tangle the present status of which is a deadlock by both sides maintaining their original positions. One of the companies in a bulletin issued recently announced that neither the financial condition nor economic conditions in general warranted an increase in wages; that with regard to the signing of a contract it refused as it always had to operate "a closed shop" but that it was willing at all times to discuss working conditions with its employees. The bulletin was in reply to the submission by the employees of a union agreement calling for "a closed shop" and asking for an increase in wages of 20 cents an hour or 36 per cent. The present scale is 55 cents. The men also sought time and a half for overtime. The advance if granted would mean an increase in the payroll of the Dayton Street Railway of more than $30,000 a year and the People's Railway of $90,000. Reports of strike votes were made, and the company officials stated that the aid of the city would be sought in running the cars. Messrs. Keyes and Powell, officials of the Dayton Street Railway and the People's Railway respectively, announced recently that there was no change in their attitude, that the increased wages could not be granted, but that they would meet with the representatives of the men.

Newspaper Campaign Active in Twin Cities

In addition to the card service on the cars the Twin City Rapid Transit Company is carrying on extensive advertising campaigns in the Twin Cities newspapers. The advertisements give some information on fares collected in various cities of the country and some important statistics on car riding in Minneapolis and St. Paul. Some historical facts on transportation progress in the Twin Cities are recorded. The company states that the passenger revenue has fallen off considerably and that a higher fare will be the result if service and equipment are to be maintained to the standard of the community served. In urging its patrons to ride the cars regularly the company promises a continuation of good management and co-operation.

One of the Recent Minneapolis Ads

Boston & Maine to Run Buses

The Boston & Maine Railroad has definitely decided to go into the motor truck and passenger bus business. For that purpose it has organized the Boston & Maine Transportation Company with a capital stock of $100,000. James H. Hustis, president, has issued an explanatory statement.

There is no intention of running buses or trucks in competition with steam trains, but the company does believe there is a legitimate field for buses and trucks as an auxiliary to steam service on some of its lines and in place of steam service on other lines. A thorough study is being made of all branch lines of the Boston & Maine system. It is the opinion of the management that the results of this study will prove that on many lines buses and trucks can be used to the advantage both of the public and the railroad.

This activity on the part of the company was referred to in the ELECTRIC RAILWAY JOURNAL for Nov. 8, page 819. Included in the system of the Boston & Maine Railroad are several electric railway properties.

Nine-Cent Fare in Poughkeepsie

The Public Service Commission on Nov. 14 authorized the Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., to charge a 9-cent fare in each of its operating zones in Poughkeepsie and nearby territory until June 1, 1925. At that time the order may be reopened upon application for a review as to operating results of the company for 1924, including a six months' period under a 9-cent fare, and for whatever determination may then be deemed necessary. An 8-cent fare is now charged in all of the three operating zones. Under the application of the company decided on Nov. 14 it had asked for the right to charge a 10-cent fare. The fare increase becomes effective on one day's notice.

New Electric Line Projected in Indiana

A new electric railroad to cost $5,000,000 is planned for southern Indiana. This electric line will provide an important traffic connection between the Chicago, Milwaukee & St. Paul and the Southern Railway. It will be primarily a freight-handling road and will tap some of the coal and oil producing sections of southern Indiana and extend across the Ohio River to Kentucky.

It is reported that the road will have terminals at Owensboro, Ky., and Elnora, Ind. It will pass through Rockport, Midway, Tennyson, Montgomery and other places. At Elnora connection will be made with the Chicago, Milwaukee & St. Paul, while at Tennyson a similar connection will be made with the Southern Railway System.

The new project has been submitted to the Interstate Commerce Commission for approval.

In steam railroad circles in Chicago nothing tangible could be learned about the project. According to newspaper reports, the new road is to be financed by British capital. It is said that the project has been under consideration since 1915, but that due to the war and the high cost of materials immediately following the war, the actual construction was deferred until the present time.

No definite date has been set for construction work to start, although the necessary funds are said to be on deposit and the right-of-way options obtained through the various counties for the entire length of the road.

Illinois Central Contracts for Electric Power

A 10-year agreement has been made by the Illinois Central Railroad with the Commonwealth Edison Company for supplying electricity to the railroad within the Chicago terminal district. This contract provides for optional extension to 1947. Under the terms of the agreement, the Commonwealth Edison Company will deliver for traction purposes 1,500 volts d.c. at the railroad right-of-way. The supply is to be available to the railroad by the beginning of the summer of 1926. It will be used for the operation of the Illinois Central suburban service.

Electrification of the company's right-of-way will extend as far as Matteson on the main line and will also include the South Chicago and Blue Island branches. Under the terms of the agreement, the Commonwealth Edison Company will build, maintain and operate seven substations located along the right-of-way. The agreement also provides for the installation in these substations of control equipment for the automatic signal system of the company and also for providing electricity for lighting the small suburban stations and the new central terminal station. Further particulars of this arrangement will be published later.

E. W. Lloyd, general contract agent of the Commonwealth Edison Company, acted for the company in making the agreement. He said:

> The acquisition of this business by the Commonwealth Edison Company means a further step in super-power development in this area. This development, over a long period of years, which has made possible the selling of energy in large quantities to railways, means a marked advance toward the electrification of all railroad terminals.

End of Southern California Power Shortage in Sight

The normal California winter rainfall has set in unusually early. This breaks up an exceptionally prolonged drought. It is believed now that the power shortage, especially the shortage in hydro-electrically produced power, suffered in the State of California for the past five months will soon be eliminated. The Railroad Commission took charge on July 1 of the power shortage matter, instituting a vigorous electric power-saving campaign by ordering reduction of power consumption by all classes of users. Electric railway cars and industries generally are still curtailed approximately 20 per cent.

It is announced that the skip-stop system on the car lines in Los Angeles and other neighboring cities where local car lines are operated will be lifted and normal operation resumed Dec. 15. The Los Angeles Board of Public Utilities, in co-operation with the California State Railroad Commission, ordered the curtailment of service.

Mr. Blair Discusses Co-ordination at Chicago

Henry A. Blair, submitting to n cross-questioning by members of the City Council on his offer to co-ordinate the Chicago Surface Lines with the elevated lines and a city-built subway, said there is no hope for Western utilities to attract money for legitimate investment as long as certain states adhere to short-term franchises.

Mr. Blair was accompanied by Leonard A. Busby, president of the south side lines, which are part of the Surface Lines. He said that his company would not yield a dollar from the price set of $162,000,000, the capital account value. Mr. Blair said:

> Why, we put $70,000,000 into the lines in a six-year period and $106,000,000 in a ten-year period since the 1907 ordinance. That's more than we are asking you to pay.

Mr. Busby backed up Mr. Blair's co-ordination plan and said he had submitted a separate offer for a partial sale only to help the city to see the possibilities in case the co-ordination fails.

The Aldermen also have before them an ordinance providing for universal transfers between elevated and surface cars and for the establishment of a transportation board similar to New York's.

Bus Rights Sought in Toledo

A company headed by New York financial interests has applied to the Ohio Public Utilities Commission for permission to establish bus lines in Toledo. The incorporators of the new company, to be known as the Toledo Peoples Motor Bus Company, are: A. G. Gorley, R. W. Schumaker and J. L. Rhinock, New York, and John W. Winn, Jr., and George R. Effler, the two latter being associated with the law firm of Marshall & Fraser, Spitzer Building.

In its application the company specifies 12 different routes. The application names two types of buses to be used, one being of the double-deck type and the other single deck. The number of vehicles to be installed has not been announced.

City Law Director Dotson said:

> We will resist with all the facilities at our command the injection into the situation of bus competition.

President Ben Adams of the Toledo Traction, Light & Power Company said:

> The traction company handles 50,000,000 passengers a year. The only way we can continue to improve our system and expand and prepare for lower fares is to operate without competition.

The company plans to charge a 10-cent fare with universal transfer if it is permitted to operate.

Hearing Before I.C.C. on 112-Mile Line

A hearing was held on Nov. 5 at Augusta, Me., before Examiner Haskell C. Davis of the Interstate Commerce Commission and the Maine Public Utilities Commission on the application of the Quebec Extension Railway asking for a certificate of public convenience and necessity authorizing it to construct a new line of electric railway from a connection with the Aroostook Valley Railroad at Washburn, Me., to the west line of the State of Maine, in Aroostook County, a distance of 112 miles. The proposed new line will be situated entirely in the County of Aroostook and will connect with the Bangor & Aroostook Railroad at Portage and with the Quebec Central Railroad at the west boundary of the State.

Blame Fixed for International Railway Wreck

Responsibility has been fixed by the Interstate Commerce Commission for the rear-end collision between two three-car trains on the Buffalo-Niagara Falls high-speed line of the International Railway at Ellicott Creek crossing on Oct. 19, when four passengers were killed and many injured. The accident is ascribed as being due to lack of automatic block signals, absence of an adequate automatic train control device and failure of the motorman of the second train to maintain a proper lookout. These reasons are contained in the report of W. P. Borland, director of safety of the Interstate Commerce Commission, who investigated the accident in conjunction with inspectors of the New York State Public Service Commission.

The commission also criticised operating conditions on the Buffalo-Niagara Falls high-speed line with respect to the length of the intervals allowed between trains.

The report of the commission found no neglect on the part of members of the crew of the first train to send back flagmen to warn the second section that the first train was standing still near the bridge over Ellicott Creek.

According to the report of the commission, the motorman of the first section saw the onrushing second section nearing the rear end of his train. He started at once to run toward the head of his own train with the view of moving it out of the way, if possible. At the point of the accident the motors of the second train were turning over at the rate of 55 m.p.h. The commission found, however, the brakes had been set and were in good working order. The commission says the motorman of the second section had a clear view 1,500 ft. ahead, but did not attempt to bring his train to a stop until he reached the flagman 300 ft. behind the rear of the standing section. When he saw a collision was inevitable, he opened the door from the vestibule into the car and yelled to the passengers to move back into the train.

Phoenix Insists on Making Test Case of Paving Issue

The test case of the Phœnix Railway of Arizona against the revoking of its franchise by the city has been referred by the United States District Court back to the state court. Following passage of the ordinance last spring revoking the franchise, the test case was taken to the state court, but there the railway sought intervention of the U. S. District Court, Judge Fred C. Jacobs of the district court has now decided it was not within the jurisdiction of that court, and remanded it back to the state court.

The revoking of the franchise came upon the initiation of Mayor Louis B. Whitney. It was charged by the city that the company had failed to live up to the conditions of its franchise particularly with respect to carrying out paving work. The controversy was the subject of an editorial in the issue of the ELECTRIC RAILWAY JOURNAL for March 1, 1924.

Buses Compete with Railway in Hammond

Independent bus service was started n Nov. 2 in Hammond, Ind., by the ecently organized Calumet Motor oach Company. Sixteen Yellow buses f the street-car type operate over six outes paralleling the lines of the Ham- ond, Whiting & East Chicago Rail- ay and the local bus routes of the ary Street Railway. Both railways urnish interurban as well as local serv- e. One connects with the Chicago urface Lines and the other operates to ary. It was to feed the interurban hat the Gary Street Railway started us service some time ago at the Ham- ond end of its line. These routes do ot compete with the local service of he other railway.

Even with this seemingly adequate ervice for a city of 45,000, jitneys ere permitted to operate very much s they pleased. After experiencing a ear of this competition, the Hammond, Whiting & East Chicago Railway asked he Board of Public Works for permits o run 10 buses to supplement the rail- ay. It also agreed to add 10 double- ruck, one-man cars and otherwise mprove service at a cost of $250,000. ccording to C. E. Lawrence, local man- ger of the railway, this proposal was ot heard by the Board of Public Works.

Recently a bus franchise was issued o Harold Miner, formerly a chiroprac- ic in Hammond. The granting of the ranchise was followed quickly by the rganization of the Calumet Motor oach Company and the appearance of 5 new city-type buses. Sixteen of hese are used for a regular schedule nd are manned by trained, uniformed rivers, directed by a transportation upervisor. According to the local rail- ay people, the source of the financial acking was not divulged at the hear- ngs before the City Council.

Simultaneously with the granting of he bus franchise, the City Council assed an ordinance ruling the jitneys ff the streets. Jitney men who operate s taxicabs with meters on their vehi- les are being arrested.

After a week of experience under the ew conditions it appears that the limination of the jitneys may partially ffset the new competition offered by he buses. During this past week the treet cars carried more passengers han during a corresponding period be- ore jitneys were removed.

Property Owners Protest Suggested Removal of Tracks

Voluntary protests have been lodged y property owners, merchants and bout 200 individuals against the sug- estion made some time ago by Mayor ylan of New York regarding the like- hood of eventually removing street rs from both Forty-second Street and 25th Street, in which the Third Ave- ue Railway operates. S. W. Huff, resident of the Third Avenue Rail- ay, has also recently taken issue ith the Mayor on the matter. Mr. uff went into the general subject at nsiderable detail. In referring more ecifically to the case of his own mpany Mr. Huff said that not only ould it be impossible to substitute buses to carry the present trolley loads, but that anything like an approximate bus capacity to achieve that result would congest traffic in important thoroughfares immeasurably beyond any congestion that the city has yet known. On the 125th Street line alone 20,000 bus trips a day would be needed to carry the traffic. A similar situation would result on Forty-second Street, Mr. Huff said.

News Notes

Railway Man Helps Fill Community Chest.—In a Community Chest Campaign in Nashville, Tenn., closed on Nov. 3, to raise $225,000 for 30 welfare agencies the Nashville Railway & Light Company ranked highest as a single contributor. It donated $6,000 to the cause. Twenty-one departments of the company also ranked highest, giving 100 per cent for employee subscriptions. The campaign was under the direction of J. P. W. Brown, general superintendent of the company, who was publicity director and general chairman and to whom due credit should be given for its success. The $225,000 sought to be raised was oversubscribed to the amount of $17,580, with 32,360 subscribers. The company assisted in the campaign by advertising on each of its cars the need for the success of the campaign.

Helena Company Would Increase Fares. — Application of the Helena Light & Railway Company, Helena, Mont., for authority to increase the price of railway tickets from four for 25 cents to three for 25 cents and to charge 4 cents for school children's tickets instead of the present 3 cents, was heard on Nov. 6 by the State Public Service Commission. The commission also is asked by the company to annul the bonus provision in the company's city franchise.

Feeder Bus Lines Authorized.—Operation of feeder bus lines in the northern section of Indianapolis, Ind., by the Indianapolis Street Railway has been authorized by Mayor Lew Shank. Citizens of the district complained some weeks ago that they were not receiving adequate transportation facilities on the city lines after A. Smith Bowman, representing the People's Motor Coach Company, asked the Board of Park Commissioners for permission to operate bus lines on a preferred street in order to reach the district. Mayor Shank, however suggested at that time that the railway be given the privilege of operating feeder lines, which Robert I. Todd, president of the car company, said would be done. The buses will be purchased shortly.

In the Interest of Safety. — The Fourth Annual Foreman's School, which is a free course of lectures on industrial safety offered by the Massachusetts Safety Council, was started on Nov. 18 and will continue to Jan. 20 on each Tuesday evening at the Auditorium, 197 Clarendon Street, Boston. Edward Dana, general manager of the Boston Elevated Railway and a vice-president of the Massachusetts Safety Council, will act as chairman of the session scheduled for Dec. 2 and the speaker for that evening will be Cyrus S. Ching, director of personnel United States Rubber Company, New York. His subject will be "Organizing the Plant Safety Committees."

Applies for 10-Cent Fare.—The Oklahoma Railway, Oklahoma City, Okla., which secured an advance in fare from 7 to 8 cents about Oct. 1, will ask the Corporation Commission to grant a further raise of 2 cents, making the proposed rate 10 cents for cash fares, or three rides for 25 cents. John W. Shartel, president of the company, states that the 8-cent fare was followed by a further decline in traffic. The city cars carried 894,052 passengers in October, 34,000 fewer than were carried in August. September was not used in comparison for the reason that the Oklahoma State Fair traffic made the month abnormal. Mr. Shartel expresses the belief that the low point in the decline of traffic has been reached and that a 10-cent fare with three rides for 25 cents will add $8,000 a month to the company's income and be sufficient to save the situation. The 10-cent fare application was filed with the Corporation Commission in September following the bringing of a receivership action in the federal court by bondholders of the company. The 8-cent fare was granted by the commission in the hope that it would prove sufficient and that the application for 10 cents would not have to be pushed, but the company has found this hope of adequate relief futile. The company was authorized to install the $1.25 weekly pass.

Will Operate Buses. — The Tampa Electric Company, Tampa, Fla., is planning to put into effect as soon as present plans can be carried out an extension of the present car system by bus lines to suburban territory. P. O. Knight, president of the company, said that bus service would be started within a short time with six buses. The routes have not been decided on as yet, but the buses will run into the center of the city.

Prepares Rerouting Plan.—The Pittsburgh Railways, Pittsburgh, Pa., has prepared a plan of operating changes for rerouting cars to relieve congestion in the central business area. A preliminary step involves turning or short-looping certain of its lines at the outer edges of the downtown section through the use of its present track facilities. A final step embraces the entire preliminary step and involves short-looping of other lines, part of which require franchises from the city for the laying of tracks on certain thoroughfares which now contain no tracks, also "separation of grades," which suggests the construction and operation of an elevated loop structure on certain streets within the downtown business area. The company has submitted its complete general program to the traction conference board for its approval. Formal protest against the execution of the company's plan for rerouting cars in the downtown district was filed on Nov. 13 by the Retail Merchants' Association.

Foreign News

Earnings Up in Paris

Figures on street car and bus operation of the Paris Transports en Commun for the first six months of 1924 show the mileage greater than that of any other like period of their existence. The tramways operated 25,352,408 car-kilometers, an increase of 24,430 car-kilometers. This slight increase was due to motor bus competition. Motor buses covered 14,355,368 car-kilometers, an increase of 1,461,920 car-kilometers over the previous six months.

Receipts were 102,694,037 francs, an increase of 14,954,356 francs. Except for the fly-boats on the Seine, all operating receipts were satisfactory. These boats are to be discontinued during the winter months.

The number of passengers carried was 238,779,183, an increase of 15,505,750 over those of the previous six months. In spite of the increase in fares in the spring, passenger-kilometers increased 12 per cent.

Glasgow Seeks to Protect Its Tramcar Riders

A demand for a Court of Criminal Appeal in Scotland is being made by the residents of Glasgow. This need has arisen from the frequent violation of the Scottish law providing that no motorist may drive between a standing tramcar and the curb until the roadway is clear of passengers.

In a recent instance a motorist killed a woman leaving a tramcar and severely injured one boarding the car. When the case was tried the jury found the driver not guilty, despite the evidence. This and a number of similar accidents has created the demand for a court to which prosecutors can appeal in case of flagrant violation of the law and unjust verdicts.

In England motorists are allowed to pass tramcars receiving or discharging passengers, although many accidents occur from the lack of legislation prohibiting this practice.

Corsica Develops the Motor Bus

Motor bus services have been extended on the island of Corsica, near Nice, France, is the announcement made by the P. L. M. Railway. Practically every community on the island is now served either by rail or interconnected bus. Primarily intended to develop tourist travel in the Isle of Beauty, these bus services are supplying a real need to the scattered population, which has formerly traveled largely on muleback because of the present lack of any direct means of communication.

Three centers have been established for the head lines of the new service. From Ajaccio to Corte, via Piana, there is service once a week, the journey occupying two days. Another bus makes a once-a-week two-day circuit of Bavella and Bonafacio. From Bastia the trip to Cap Corse is made twice a week, to Orezza once a week and to Saint Florent twice a week. From Corte the Inzecca route runs once a week and a two-day journey once a week includes Corte, Piana and Ajaccio.

Corsica is probably the ideal motor-bus touring ground of the world and service is being developed in an intensive way on this basis. It was tried last year as an experiment.

One-Man Express Bus Tried in Paris

The first of the express lines of motor buses in Paris began operation on Sept. 22 on the Passy-Bourse line.

Three stops are made near each terminus to allow passengers to enter and leave. The route of these express buses is somewhat shorter than that of the regular service and avoids the more crowded streets.

Fares are 1 franc for any distance. The passenger pays the driver on entering by the single front entrance, the fare being recorded on the ordinary type fare register. This one-man operation and the registering of fares is the first step in France toward putting fare collection on bus and street car services in line with similar operations in the United States.

The express service will not operate on Sundays or holidays.

Mulhouse, France, Tramway Company Increases Capital

An increase in capital of 1,500,000 francs has been granted the Société des Tramways de Mulhouse, Alsace, France, by the Council General of the Upper Rhine. The new issue is to be used for electrification of the steam road from Mulhouse to Wittenheim and the line is to be continued to Theodore, a mining village. The line from Mulhouse to Battenheim will also be electrified.

Edinburgh Corporation to Build Tramway Equipment

Six car bodies for the Edinburgh Corporation Tramways, Edinburgh, Scotland, are to be constructed in the municipal workshops of that city. This decision was made after receiving bids from manufacturers, the lowest received being £990 each, while the Corporation's estimate was only £750. It is stated that delivery will be much quicker.

Sarthe Tramway to Experiment with Gasoline Car.—A gasoline-propelled passenger car is about to be put into service by the Tramways de la Sarthe in Brittany, France, as an interurban feeder on the line between Grand-Luce and Saint Calais. The vehicle has a 40-hp. gasoline motor and carries 40 passengers, of whom 34 are seated. A trailer for baggage and package freight has a capacity of 7 tons.

London, England, to Experiment with Heating Tramcars.—The experimental fitting of five tramcars with heating apparatus, utilizing the heat from the motor resistances, is under consideration by the highways committee of London County Council. Owing to the mild winters and the large proportion of short-haul passengers few tramcars are equipped with heating apparatus.

Tunnel Under Mersey River Discussed.—Construction of a tunnel under the Mersey from Liverpool, England, to Birkenhead for vehicles and tramways is under consideration. The proposed tunnel would be about 2,400 yd. long and the estimated cost is £7,000,000. There is now a railway tunnel under the Mersey, but vehicles are taken across by ferries, which carry about 2,500 per day.

British Railway to Electrify Another Line.—Electrification of the steam line between Manchester, Oldham and Shaw, England, and a branch line to Royton, a distance of about 12 miles, will be begun at once by the London, Midland & Scottish Railway, according to an announcement made Nov. 4 by the directors. The third rail system is to be used and the cost, including various improvements and steel cars, is estimated at £600,000. This work is an extension of the electrification carried out by the Lancashire & Yorkshire Railway before the consolidation of the two companies.

Havana Car Men Strike.—A 24-hour strike of the platform men of the Havana Electric Railway, Light & Power Company, Havana, Cuba, was called Nov. 8 without warning to the public, as a protest against suspension of six employees charged with minor infraction of rules. Several of the union leaders were arrested, but were later released on bail.

Argentine Railway to Be Modernized.—The street car system of Rosario, Argentina, is to be extended and modernized. As the first step toward the end, the city engineer has issued specifications inviting bids on the work. These specifications, designated as Schedule No. E7210 Street Railway, File No. 148834, are available at the Chicago and New York offices of the Bureau of Foreign and Domestic Commerce.

Modern Transportation Planned for Moscow.—Construction of a subway on the American plan, new tramways, the establishment of omnibus systems, taxicab lines and other improvements are being planned by the municipal authorities of Moscow, Russia. Loans to finance these projects are being sought in France, England and Germany.

New Cars in Service on Paris-Versailles Railway.—New motor cars have lately been put in service on the Paris-Versailles branch of the French State Railway. These differ in several important ways from the cars placed in service in 1921. Each car will have four 165-hp. motors, which will give a maximum speed of 70 km.p.h. (42 m.p.h.) The motors are also of a different type and certain changes have been made in their mounting.

Financial and Corporate

Suburban Holders Agree

st Obstacle to the Reorganization of United Railways, St. Louis, Removed

One of the last obstacles to a com-ete reorganization of the United Rail-ys, St. Louis, Mo., was removed on v. 17 by the announcement that rep-sentatives of holders of $6,500,000 of . Louis & Suburban bonds had agreed the terms of the reorganization com-ittee for refinancing the railway sys-m. The plan accepted provides for a chnical segregation of the suburban roperty, but for its operation by the me management as the remainder of e United Railways as part of the gen-al city-wide system. The idea behind is arrangement is that if in the future becomes necessary through default of rincipal or interest on the bonds fore-osure may be attained with a mini-um of legal procedure. The contract ill also pro rate the share of the light nd power contracts and franchise ghts of the companies.

Provision is also made for the imme-iate payment of the $2,000,000 of Sub-rban consolidated bonds with inter-st at 8 per cent from Oct. 1, 1923, the ate of default. The general 5 per cent onds, totaling $4,500,000, will be ex-hanged for new bonds extended to July . 1934, with a sinking fund arrange-ent that will retire $100,000 of such onds at par annually until 1934. This the same maturity date as the issue f $30,300,000 United Railways general s and indicates that the reorganizers lan to refinance both issues at the ame time. Interest for one year at 5 er cent will also be paid on the Sub-rban general bonds. In the event hat the United Railways desires to re-re more than $100,000 of the Suburban onds in any one year it is to pay more han par for them.

Under the refinancing plan as now greed upon reorganizers will pay off 4,100,000 of underlying bonds, $2,000,-00 of Suburban bonds and $4,200,000 of eceiver's certificates. The issue of 9,790,000 of St. Louis Transit Com-any bonds will be retired at the rate f $300 cash and 5½ shares of new pre-erred stock for each $1,000 bond, with he privilege of purchasing 10 shares of ew common stock at $12.50 a share for ach bond.

There will be 53,845 shares of pre-erred and 352,645 shares of common tock in the reorganized company. olders of 163,830 shares of the pres-nt preferred stock may purchase 1½ hares of new common stock at $12.50 a hare for each share of preferred now eld. If all exercise this privilege this ill bring $4,438,000 cash to the new ompany.

Such common stock as is not taken y the Transit Company bondholders or referred stockholders may be pur-hased by the holders of the present ommon stock, of which the North merican Company owns approximately 2 per cent.

Under this plan the bonded indebted-ness of the company would be reduced to $34,800,000, but a new issue of $8,000,000 will bring it to $42,800,000. The company will ask the Missouri Pub-lic Service Commission for the privilege of earning 7 per cent on a valuation of $57,200,000 already fixed by that com-mission.

Four-Mile Line in New York Bankrupt

The Port Jervis Traction Company, operating between Port Jervis and the town of Deerpark, Orange County, N. Y., filed a voluntary petition in bankruptcy on Nov. 17 in the United States District Court. It was stated on behalf of the railway that the in-debtedness was $165,419 and the assets $19,033.

Judge Henry W. Goddard appointed Harry T. Crist, Port Jervis, receiver under a $3,000 bond. The company also asked that its bus business be adjudged bankrupt, stating its liabilities amounted to $8,824 and its assets to $4,045.

According to its petition, the com-pany operates on its surface car route 3.985 miles in a community of 10,171 people. Samuel M. Cuddeback, attorney for the company, recorded as one of its big items of indebtedness $70,000 of 5 per cent first mortgage bonds, held by the Orange County Public Service Com-pany, Inc., Middletown, N. Y., with in-terest unpaid up to Oct. 1 of the cur-rent year, amounting to $27,527.

Other items listed as debts include State taxes of $213; taxes to the city of Port Jervis for 1921, $398, and for the current year, $374; county taxes, $3,224, and the Bank of Port Jervis, with an unsecured claim of $8,000.

Some of the assets are real estate, $10,000; receivable accounts, $3,208; vehicles, $5,100, and deposits of $725. Secured claims amount to $97,527 and unsecured claims $62,984.

October Operations in Toledo Show Deficit

While showing a slight improvement over September, operations of the Com-munity Traction Company, Toledo, Ohio, during October this year proved to be far under the similar month a year ago. Commissioner E. L. Graum-lich reported a net loss of $27,268, bringing the total deficit to the stabiliz-ing fund to $550,753, including the original $400,000 in the fund. Actual operating expenses were met in October and about half the bond interest and dividends on preferred stock earned.

Increase in passenger revenue over September was $24,373. Operating charges for the month totaled $224,722, including $15,000 set aside for extraor-dinary maintenance. Last year the operating expense in October was $251,883.

During October 3,831,612 revenue passengers were carried compared with 5,178,069 for October a year ago. Sep-tember this year showed only 114,383 revenue passengers a day were carried.

Business has continued to pick up for the first half of November with an increase in revenue of $4,500 as com-pared with a similar period of last month.

Successful Year in 1923

Capital Traction Closes Unusually Active Year with Substantial Increase in Balance

The credit balance of the Capital Traction Company, Washington, D. C, at the close of 1923 was $1,524,240, an increase of $169,673 over the credit balance at the end of the preceding year. More than ordinary activities during 1923 included the taking over of the Kensington Railway, the ex-tension of tracks over the Key Bridge, the installation of bus lines and the large amount of work done on repair, maintenance and construction.

The report states that the increased use of automobiles in and about Washington is still affecting the rail-way. The average daily number of passengers carried during 1923 was 188,090, which represented a loss of 3.15 per cent over the preceding year. The loss in traffic resulted in a corre-sponding reduction in revenue. Operat-ing expenses decreased $39,025 despite the fact that much money was utilized in the installation of bus service.

In February, 1923, bus service was substituted for operation on Con-

SUMMARY OF OPERATIONS OF CAPITAL TRACTION COMPANY YEAR ENDED DEC. 31

	1923	1922
Passenger revenue, railway	$4,797,909	$4,966,341
Bus revenue	21,411	.....
Special car revenue	106	20
Total revenue from transportation	4,819,426	4,966,361
Revenue from operation other than transportation	23,192	27,682
Railway operating revenue	4,842,619	4,994,044
Operating expenses (64.117 per cent gross revenue)	3,128,186	3,167,211
Net operating revenue	1,714,432	1,826,832
Taxes assignable to railway operation	409,031	436,093
Operating income	1,305,400	1,390,739
Non-operating income	34,725	34,906
Gross income	$1,340,126	$1,425,645
Deductions from gross income:		
Interest on funded debt	$280,300	
Interest on unfunded debt	22,950	
Miscellaneous rents	1,317	
Rent for leased roads	12,832	
Miscellaneous debits	4,372	
Total deductions	321,773	320,655
Net income	$1,018,352	$1,104,992

PROFIT AND LOSS STATEMENT

Credits:		
Balance at beginning of year	$1,354,567	
Net income for year	1,018,352	
	2,372,919	
Debits:		
Dividends	840,000	
Excess cost of reconstructing Kensington Railway tracks	8,669	
Miscellaneous	10	
	848,679	
Credit balance at close of year	$1,524,239	$1,354,567

SUMMARY OF OPERATIONS PER REVENUE PASSENGER IN CENTS

	1923	1922
Passenger revenue	7.02	7.01
Other revenue	.06	.08
Gross revenue	7.10	7.09
Operating expenses	4.56	4.47
Taxes	.59	.61
Interest and other deductions	.47	.45
Operating expenses, taxes, interest, and other deductions	5.62	5.53
Net income	1.48	1.56

SUMMARY OF OPERATIONS PER CAR-MILE IN CENTS

	1923	1922
Passenger revenue	49.55	52.00
Other revenue	.59	.65
Gross revenue	50.14	52.65
Operating expenses	32.16	33.16
Taxes	4.20	4.56
Interest and other deductions	3.31	3.36
Net income	10.47	11.57

REVENUE AND TRANSFER PASSENGERS

Number of passengers carried:	1923	1922
At 6 cents	16,562,845	15,303,295
At 7 cents	.....	9,263,546
At 6½ cents	50,791,651	45,025,583
At 5 cents	923,001	972,779
At 3 cents	304,206	321,724
Number of cash passengers carried on Kensington line	27,555	.....
Number of ticket passengers carried on Kensington line	43,612	.....
Total revenue passengers	68,652,870	70,886,927
Other passengers:		
1-cent Intercompany transfer passengers	2,603,125	2,636,136
2-cent bus to car transfer passengers	126,295	1,009
2-cent car to bus transfer passengers	94,814	
2-cent Eastern High School tickets	3,057	
Free car to bus transfer passengers	179,563	202
Capital Traction Company free transfer passengers	17,368,473	16,182,305
Other free passengers:		
Employees	644,715	883,835
Policemen and firemen	*76,403	*82,496
Total passengers	90,149,315	92,672,910

*Exclusive of policemen and firemen riding free while in uniform.

necticut Avenue, on May 17 a bus line was established at Fourteenth and Kennedy Streets and on Aug. 1 the operation of a bus line from Eleventh Street was put under way. Again on Dec. 1 a bus line was established from Seventeenth Street and Pennsylvania Avenue. Eight buses were purchased at a total cost of $56,876. On the subject of bus operation the company states that the operation of these lines must, for the time being at least, result in some loss financially, but the company believes it is essential to establish the policy that all urban transportation should be furnished by the existing street railway companies wherever the need for it is positively shown. The additional transportation can be furnished much cheaper, for the present at least, by buses than electric lines on account of the high cost of conduit track construction.

FUNDED DEBT UNCHANGED

There has been no change in the company's funded debt. Of the total authorized issue of $6,000,000 first mortgage 5 per cent bonds maturing in 1947, $200,000 are held in the treasury and $194,000 have been repurchased and are held in the fire insurance reserve. Capital expenditures for the year amounted to $392,380. No change has been made in the method of accruing depreciation for several years past. The total amount accrued was $424,060. Charges against the reserve were $178,245, leaving a net accrual of $245,815. The balance in reserve on Dec. 31 was $1,665,474, of which $806,000 was invested in United States securities, $48,571 deposited in interest-bearing accounts and $810,902 advanced for capital expenditures. Tax accruals for 1923 were $439,031.

The three-year contract covering wages and working conditions which expired on March 30 was renewed for another three-year period through direct negotiations without the necessity of arbitration. In the history of the Employees' Relief Association, the year 1923 was the most prosperous. After charging off expenditures for sick and death benefits and all other expenditures the year's operation showed a net profit.

The accompanying tables show the year's operation *in toto* and per car-mile and some passenger statistics.

Terms of Holyoke Power House Sale Announced

The stockholders of the Holyoke Street Railway, Holyoke, Mass., meeting there on Nov. 18, ratified the action of the board of directors of the company in arranging for the sale of the railway power plant to the Turners Falls Power Company.

By the terms of the agreement the railway will receive $400,000 for the plant, but will agree to take power from the power company for a period beginning Jan. 1, 1926, and extending to Dec. 31, 1945. It is agreed, however, that the power company can begin to furnish power to the railway prior to the date mentioned if equipped to furnish such service. The power company has already made connections with railway lines at various points, except in Holyoke.

At the base rate of 0.018 cent per kilowatt-hour the minimum payment by the railway for power would be $117,000.

Jitney Competition Hurtful in Atlanta

For the fourth consecutive month the receipts of the railway department of the Georgia Railway & Power Company, Atlanta, Ga., have shown heavy losses as compared with the figures for 1923, the loss for October amounting to $41,269. This is the largest decrease in revenues of any month this year with the exception of September, which showed a loss of $47,000.

With $38,779 for July on the wrong side of the ledger and $35,904 for August, revenues of the railway department for the past four months are now $162,954 under those for the similar period in 1923.

It will be recalled that the railway failed by more than $565,000 in 1922 and by more than $589,000 in 1923 to earn the amount set by the State Public Service Commission as a fair return on the commission's minimum valuation of the property. This year it will fail by a much greater amount to yield a fair return.

In view of these conditions the company has again called attention to the petition before the City Council asking that steps be taken to put the railway on a self-sustaining basis. The company says that the figures for the past four months should be convincing proof of the statements contained in the petition and made by officials at the public hearings last January that unless relief is given it will be impossible to continue the railway service. The losses are considered to be due largely to unfair jitney competition.

Date of Conspectus Announced.—The Conspectus of Indexes prepared by Albert S. Richey will be published in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 29.

Railway Buys Bus Line.—The Jamestown-Dunkirk Transit Company, which operates several buses between Jamestown and Dunkirk, has been sold to the Buffalo & Erie Railway, Buffalo, N. Y., according to advices of George MacLeod, general manager of the transit company. It is planned to operate the bus line in conjunction with the railway company.

Service Discontinued.—Service on the South Side loop of the Jamestown Street Railway, Jamestown, N. Y., has been discontinued. The territory is now served by a bus line, except during the rush hour, when the trolley cars will run. The South Side trolley line was built many years ago and is one of the lines on which horse cars were first used. The line was electrified about 1890.

Passenger Revenue Increases.—For the ten-month period ended Oct. 31, 1924, the Philadelphia Rapid Transit Company, Philadelphia, Pa., had a net income of $1,709,590 against $1,705,163 for a similar ten-month period ended Oct. 31, last year. The number of passengers carried showed a falling off being 755,724,687 in 1924 and 758,262,226 in 1923. The passenger revenue however, increased. It was $36,494,359 for the ten months of 1923 and $36,659,484 for the period of January through October, 1924.

Makes Offer to Sell Toronto Line.—The York Township Council has received an offer from Sir Henry Thornton, head of the Canadian National Railway, to sell on behalf of that system the section of the Toronto Suburban Railway lying between the city limits and Weston. The price is given as $15,000. Sir Henry's suggestion also included bettering transportation conditions in the district. Prices mentioned were $25,000 for the portion of the radial within the Weston town limits and $15,000 for the southern end running through Mount Dennis into the township. A point in the offer was that the municipalities were not obliged to take over any of the present rolling stock of the radial line. It was stated that the Toronto Transportation Commission was willing to assume operation of the line provided satisfactory financial arrangements were made.

Net Income Increases.—For the four-month period ended Oct. 31, 1924, the Brooklyn-Manhattan Transit Company, Brooklyn, N. Y., and its affiliated com-

panies had a total operating revenue of $14,360,028 against $13,020,657 for a similar period of last year. The expenses showed an increase from $8,645,726 for the four-month period ended Oct. 31 of last year to $9,424,390 for the four months of the current year. The net income advanced from $1,184,168 for the four-month period ended Oct. 31, 1923, to $1,681,863 for the similar four months of the current year.

Operating Ratio 75 per Cent.—The report of the Madison Railways, Madison, Wis., for the year up to Aug. 31, shows total revenues at $411,679, while operating expenses, not including interest or depreciation charges, were $311,352, or a little more than 75 per cent of the total amount taken in. The number of revenue passengers carried during the year decreased 190,000 over the two preceding years. These facts were contained in a recent audit made by the Railroad Commission. The company some weeks ago announced a comprehensive program of replacements and extensions to its system.

Deficit Increased.—For the nine-month period ended Sept. 30, 1924, the International Railway, Buffalo, N. Y., reported an operating income of $7,741,174 against $8,065,828 for the similar nine months in 1921. The operation and taxes showed a falling off, being $7,062,555 in 1921 and $7,043,486 in 1924. The gross income fell off from $1,033,769 in 1921 to $736,435 in 1924. After the consideration of income deductions the nine-month period of 1924 showed a deficit of $353,963 against a deficit in 1921 of $91,209. The company states that because of the strike in 1922 and its effect on the revenue and operating costs of the year 1923 the calendar year 1921 is used for comparative purposes.

Holdings Transferred. — The stockholdings of the Barnsdall Corporation of New York, which controlled the Moncton Tramways, Electric & Gas Company, Moncton, N. B., Canada, have been transferred to the Stevens & Wood interests of New York. Reference to the Canadian undertaking changing hands was made in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 4, 1924. About 2.5 miles of electric railway in Moncton are involved. The Barnsdall Corporation disposed of its interests for approximately $500,000. This stock was carried on the company's balance sheet at $105,780.

Changes Hands. — The Wellsburg, Bethany & Washington Railway, Wellsburg, W. Va., has recently changed hands and plans have already been laid by the new owners, the Buffalo Valley Collieries Company, to extend the line to Washington, Pa. For many years there has been discussion about this extension. The leasing of the line was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 23, 1924.

New Manhattan Railway Directors.—At the annual meeting of stockholders of the Manhattan Railway, New York, on Nov. 12, James F. Hughes, William Dean Embree and John Nordhouse were elected to fill vacancies on the board of directors. The Manhattan Railway owns 140 miles of elevated railway leased by the Interborough Rapid Transit Company.

Personal Items

A. J. Manson Advanced

Well-Known Westinghouse Official Is Made Manager of Company's Heavy Traction Division

A. J. Manson, manager of the transportation division of the New York office of the Westinghouse Electric & Manufacturing Company for the past four years, has been promoted to manager of the heavy traction division of the railway department with headquarters at East Pittsburgh.

Mr. Manson is considered one of America's foremost authorities on railroad electrification. He joined the Westinghuose company through its engineering apprenticeship course about nineteen years ago. Just before that he was graduated as an electrical engineer from the Massachusetts Institute of Technology.

His long service with the Westinghouse company has included every branch, from construction to sales. As a result Mr. Manson has been connected with the work of solving nearly all of the important electric transportation problems in the eastern part of the United States. They include helping to build and test the first New Haven locomotive; being assigned to the electrification work of the New York, New Haven & Hartford Railroad in the spring of 1907 and aiding in the inauguration of electric service; instructing steam engineers in their duties as electric enginemen, and qualifying the early ones for electric service, and being associated with the preliminary test conducted by the Pennsylvania Railroad on Long Island prior to the decision as to the system to be used in the Pennsylvania tunnels entering New York City.

Another accomplishment of Mr. Manson was assisting F. H. Shepard, director of heavy traction of the Westinghouse company, in connection with the Pennsylvania-New York tunnel electrification. This installation included power house, substations and locomotives. Mr. Manson is well known throughout the electrical and railway world through his book "Railroad Electrification."

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A. J. Manson

R. L. Peterman in Charge of Spartanburg Property

R. L. Peterman has assumed charge of the local utilities at Spartanburg, S. C., recently bought up by W. S. Barstow & Company. Mr. Peterman entered the utility field at Charleston, in the electric light division of the utilities company. He later went to Binghamton, N. Y., with the Binghamton Light, Heat & Power Company, another Barstow property, as general manager, succeeding Robert N. Hodgson. At one time Mr. Peterman was superintendent of the Pennsylvania Utilities Company.

As vice-president and general manager of the South Carolina Gas & Electric Company in Spartanburg Mr. Peterman has the problem of restoring railway service, which has been abandoned on practically all lines for the past few years. One of his first steps on assuming charge of the Spartanburg property was to petition the City Council for permission to operate bus lines in conjunction with the railway lines. In addition to his duties in Spartanburg Mr. Peterman also has charge of the Columbia Railway, Gas & Electric Company, another recently purchased Barstow property.

G. E. Emmons Retires from General Electric

George E. Emmons has asked to be relieved of his duties as vice-president of the General Electric Company in charge of manufacturing. Mr. Emmons is a pioneer in the electrical industry. He has been actively engaged in the management and development of the production department of the General Electric for nearly thirty years. During his administration the Schenectady plant attained its present immense proportions, and he has also been instrumental in the development of the company's plants in other places. He began his electrical work with the old Thomson-Houston Company in 1886. When that organization was merged with the General Electric Company he was retained on the staff.

In 1895 he was made general manager of the plant at Schenectady and in 1916 was elected to the office of vice-president. Two years ago Mr. Emmons was decorated by the Japanese government in recognition of his services in introducing electrical machinery into Japan and of his contributions to the development of the electrical industry in that country.

In commenting on his resignation Gerard Swope, president of the company, said:

> Mr. Emmons has served the company loyally, whole-heartedly and indefatigably

for almost forty years. He has met his arduous responsibilities not only with outstanding ability, but in a manner which has won and held the respect and affection of workers in all grades of service throughout the organization.

Willis A. Lovejoy New Superintendent of Maine Property

Willis A. Lovejoy has succeeded Sterling T. Dow as superintendent of the York Utilities Company, operating between Sanford and Biddeford and from Town House to Kennebunkport and Cape Porpoise, Me. Mr. Dow, whose resignation was referred to recently in the ELECTRIC RAILWAY JOURNAL, has accepted a similar position in Portland. His successor was elected at a meeting of the board of directors on Oct. 29, but the promotion did not become effective until Nov. 1. Mr. Lovejoy has been associated with the Maine property, formerly the Atlantic Shore Line, for twelve years. He was first employed as shop foreman at Dover, N. H., when the Dover and Portsmouth branch was in operation, and later as master mechanic at Town House. Mr. Lovejoy originally went to the Atlantic Shore Line from Lewiston, where he was in charge of the carhouse of the old Lewiston, Brunswick & Bath Railroad.

George Hanscomb, for many years connected with the York Utilities Company, both in the operating and executive departments, was chosen assistant superintendent.

E. L. McCulloch, who was assistant to C. D. S. Johnson, president of the old Denver & Laramie Railrond and the Seeing Denver Electric Railway Company, and who piloted the canvass of Rice Means until he was elected United States Senator in the November election, has been appointed secretary to Colonel Means. Mr. McCulloch is a former newspaper man.

Carl Bacon, for the past four years chief electrical engineer of the Olean, Bradford & Salamanca Railway, with headquarters at Olean, N. Y., has resigned. He will become connected with the Texas Company, New York.

H. G. Butler would seem to be nearing the end of his duties as state power supervisor in California. The emergency during which he has been serving has about passed. With the impending finish of the necessity for power saving, much praise is to be extended for the qualities of firmness, tact, consideration and quiet efficiency shown by Mr. Butler. The State Railroad Commission had full jurisdiction over the power-saving campaign, and that body selected him for the position of state power supervisor principally due to the skill he displayed in similar executive work during war-time conservation. In the work now drawing to a close Mr. Butler has, more or less, occupied a buffer position between the public utilities, including the electric railways, and consumers, and he has performed the near miracle of apparently satisfying all parties and bringing about civic teamwork. Under a less competent hand, confusion might easily have resulted. Mr. Butler is a consulting engineer in private practice in San Francisco.

Mr. Butler Named Senator

Electric Railway President Appointed by Governor to Succeed the Late Mr. Lodge of Massachusetts

William M. Butler, president of the Boston & Worcester Street Railway, Framingham, Mass., and the Boston & Worcester Electric Companies, was appointed on Nov. 13 by Governor Cox of Massachusetts to fill until the next general State election in 1926 the seat in the United States Senate left vacant by the death of Henry Cabot Lodge. Mr. Butler led Calvin Coolidge's preconvention campaign for the Presidential nomination and was chairman of the Republican national committee in the recent election. He will continue in that capacity.

From the eighth floor suite of offices at 77 Franklin Street, Boston, Mr. Butler has long kept a watchful eye on the operations of his several textile properties, an electric railway and the political horizon. Visitors concerned with one or another of these fields of activity come and go in a constant stream. Like the late Senator Crane and like the silent man of the White House, Mr. Butler is a doer rather than a talker. By his own efforts he has made a fortune in the textile industry, controlling some of the best properties in New England, and has found time to take an effective part in politics, state and national, for many years. He has a vigorous physique, is alert of mind and is endowed with charm of personality.

A year ago, before Mr. Butler threw himself into the Coolidge campaign, it was said of him that politics was his hobby, his recreation. It was said that he loved the game, but that he was merely a fan. However, he proved himself to be an adept at the game when he took it upon himself to participate as a player.

Mr. Butler is a minister's son. His father, James D. Butler, was formerly a sea captain of New Bedford, and later was ordained a clergyman in the Methodist Episcopal Church. His mother was Eliza B. Place. William was born in New Bedford on Jan. 29, 1861. He received his education there, and before deciding to make law his life profession, worked as a bookkeeper. Then he attended Boston University, graduating with his law degree in 1884, and setting up an office in New Bedford. He got his first taste of politics by being elected to the New Bedford City Council and to the State Legislature. But he was Councilman, Representative, Senator, and then he quit being a candidate for office and became a manager. It was then that Senator Crane took charge of his destiny.

Mr. Butler moved to Boston and his law practice expanded. He acquired interests in various business concerns, chiefly textile interests and the Boston & Worcester Street Railway. He kept in touch with legislation and took up politics as his hobby. When Crane was in Washington Mr. Butler was his spokesman in Massachusetts.

Besides being president of the Boston & Worcester Street Railway, Mr. Butler is head of the Butler Mill, Hoosac Cotton Mills, New Bedford Cotton Mills Corporation, and Quissett Mill. He has been a trustee of Boston University and a member of a half dozen exclusive clubs.

In urging the appointment of Mr. Butler to public office the Boston *News Bureau* paid him this fine compliment:

> Nobody is better equipped, nobody has shown higher talent, to uphold the Coolidge program than William M. Butler. He may not want the task. Private business is calling for his attention, as it is calling for the attention of many valuable members of the Cabinet. But is it not a duty for them all to sacrifice still further personal considerations and plant the United States solidly on world reconstruction with reduction of government interference and reduction of taxation?
>
> Is not one of the keynotes of this situation the appointment of William M. Butler by Mr. Cox to uphold the hands of the administration and the policies of President Coolidge? And is it not the duty of Mr. Butler to accept?

Obituary

Martin F. Delahanty died suddenly on Oct. 23 at his home in Buffalo, following a stroke the day before. He had been connected with the International Railway, Buffalo, for 27 years in various capacities. At the time of his death Mr. Delahanty was foreman of the electrical department.

E. A. Gregory, district sales manager of the American Brake Shoe & Foundry Company, New York, with headquarters and residence at Houston, Tex., died on Nov. 1 in New York, following a severe illness and operation. Mr. Gregory was a most lovable character and a general favorite with a large number of friends, acquaintances and railroad officials, particularly in territory comprising the States of Louisiana, Mississippi, Texas, Arkansas and Oklahoma. He was born in Nashville, Tenn., on March 22, 1877, and took up railroad work in 1900 with the Nashville, Chattanooga & St. Louis Railway. In 1903 he was appointed foreman of terminals of the Louisville & Nashville Railway at Nashville, Tenn., which position he held until he entered the employ of the American Brake Shoe & Foundry Company on Jan. 15, 1909. On March 1, 1923, he was appointed district manager of the company, with headquarters at Houston.

Frederick Alfred Boutelle, a pioneer in the electric railway industry, died on Nov. 4 at the home of his daughter in Portland, Me. He was identified with transportation companies on the Atlantic coast, the Pacific coast and in the central states for more than 45 years. At the age of 18 years, he entered the employ of the Delaware & Hudson Canal Company in the capacity of telegrapher. Some years later he was promoted to chief dispatcher. He continued in this position until 1901, when he resigned to become general superintendent of the Hudson Valley Electric Railway, Glens Falls, N. Y. In 1902 he became superintendent of transportation of the Columbus, Buckeye Lake & Newark Traction Company and the Columbus, Newark & Zanesville Electric Railway. In 1905 he resigned this position to become general superintendent of the Tacoma Railway & Power Company and the Puget Sound Electric Railway at Tacoma, Wash. He held this position until he retired in 1913. Mr. Boutelle was 73 years old.

Manufactures and the Markets

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

Electrification Progressing in Europe

Roads Are Planning to Handle Greater Traffic and Already Have in Use Over 3,000,000 Hp. of Locomotives

Marked activity in electrification all over Continental Europe was observed by Frank H. Shepard, director of heavy traction of the Westinghouse Electric & Manufacturing Company, who returned to New York last week after a month's trip to France, Italy, Spain, Switzerland, Czechoslovakia, Germany, Holland and England. In an interview with representatives of this paper he said that the work of electrification on the Continent is in full swing. Plans are being made for the future, so that the railroads can handle greatly increased traffic.

Installations in progress or already in operation on the railways in Norway, Sweden, Germany, Austria, Switzerland and Italy, using alternating-current trolley systems, single-phase or three-phase, now have in use or on order locomotives totaling some 2,500,000 hp. In France, England, Spain and Holland, where the direct-current systems are used, some 600,000 hp. of locomotives are built or building.

While in the past American manufacturers have supplied considerable electrification material for European roads, Mr. Shepard is of the opinion that in future the nationalist movements in the leading European countries will result in the production locally of more and more of their equipment. This movement has even gone so far as to affect the decision for electrification systems, particularly in France, where direct current was adopted in part to prevent interchangeability with Germany, which uses the single-phase system.

American Experience Still Needed

Mr. Shepard felt that despite the movement for patronizing home industries, American engineering experience and the leading position of this country in the electrical industry will make the assistance of our manufacturers essential, so that they may expect to participate in European electrification work for a long time to come. Of course, he said, we must bear in mind that foreign countries have gone much further than America in electrification work, having three to four times as many miles operated in this manner, although the United States has over half the world's railroad mileage.

What is needed here, he said, is that the railroads get away from the present plan of going along day by day, which has come as a result of over-regulation and adverse legislation, and adopt a broad policy looking toward the future. Greater stability in the political situation should bring this nearer than it has been. Electrification should then be considered not as a means of replacing steam but of giving a service impossible with present operating methods.

$8,250,000 for New Equipment

The Illinois Central Railroad on Nov. 19 awarded contracts for $8,250,000 of new equipment. This includes 130 motor cars to be built by the Pullman Car & Manufacturing Company and 85 trailers by the Standard Steel Car Company. The contract for the entire electric control equipment was awarded to the General Electric Company. The motor order was divided between the General Electric Company and the Westinghouse Electric & Manufacturing Company, each company to furnish 50 per cent. Deliveries of cars and electric equipment shall start March 1, 1926, and shall be completed by July 1, 1926. Except for the electric equipment these cars will be similar to the 45 purchased during the last three years, which are now hauled by steam engines. The motor cars will carry pantographs and will be arranged for multiple-unit control from either motor or trail car.

Brooklyn Car Order Placed

Final decision has been reached by the Brooklyn City Railroad, Brooklyn, N. Y., concerning the placing of its order for 335 double-truck four-motor cars. Of these 150 will be built by the J. G. Brill Company, the trucks being built by Brill; 100 by the St. Louis Car Company and 85 by the Osgood-Bradley Car Company. Motors for the entire complement will be supplied by the Westinghouse Electric & Manufacturing Company. Westinghouse Air Brake Company will furnish the air brakes. Some details of the other equipment of the cars remain to be settled and announcement concerning them probably will be made in the near future.

Metal, Coal and Material Prices

Metals—New York	Nov. 18, 1924
Copper, electrolytic, cents per lb.	13.938
Copper wire base, cents per lb.	16.25
Lead, cents per lb.	8 65
Zinc, cents per lb.	7.25
Tin, Straits, cents per lb.	54 75
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.325
Somerset mine run, Boston, net tons	2.05
Pittsburgh mine run, Pittsburgh, net tons	1.875
Franklin, Ill., screenings, Chicago, net tons	1.375
Central, Ill., screenings, Chicago, net tons	1.275
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, N. Y., cents per lb.	18.25
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.13
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.152
Turpentine (bbl. lots), N. Y., per gal.	0.85

Local Firm Favored for Detroit Bus Bid

Following a hearing on Nov. 14 before the Detroit City Council in committee, it was decided to award a contract for 50 double-deck buses for the Department of Street Railways to the Standard Motor Truck Company, a local concern. The Street Railway Commission had previously recommended that the bid of the Yellow Coach Company, Chicago, be accepted, although that concern's bid was $11,250 a bus and the Standard Company's bid was $9,500. Final action has not yet been taken. Even after the contract is awarded the Council can reconsider its action any time within several days.

Ross Schram, general manager, suggested that if it was desired to encourage the bus building industry in Detroit, the Council should reject the bids now under consideration and readvertise so as to purchase 25 buses of known quality from the Chicago firm and distribute contracts for 25 among the Detroit manufacturers. He suggested that the commission be permitted to provide new specifications.

It was pointed out by the commission that Yellow Coach buses were wanted by the Street Railway Department in extending its transportation service because those buses met all the requirements specified by D.S.R. engineers and were manufactured by a concern which has put out hundreds of buses similar to those desired for use in Detroit, while the Standard company has made only single-deck buses.

Mr. Schram also questioned the assumption that the Standard's bid was the lowest. He cited that the bid was on a type of bus that differed in five or six important details from that of the other company.

A tentative agreement has been reached by the D.S.R. under which the department may rent single-deck buses from Dodge Brothers, Inc., for suburban use with the understanding that the rental paid may be applied on the ultimate purchase price if the city decides to buy the buses. The D.S.R. has been given authority to advertise for open bids on such a rental project.

Glasgow Corporation Rejects American Bid

The Glasgow Corporation turned down on Nov. 13 the recommendation of the tramway committee to place a contract for special trackwork with the United States Steel Products Company. Its offer was £7,850, or £800 less than the lowest British offer, which the corporation decided to accept. The vote of the corporation was 73 against acceptance to 17 in favor.

In making his motion that the work be given to the lowest British bidder, Counselor Walker said that the American company refused to recognize the elementary right of workmen of combining to protect their interests and that the Americans were throwing their goods in England at lower prices than they charged in the home market so as to destroy any revival of trade in Britain.

Car Order Delayed

Grand Rapids Railway Intends to Conduct Test of Vehicles Supplied by Three Manufacturers

Louis J. DeLamarter, vice-president and general manager of the Grand Rapids Railway, has announced he has secured the co-operation of three of the leading car builders in the country for a comprehensive test on the lines of his company of three types of street car which will embody the latest ideas in car construction.

Cars will be entered in the competition by the Light Weight Noiseless Electric Street Car Company, Minneapolis; the St. Louis Car Company, St. Louis, Mo., and the J. G. Brill Company, Philadelphia. These cars are to be light-weight, double-truck, single-end type, arranged for both one-man and two-man operation. Definite details of the cars in the contest have not been settled. It is expected the cars will be delivered to the railway about Feb. 1, 1925. They will be operated through the winter, given the severest tests possible and a decision reached in the early spring by the railway with respect to the award of a large order for new cars.

The average weight of the cars to be replaced is about 47,000 lb. The new cars will weigh about 24,000 lb., but will have the same seating capacity as the cars it is intended they shall replace. They will be 36 ft. 8 in. long, equipped with double folding front and rear doors. The roof will be of the plain arched type and will be made of Haskelite. The interiors will be finished in mahogany.

One or more of the cars will be equipped with Mead cushion wheels, a new departure in street car construction. This wheel has a steel tire with rubber core, designed to eliminate any shock. Another feature is to be a brake band which will operate on large brake drums attached directly to the axles, the same as on automobiles. In order to install the band brake it has been necessary to redesign the truck to make it inside hung and not outside as at present. An adjustment device is to be so arranged that any slack in the brakes may be quickly taken up from time to time. One of the cars doubtless will be equipped with hydraulic brakes. Four 25-hp. motors will be installed on each car.

There are to be emergency door openings at the rear, but the operator will be prevented from starting the car until the emergency door has been closed. The cars are also to be equipped with an outside control valve to permit a street man to open the rear door from the outside, collect fares, let passengers on and otherwise speed up car loading. In addition to the air brake the cars will be equipped with a Peacock staffless hand brake for emergency use.

The windows will be made to be raised instead of being lowered into a slot. Footrests are to be designed for just the proper height and reach for restful posture. The seats will be extra wide. The seats and backs will be spring filled and made of rattan. One of the cars will have plain floors and another will have mosaic rubber tiling. Electric heaters will be used. There will also be a new and improved design of wheel guard and fender.

Air-operated track scrapers will facilitate the work of keeping the right-of-way open after heavy snowfalls. The latest approved safety car electric lighting fixtures will adorn the new cars. For the local service it was considered advisable to adopt the folding step to which the riding public is accustomed. Large illuminated destination and routing signs will be used, the destination sign on the upper part of the vestibule, the route sign on the dash. All the car trimmings will be in bronze, polished and lacquered.

A new feature of at least one of the cars will be the observation end. The rear vestibule will be provided with seats all around, giving an unobstructed view of both sides of the street.

During the test period the cars will be painted different colors to distinguish them and make it easy for the public to give each a trial.

Rolling Stock

Indiana Service Corporation, Fort Wayne, Ind., is in the market for the purchase of 15 new light-weight interurban cars.

Detroit United Railway, Detroit, Mich., has placed an order with the G. C. Kuhlman Car Company for the construction of 10 new light-weight interurban cars which will be similar in design to the last group of cars built by the Kuhlman company for the Detroit United.

Portsmouth Public Service Company, Portsmouth, Ohio, is changing over six light-weight double-truck cars for one-man operation. These cars will be equipped with Safety Car Devices Company equipment and will have the exit at the rear. They will be similar to the three new cars now being built for this company by the Cincinnati Car Company.

Track and Line

Community Traction Company, Toledo, Ohio, is doing temporary repair work on Cherry and Summit Streets. It is planned to renew the track next summer.

South Carolina Gas & Electric Company, Spartanburg, S. C., is repairing street paving between its tracks on East Main Street and Morgan Square. Tracks are being reconditioned and new copper bonds to hold the rail sections are being put in place. This work is preparatory to resumption of railway operation by the new management.

Key System Transit Company, Oakland, Cal., has opened the new extension of the Piedmont electric train line into Piedmont, to serve that city and give through service to San Francisco. The extension into Piedmont runs from the old terminal at Piedmont Avenue and Fortieth Street over the present street car tracks to Manor station, and then over a new right-of-way and new tracks to Oakland Avenue. The extension cost $65,000. The Key System company has also begun work on t other projects in its program of tra replacement and extension. The fi was started on West Twelfth Street l tween Wood and Market Streets, Oa land. This involves the reconstructi of the tracks and the laying of perm nent pavements. The estimated cost $103,000. The second project cove double tracking of the Lakeshore Av nue line on Walla Vista Avenue fr the end of the present double tracka system at Lakeshore Avenue to a poi about 1,700 ft. beyond.

Trade Notes

Armin Elmendorf, who during t war was in charge of the plywood se tion of the Forest Products laborato at Madison, Wis., has rejoined the eng neering staff of the Haskelite Manufa turing Corporation, Chicago, Ill. M Elmendorf has been in Europe for t past two years investigating the ele tric railway, bus and commercial bo fields. During his stay there he co lected a great deal of interesting da on car construction. Mr. Elmendo reports that the one-piece Haskeli roof has proved satisfactory on t street cars of London and that at t present time there are more than 2,0 buses on the streets of London usi Haskelite.

T. R. Langan, manager of the tran portation division of the Westinghou Electric & Manufacturing Company Buffalo, N. Y., will succeed A. Manson as manager of the transport tion division of the New York office the Westinghouse Electric & Manufa turing Company. As noted elsewhe in this issue Mr. Manson has been mad manager of the heavy traction divi io of the company with offices in Pitt burgh.

Howard J. Whittman, Toledo, Ohi has been appointed district representa tive of the Kuhlman Electric Compan of Bay City, Mich. Mr. Whittman wi have northwestern Ohio as his territor

Westinghouse Air Brake Company Wilmerding, Pa., automotive divisio has announced the opening of a ne automotive air brake sales and servic branch at Detroit in the General Mo tors Building, with C. D. LeFevre i charge. Mr. LeFevre is well known i the automotive industry, having serve for several years as assistant secretar of the Society of Automotive Engineers A little more than two years ago h became Eastern manager of manufac turers' sales for the Westinghous Union Battery Company and was late made special factory representative He was graduated from Cornell as mechanical engineer in 1911.

New Advertising Literature

J. G. Brill Company, Philadelphia Pa., has issued Bulletin No. 280, de scribing its 27-M. C. B. truck.

Crouse-Hinds Company, Syracuse N. Y., has issued folder No. 20, en titled Safety Switch Condulets (tum bler type).

Accidents are often prevented by inches—

That is why a brake "just a little" better might pay for itself a thousand fold.

Inches often represent the dividing line between safety and a serious accident.

There is no time when a good brake is more essential to safety than in emergencies. Only a brake which is fast, powerful, and of ample capacity, can protect the lives of passengers. So much depends upon handbrakes that it pays to be over cautious in their selection.

Common sense dictates that any vehicle carrying large numbers of human beings should have the best brake equipment, which means the *safest*.

Peacock Staffless Brakes Are Safe—

With a braking power three times that of the ordinary equipment, and almost unlimited chain winding capacity, Peacock Staffless Brakes are a guarantee of *safety*. Neither slack chain nor worn brake shoes can prevent effective braking, because there is no limit to the length of chain that can be wound in with the Peacock Staffless. Where the ordinary hand brake might jam after a few turns the Peacock will take up chain until the brakes take hold.

One serious accident prevented—perhaps by inches, will more than pay the entire cost of Peacock Brakes for your cars.

Ask us for estimate on your installation.

"The Peacock Staffless"

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

Easiest Maintenance

VITRIFIED brick, asphalt-filled, protects ties, cross-rods and base from seepage and destructive action of surface drainage, yet the tight water-seal is easily broken by a crow-bar when repairs are required. Each brick is then a removable unit, ready for relaying,—salvage value is practically 100%.

Six-point-service—

I
absorbs impacts at rail joints

II
water-seals road-bed and ties

III
allows for contraction and expansion

IV
resists heaviest traffic

V
is easily removable for track repairs

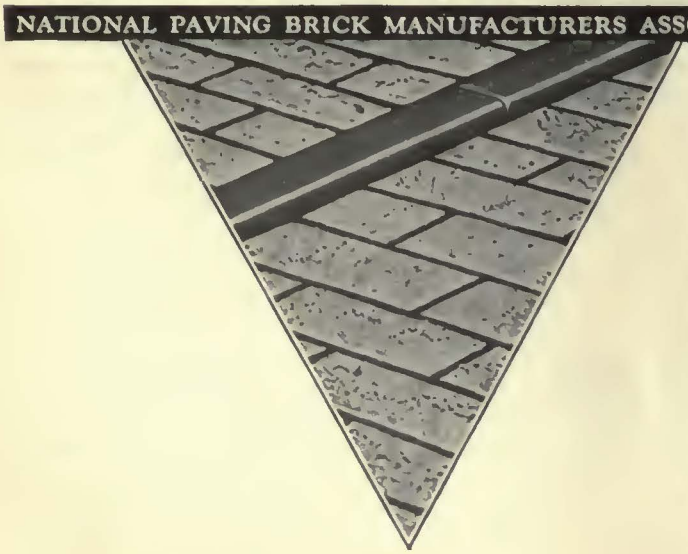
VI
practically 100% salvage value

VITRIFIED **Brick** PAVEMENTS

Get six-point-service and six-point-satisfaction,—pave with vitrified brick, asphalt-filled.

OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO



Alton Brick Company
Alton, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hisylvania Coal Co.
Columbus, Ohio
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Metropolis Paving Brick Co.
Pittsburg, Kans.
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Paving Brick Co.
Mineral Wells, Texas
Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Nelsonville Brick Co.
Nelsonville Ohio
Peebles Paving Brick Company
Portsmouth, Ohio
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Co.
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
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Second Edition

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This new second edition of Electric Railway Transportation, covers every important phase of modern electric railway transportation, giving all of the latest developments and all of the latest methods used to meet present-day traffic requirements and competitive activities.

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This second edition is practically a new book. The material has been thoroughly revised and brought right down to present-day practice. Much new valuable material has been added. Of particular value is the new information given on

(1) the motor bus in the modern transportation scheme, showing how the bus is being utilized in supplementing railway service—and pointing out how bus competition is being successfully met by transportation companies;

(2) the emphasis placed upon merchandising in securing for a road the maximum traffic. Rapid strides have been made in recent years in this direction and the full importance of this phase of transportation work is reflected in the pages of this book.

CHAPTER HEADINGS

I.—Organization and Definitions. II—Adjustment of Traffic to Service. III.—Accelerating Traffic Movement Along the Line. IV.—Accelerating Traffic Movement on the Car. V—Car Types in Relation to Traffic. VI.—City Timetables—Preliminaries. VII.—Interurban Schedules and Dispatching. VIII—Fares. IX.—Fare Collection Practices and Devices. X.—Public Relations. XI.—Promotion of Passenger Traffic. XII.—Traffic Signs for Cars, Station and Road. XIII.—Motor-Bus Operation by Electric Railways. XIV.—Selection and Training of Men. XV.—Wages and Wage Agreements. XVI.—Employee Relations. XVII.—Discipline of Trainmen. XVIII—Forms of Extra Pay.

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T. S. Q. means this ➜

...de la Concepción y algunas en la Ciudad Lineal.

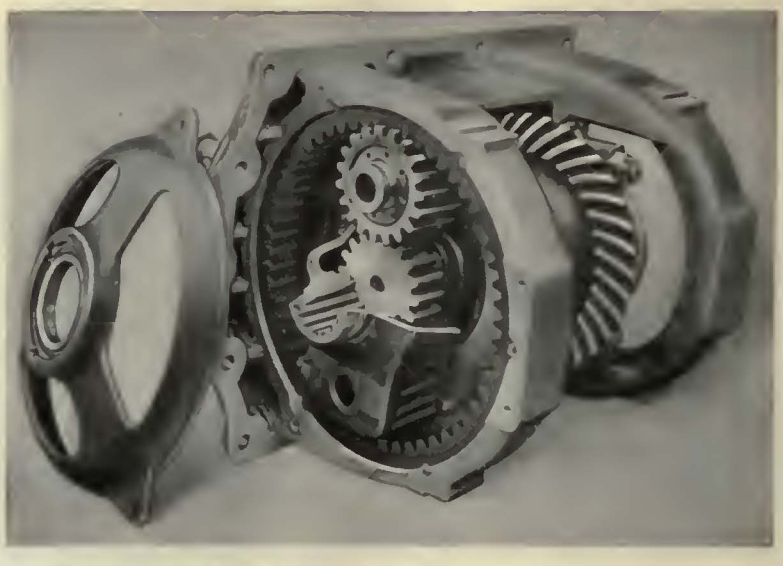
Material móvil.—Muy importante, tanto como necesaria, ha sido la renovación de piezas, mereciendo especial mención el importante suministro hecho por los Talleres de Deusto de piezas para los trucks; los engranes, piñones de acero especial de la más acreditada marca en el mundo, «Tool steel»; un hogar de cobre de la casa alemana Orenstein y ...

Translation "Very important and necessary has been the purchase of repair parts and we make special reference to the gears and pinions of the most famous make in the world, the "Tool Steel."

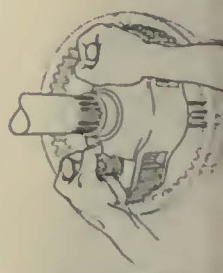
A large company in Spain, in its annual report to stockholders, commenting on its financial showing and *good management*, includes the above paragraph.

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

Tool Steel Gear and Pinion Co.
Cincinnati, Ohio

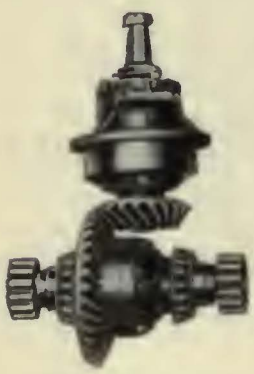


Partially cut-away view showing the entire driving mechanism of the Huck Axle, which is a self-contained unit.



The drive of the Huck Axle is balanced.

An improvement
over conventional second reduction gearing



The first reducrion is a spiral bevel gear set in which the bevel pinion is almost as large as the bevel gear.

The second reduction is accomplished by epicyclic gearing, which is noted for its extremely high efficiency.

BY centralizing the entire driving mechanism of the Huck Double Reduction Axle in a self-contained unit, it is possible to operate it in a bath of oil.

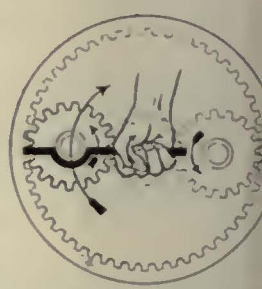
Because the entire driving mechanism is a self-contained unit, housing deflection and play in the wheel bearings [which have been minimized in the Huck Axle but can never be totally eliminated in any type or kind of axle] do not affect the alignment of gears and parts having motion relative to each other and are therefore rendered harmless.

The perfect lubrication and positive alignment resulting from the unit construction of the driving mechanism spell LONG LIFE AND PERMANENTLY QUIET OPERATION.

The gearing used has rolling contact rather than sliding contact. This *reduces frictional power loss to a negligible amount* under any load and speed condition.

The driving mechanism is extremely accessible and its compactness provides ample road and overhead clearance thus allowing lower bus floors.

And it does so without a large overhang ahead of the axle, which is undesirable because of the great length of the arc through which it snaps the rear universal joint when the axle weaves as the springs absorb and cushion the torsional reaction.



The internal gear teeth form the fulcrum of the continuous levers which the driving pinions form. The force on the pins driving the axle shafts is double the tooth pressure.

This book tells a more complete story. Send for it.

SHELDON AXLE & SPRING CO.
Huck Axle Division ∽ ∽ ∽ *Wilkes-Barre, Pa.*

HUCK DOUBLE REDUCTION BUS AXLE

Made by Sheldon *under Huck Patents*

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ELECTRIC tramway superintendent wanted for West Indies. Excellent living conditions, delightful climate, good pay. Position suitable for young man with professional training and practical experience. P-751, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SHOP foreman wanted for electric railway in New England. Give experience, reference, age and salary expected in first letter. P-752, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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AUDITOR or assistant. Twenty years' experience in electric light, power and railways. At present employed but desire to make change. PW-750, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

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

MECHANICAL and electrical engineer, thoroughly experienced with rolling stock design, construction and maintenance, desires connection with some city or interurban electric railway. Particularly qualified as superintendent of rolling stock and equipment on any size property. PW-755, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

TRANSPORTATION superintendent, 3½ years' experience. Proven ability in public relations. 2½ years' experience track department. 38 years of age, married. Can furnish best of references. Willing to locate anywhere. PW-753, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

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To take charge and operate Railway Department, 125 miles of city and interurban track. 300 street cars. Reply, giving full particulars, to

Winnipeg Electric Co.
Winnipeg, Canada
A. W. McLimont, Vice President

FOR SALE Standard Gauge Electric Railway Equipment

1—Parlor Chair Car, built by American Car Company, length 48-ft.—seating capacity 40—fully equipped air brakes, electric heating system. Brill standard double trucks, 65-hp. motors. Type M Controller.

6—Interurban Passenger Cars, built by American Car Company, length of cars 49-ft., seating capacity 50, fully equipped air brakes. Electrical equipment 4 G.E.—67—40-hp. motors and K-6 controllers. Smith heaters and Brill standard double trucks.

1—Express Car built by American Car Company, length 50-ft., equipped with air brakes, stove heat. Brill standard double trucks. Electrical equipment 4 G.E.—67—40-hp. motor and K-28 controller.

1—Line Car, 24-ft. long, Electrical equipment consists of 2 G.E.—1000—35-hp. motors and K-10 controller.

Cars in splendid condition, finished in both rattan and plush. For quick sale, we offer these Cars at $3000 each, f.o.b. cars. Write at once for detailed specifications. Located in Chicago District. Inspection invited.

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Rails, Locomotives and Cars
Main Office—CHICAGO—Peoples Gas Bldg.
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Through double track truss. Angle of skew—30 degrees to the left. Span—107 ft. c. to c. of bearings. Width—28 ft. c. to c. of trusses. Capacity—80-ton cars, 6-ft. wheel base and 22 ft. c. to c. Estimated weight of steel—173,228 lbs.

Bridge located at Frankfort Junction, over Erie Canal on West Shore Cut-Off.

New York State Railways
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FROGS
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All Rails and Track Materials shipped subject to inspection and approval at destination.

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18—G.E. 264; practically new.

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Single Truck

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NEW GEARS, PINIONS AND GEAR CASES FOR SALE

GE-1000 Motor:
173 15 tooth pinions
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100 doz., No. 778; 75 doz., No. 786; 50 doz., No. 986, Macbeth brand. Absolutely new. Price $2.50 per dozen.

C. F. BULOTTI MACHINERY CO.
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In good condition with at least 8 ft. between centers and 36-in. swing, suitable for turning wheels; motor driven preferred.

ATLANTIC CITY & SHORE R.R. CO.
Atlantic City, N. J.

WE WANT TO BUY

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MOTORS

Have you any to offer?

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

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

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

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

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

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Associated Spicer Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
Sheldon Axle & Spring Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Axles (Front & Rear) Motor Bus and Passenger Car
Associated Spicer Co.
Sheldon Axle & Spring Co.

Babbitt Metal
Ajax Metal Company

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

Barges Steel
American Bridge Co.

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

Bearings, Center and Roller Side
Baldwin Locomotive Wks.
Stucki Co., A.

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

Bearings, Roller
Norma-Hoffman Bearings Corp.

Boilers
Babcock & Wilcox Co.

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

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Boxes, Switch
Johns-Pratt Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

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

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

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

Bridges, Steel
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co.
U. S. Graphite Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buildings, Steel
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
Garford Motor Truck Co.
International Motor Co.
New York Transportation Co.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Cables. (See Wires and Cables)

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

Carbon Brushes (See Brushes, Carbon)

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

Car Lighting Fixtures
Elec. Service Supplies Co.

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

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

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

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

Car Wheels, Rolled Steel
Bethlehem Steel Co.

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

Castings, Gray Iron and Steel
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

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

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

Catenary Construction
Archbold-Brady Co.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Change Carriers
Cleveland Fare Box Co.

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

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

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

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.

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

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

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. 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.

Concrete Reinforcing Bars
Laclede Steel Co.

Condensor Papers
Irvington Varnish & Ins. Co

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

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

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

Conveying Machinery
American Bridge Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.

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

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

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crosslog, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.
Safety Car Devices Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Economizers
Power Specialty Co.

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

Electric Grinders
Railway Track-work Co.
Western Electric Co.

Electric Transmission Towers
American Bridge Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly-Cooke Co.
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engineering
Equipment Engineering Co.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

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

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co

Field Coils (See Coils)

Floodlights
Elec. Service Supplies Co.

Forgings
Brill Co., J. G., The

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

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Furnaces, Electric Steel Melting
American Bridge Co.

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

Fuses, Cartridge, Non-Refillable & High Voltage
Johns-Pratt Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

Gaskets
Westinghouse Tr. Br.

Gas Producers
Westinghouse E. & M.

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

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

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

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

Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies
General Electric Co.
Nat'l Ry. Appliance
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg.
General Electric Co.
Westinghouse E. & M.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind Supplies
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 & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies
More-Jones Brass Metal
Nuttall Co., R. D.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

Heaters, Car (Electric)
Consolidated Car Heat.
Gold Car Heat. & Ltg.
Nat'l Ry. Appliance
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

Heaters for Special Purposes
Power Specialty Co.

Helmets—Welding
Railway Track-work Co.

Hoisting Machinery
American Bridge Co.

Hoists, Portable
Ingersoll-Rand Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Indicating Signals
Oakes Equipment Co.

Instruments Measuring, Testing and Recording
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Suplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co., Inc.

Jacks (See also Cranes, Hoists and Lifts)
Buda Co.
Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

Junction Boxes
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locomotives, Electric
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Co.
Texas Company
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co.

Manganese Steel Guards Rails
Ramapo Ajax Corp.

Manganese Steel, Special Track Work
Bethlehem Steel Co.

Manganese Steel Switches Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants),

Oil Heaters
Power Specialty Co.

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Packing
Elec. Service Suplies Co.
Westinghouse E. & M. Co.

Paints and Varnishes (Insulating)
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co

Pavement Breakers
Ingersoll-Rand Co.

Paving Brick Vitrified
National Paving Brick Mfrs. Assn.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Pneumatic Tools
Ingersoll-Rand Co. (A. S. Cameron Steam Pump Works)

Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Poles & Ties Treated
Bell Lumber Co.
International Creosoting & Construction Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
International Creosoting & Construction Co.
Southern Cypress Mfrs. Assn.

Poles, Trolley
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

Porcelain Special High Voltage
Lapp Insulator Co., Inc.

Portable Grinders
Buda Company

Potheads
Okonite Co.

Power Houses
American Bridge Co.

Power Saving Devices
National Ry. Appliance Co
Railway Improvement 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-Vehslage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Rail Joint Co.

Rail Joints—Welded
Lorain Steel Co.

Rails, Relaying
Foster Co., L. B.
Hyman-Michaels Co.

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rail Welding
Railway Track-work Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Cells)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Elec. Service Sup. Co.

Resistances
Consolidated Car Heat. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

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

Roofing Car
Pantasote Co., Inc.

Roofs
Haskelite Mfg. Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

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

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.

Seats, Bus
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co. The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

Seating Materials
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Consolidated Car. Heat Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.
Oskel Equipment Co.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
Wood Co., Chas. N.

Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

Slack Adjusters (See Brake Adjusters)

Steel Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Sockets & Receptacles
National Metal Molding Co.

Snow Sweepers, Rattan
Heywood-Wakefield Co

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)
Irvington Varnish & Ins. Co.

Solderless, Connector
Frankel Connector Co.

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steel and Steel Products
Carnegie Steel Co.

Steps, Car
Brill Co., J. G., The
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.
Oskel Equipment Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

Strand
Roebling's Sons Co., J. A.

Straps, Car, Sanitary
Railway Improvement Co.

Subway Boxes
Johns-Pratt Co.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches, Safety
Johns-Pratt Co.

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Tamper Tie
Ingersoll-Rand Co.
Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Elec. Service Supplies Co.

Ties, All-Metal
Metal Safety R. R. Tie Co

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tool Steel
Bethlehem Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Torches, Acetylene (See Cutting Apparatus)

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Grinders
Railway Track-work Co.

Track, Special Work
N. Y. Switch & Crossing Co

Trackless Trolley Cars
Brill Co., J. G., The
St. Louis Car Co.

Track, Special Work
Bethlehem Steel Co.
Buda Company
Columbia Machine Wks. & M. I. Co.
Ramapo Ajax Corp.

Transfer (See Tickets)

Transfer Tables
American Bridge Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety, Stair, Car Step
Morton Mfg. Co.

Trolley Bases
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co
More-Jones Brass & Metal Co.
Ohio Brass Co.

Trolley Shoe
Miller Trolley Shoe Co.

Trolley Wheel Bushings
More-Jones Brass & Metal Co.

Trolley Wheels & Harps
More-Jones Brass & Metal Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Roebling's Sons Co., J. A.

Trucks, Car
Baldwin Locomotive Wks.
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

Tubing, Yellow & Black Flexible Varnish
Irvington Varnish & Ins Co.

Turbines, Steam
Allis-Chalmers Mfg.
General Electric Co.
Westinghouse E. & M. Co

Turbines, Water
Allis-Chalmers Mfg. Co.

Turnstiles
Elec. Service Supplies Co
Perey Mfg. Co., Inc.

Turntables
American Bridge Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Acme Wire Co.
Irvington Varnish & Ins Co.

Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Vitrified Paving Brick
National Paving Brick Assn

Welded Rail Joints
Alumino-Thermic Corp.
Elec. Ry. Improvement Co
Ohio Brass Co.
Railway Track-work Co.

Welders, Portable Electric
Elec. Ry. Improvement Co
Ohio Brass Co.
Railway Track-work Co

Welding Processes and Apparatus
Alumino-Thermic Corp.
Elec. Ry. Improvement Co
General Electric Co.
International Oxygen Co
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co

Welding Steel
Elec. Ry. Improvement Co
Railway Track-work Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Bemis Car Truck Co.
Carnegie Steel Co.

Wheels, Wrought Steel
Carnegie Steel Co

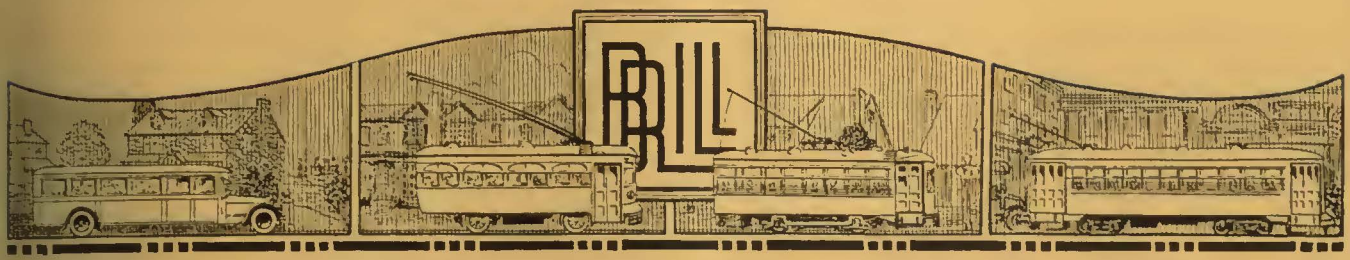
Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.

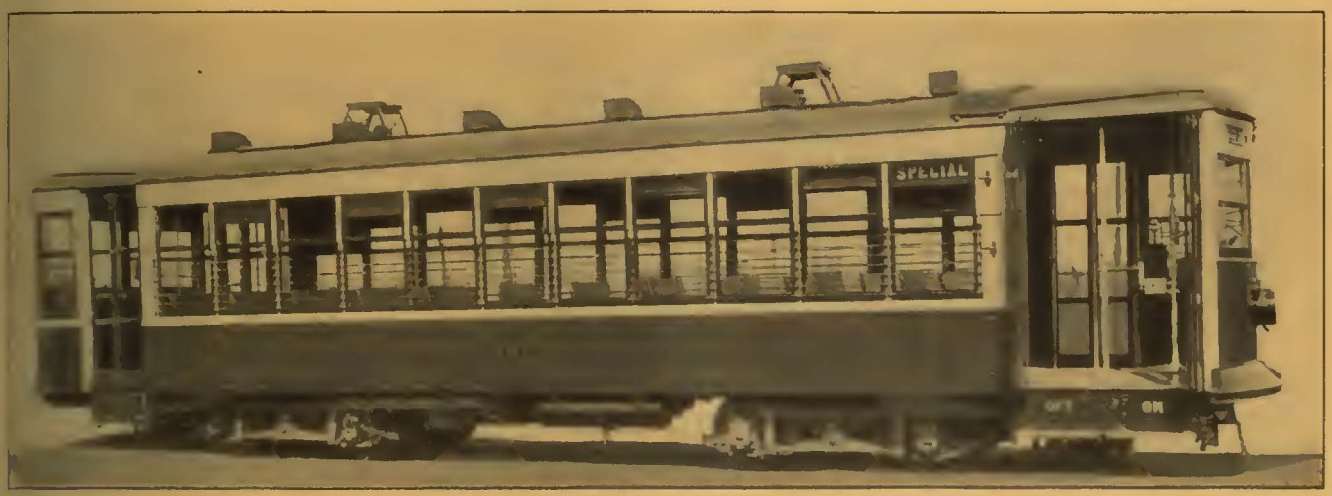
Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Wire Rope
Roebling's Sons Co., J. A

Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Kerite Insulated Wire & Cable Co.
Okonite Co.
Roebling's Sons Co., J. A
Std. Underground Cable Co.
Westinghouse E. & M. Co.

ALPHABETICAL INDEX TO ADVERTISEMENTS





Beaumont Convention Car

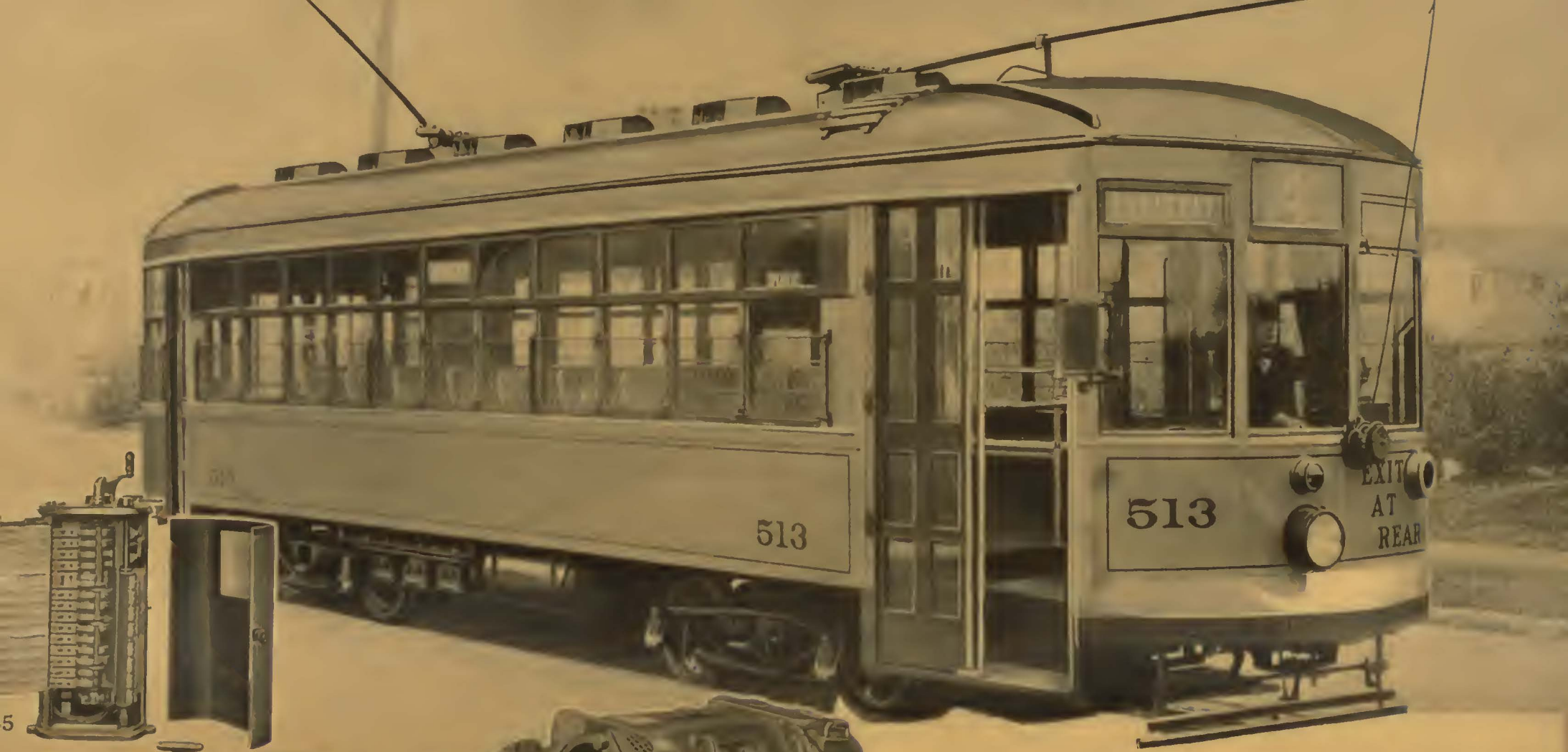
Wins Public Approval

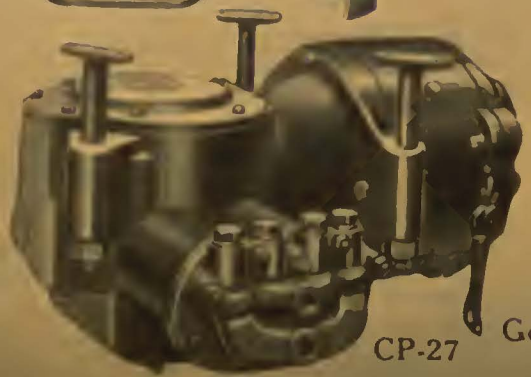
Word comes from Beaumont, Texas, that the seven double-truck Birney Safety Cars recently built at the plant of the American Car Company have received the public's heartiest approval. One car was placed on exhibition in the Interurban terminal in Beaumont and the public given the opportunity to inspect it thoroughly.

This is the same type car shown by us at recent Atlantic City Convention. It measures 40 ft. 1 in. overall, seats 48 passengers and weighs 28,500 lb. complete. Trucks are the Brill 77-E-1 type for low-level light-weight cars.

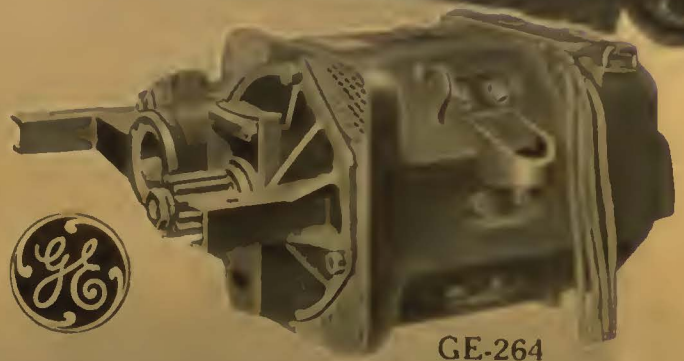
THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST LOUIS MO — G. C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.





CP-27



GE-264

General Electric Company
Schenectady, N. Y.

Lighter Weight in Fort Wayne

Another installation where GE-264 Motors, K-Control with Line Breakers, and CP Compressors are proving successful.

The Indiana Service Corporation, Fort Wayne, has in operation 15 cars, 31,000 lb. complete, with this equipment.