

ELECTRIC RAILWAY JOURNAL



At left—Pennsylvania Avenue, Indianapolis, Ind. Installing Carey Rail Filler.

Below—Carey System of Track Insulation installed in Maryland Street tracks, Indianapolis, Ind.



Indianapolis makes her good streets *better!*

Indianapolis ranks high among her sister cities for unusually good streets.

With the Indianapolis interest in good streets it is natural that in repairing Pennsylvania Avenue and Maryland Street the Carey System of Track Insulation was used.

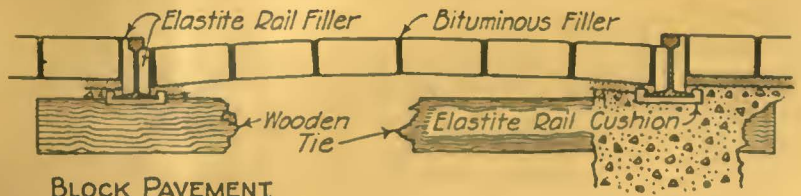
Quiet street car traffic, longer life for tracks and pavements, and a big saving in street and track repairs, are the desirable results.

Send for complete data on the Carey System of Track Insulation.

THE PHILIP CAREY COMPANY
53 Wayne Avenue, Lockland, Cincinnati, Ohio

Carey Elastite

SYSTEM OF TRACK INSULATION



HOUSTON PUBLIC LIBRARY
AND CARNEGIE BRANCH
HOUSTON, TEXAS.

Elastite Rail Filler Is Easy To Install

a tap of a mallet holds it in the web of the rail

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement absorbing traffic-impact, rail vibration and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

The Service Record

of the

St. Clair Tunnel Single-Phase Electric Locomotives



St. Clair Tunnel Electrification (Grand Trunk Railway) Canadian National Railways

Placed in service	1908
Number of motive-power units	6
Ton miles, 1909-1923 inclusive	1,026,190,000
Miles per year per locomotive (Two motive-power units)	34,457
Maintenance per locomotive mile (15 year average)	9 $\frac{1}{4}$ ¢
Delay in traffic, during 15 years, chargeable to Electric Operation	<u>1 Hour</u>

This service record is an example of the performance obtained from Single-Phase, Alternating-Current Equipment



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



Baldwin-Westinghouse

X79703

ELECTRIC RAILWAY JOURNAL

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Associate Editor

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McGRAW-HILL COMPANY, INC.

Tenth Avenue at 36th Street, New York

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Electrical Merchandising
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

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He Hardly Can Wait for It

RECENTLY we wrote to a man who had discontinued his subscription and asked him to give frankly the reason why he did not need the paper any longer. Here is his answer:

DEAR SIR:

The reason I have not requested you to continue my subscription to the JOURNAL is that my company looks after this, having one sent to my office.

I cannot convey to you just how much I like the JOURNAL, but you will realize just what I think of it when I say that I can hardly wait for Mondays to arrive and am much peeved when I have to wait until Tuesday for it.

I appreciate the JOURNAL and could not do without it.

I will ask you to discontinue sending it to my residence as I receive it at my office.

Yours truly,

SUPERINTENDENT OF TRANSPORTATION

So the company as well as the superintendent had realized the value of ELECTRIC RAILWAY JOURNAL to such an extent that it was willing to pay for his subscription so as to keep him informed weekly in the latest developments in his line of work.

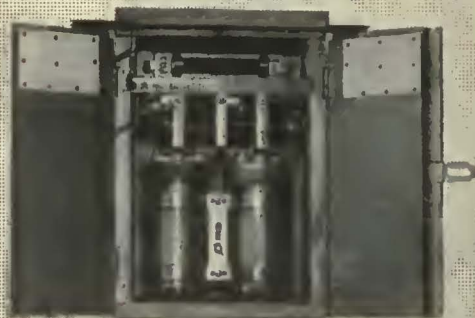
Protect Your Cars; Your Line
and Your Stations with—
Westinghouse Railway Lightning Arresters



MP Arrester, 100-750 Volts



Type K-3
For Voltages up to 1500



Type AR Electrolytic Arrester
For Voltages up to 3800

MP Arrester

This low-priced arrester is adequate for the protection of cars under all ordinary conditions, one to the car and five to the mile of line. It is easy to install and, once installed, requires practically no attention.

The MP arrester has a long life and affords greater freedom of discharge than any other type using series resistance.

For extra severe 600-volt, and all 1200- and 1500-volt service, for car and pole mounting, we recommend the

K-3 Arrester

This is a condenser arrester of high capacity and, like the MP, requires no attention whatever after installation. It stays on the cars the year round, having no liquids to freeze, no moving parts to wear out, and no glass parts to break.

AR Arrester

This is an electrolytic arrester having a high discharge capacity. It is recommended for station service where it can easily be given the required periodic maintenance and is not subjected to freezing temperatures.

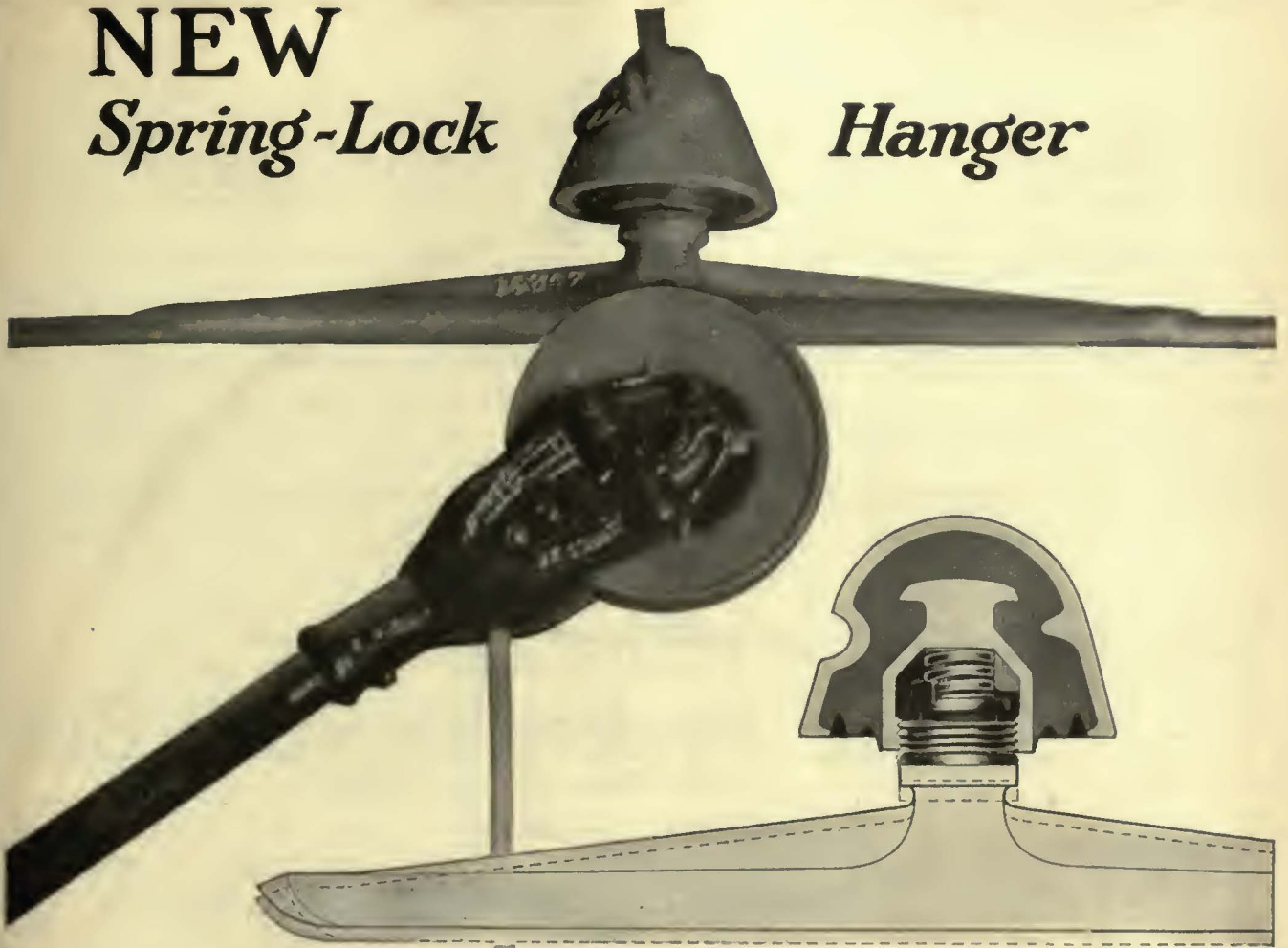
For further details ask for a copy of Descriptive Leaflet 20021.

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



Westinghouse

NEW *Spring-Lock* Hanger



O-B Builds a Shock Absorber

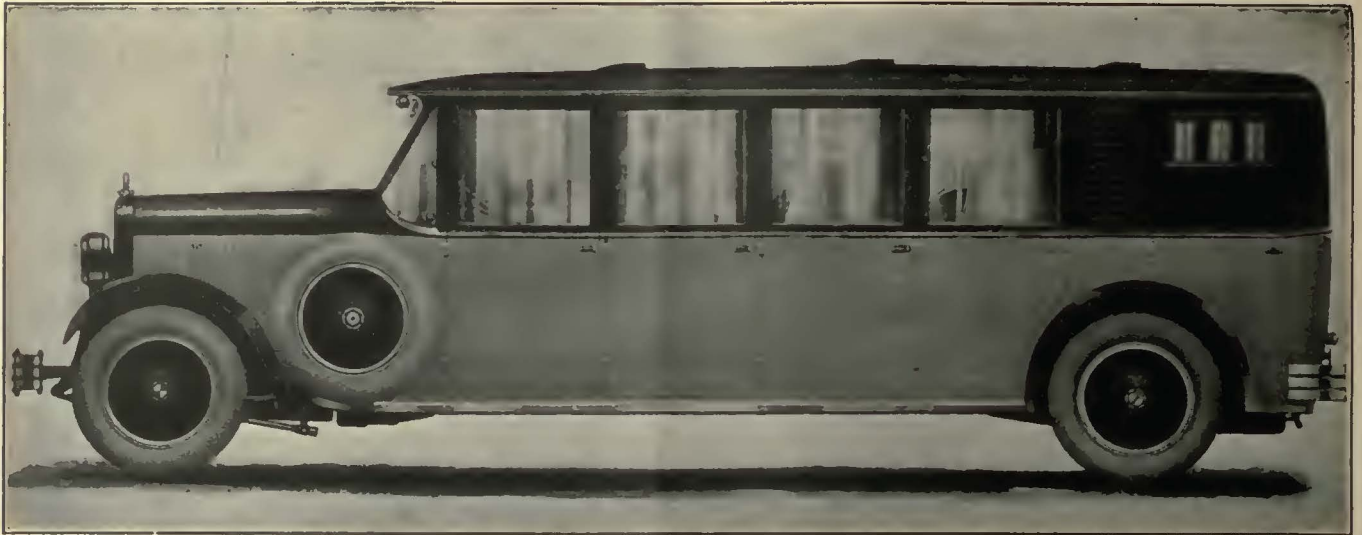
The new O-B Spring-Lock Hanger takes the usual hard spot out of the overhead. It interposes a spring between the ear and hanger that softens the shock from the wheel as it passes under the hanger boss. There is a give to the ear — a resilient action — that cushions the overhead and saves wear of the ear and trolley wheel.

The Spring-Lock is made for span work, as illustrated, or in a barn type.

Let us go into details with you

The Ohio Brass Co.
Mansfield, Ohio

O
B
LINE MATERIAL



Let the car builder put Air Brakes on your Bus



The Automotive Air Brake is completely described in our Publication 9058. A new edition is just off the press. May we send you a copy?

Have those new buses of yours equipped with Westinghouse Automotive Air Brakes at the factory. This will give you a "running start" toward the attainment of a profit-paying business.

Westinghouse Automotive Air Brakes are standard factory equipment on buses built by:

Fageol Motors Co.
(Double-deckers)

International Harvester Co.
Moreland Motor Truck Co.
(Double-deckers)

Newport Coach Co.
Schacht Motor Truck Co.

The Gosome Motor Coach Co.
Capital District Motor Corp.
(Versare Corp.)

and are included as optional factory equipment by:

Acme Motor Truck Co.

Fageol Motors Co.
(Single-deckers)

Federal Motor Truck Co.
Gotfredson Truck Corp.
Garford Motor Truck Co.

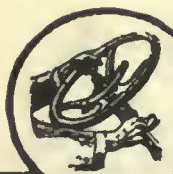
Pierce Arrow Motor Car Co.

The Six Wheel Co.

Yellow Coach Mfg. Co.

Standard Motor Truck Co.
Commerce Motor Truck Co.
International Motor Co.

WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, Wilmerding, Pa.

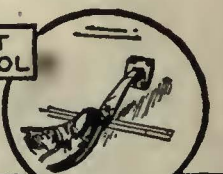


HAND
CONTROL

WESTINGHOUSE

FOOT
CONTROL

Automotive AIR BRAKES





THE FIFTEENTH YEAR

37% More Twin Ties sold than in 1923.

80% Sold to Companies with upwards of 13 years experience with Steel Tie Construction.

20% Sold to new customers.

There is a definite relation between this record year for sales of Steel Twin Ties and Track Costs for initial installation

and maintenance on over 147 properties in the United States and Canada.

While the complete presentation of this data in our book, "Steel Tie Track Construction" is persuasive, it is not dangerous.

Expose yourself to it by directing us to mail it to your office or home.

THE INTERNATIONAL STEEL TIE COMPANY
Cleveland, Ohio

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

FORD TRIBLOC

"SAFETY FIRST" HOISTS —EVERY ONE A TRIBLOC

By resisting the surge and shock of hoisting service in the shop—the strength, safety and smooth action of Ford Triblocs are saving man power and labor hours, and speeding human effort.

Workmen appreciate the advantages of Ford Triblocs—management profits through their use.

A distinguishing feature of all Ford Triblocs—the Patented Loop Hand Chain Guide—permits operation of the hoist from any angle—a decided advantage in machining and assembling operations. It prevents the hand chain from gagging, or over-riding the flange of the hand wheel.

You can instantly recognize a Tribloc by the "Loop Guide"—*it's green.*

May we send you detailed information of other advantages which contribute to the safety, long life, and low maintenance of Ford Triblocs? Just ask for Catalog 6-B.

Capacities $\frac{1}{4}$ ton to 20 tons

FORD CHAIN BLOCK COMPANY

Second and Diamond Sts.

Philadelphia, Penna.

Bulletin 4-G tells about the "EZEEJOIN" shackle that makes chain renewals easy. May we send you a copy?



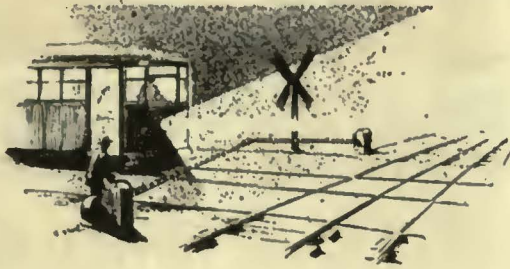
5 to 10 ton

12 to 20 ton

Differential
Hoist

Screw Hoist

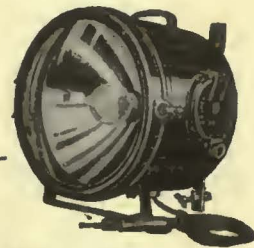
2255-D



There is safety for you in the use of **GOLDEN GLOW HEADLIGHTS**

In the dusk of falling twilight or the mists of early dawn, in the darkest night, through storm, fog or smoke, Golden Glow cuts a pathway of brilliant light. Obstructions on the track, dangerous grade-crossings, other vehicles, animals or persons in its path are thrown into clear relief for the motorman to see. *But*—in spite of its intense illumination, penetrating as it is, the Golden Glow beam is not blinding or dazzling. The peculiar greenish-yellow glass reflector absorbs the violet rays and softens the light.

Choose a Golden Glow Headlight to suit your requirements. Consult ESSCO Catalog No. 7 for various types and sizes.



Some other items from the long list of Keystone Car Equipment.

Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
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Peerless Armature Machines
Insulating Materials
Cass Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards

ELECTRIC SERVICE SUPPLIES Co.

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HASKELITE

and PLYMETL

Have revolutionized car building

A new and better type of car has been developing year by year following the introduction of HASKELITE and PLYMETL into this field. Passenger comfort, better appearance, lighter weight, lowered operating and maintenance costs are among the benefits resulting from their use.

THE superior advantages of HASKELITE and PLYMETL have impressed themselves upon car designers and engineers so that a new type of construction has resulted. Perhaps the highest development in this field is represented by the cars being placed in service on the lines operated by Day & Zimmermann, Inc. in Ohio and Pennsylvania. Two examples are shown on this page. Large sections of HASKELITE form the roofs, reinforced by a special form of pressed steel carline. No ceiling or headlining is required, the under surface of the roof being given a high character enamel finish.

PLYMETL side panels and letter boards are used, and the insulating value of this is such that no inner linings are needed. By the replacing of heavy lumber roofs, and sheet steel sides, several hundred pounds are saved in the weight of an average double truck car, reducing the operating expense \$50 or more per year.

Our Engineering Department will welcome an opportunity to discuss the application of HASKELITE and PLYMETL to your building or repair requirements.



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



New cars built by J. G. Brill Co. for the York Railways, York, Pa., operated by Day & Zimmermann, Inc. This is probably the highest development at the present time, of the "HASKELITE-PLYMETL" car.

One of twenty single truck cars built by G. C. Kuhlman Co., for the Columbus, Newark and Zanesville Electric Co., for use in Zanesville, Ohio. Operated by Day & Zimmermann, Inc. HASKELITE roofs and PLYMETL side panels are distinctive features.





TREADLE-OPERATED REAR-EXIT DOOR



The Dallas Railway Company has installed a number of treadle-operated doors in their double-truck one-man cars. This arrangement has proven so satisfactory that they hope to have, in a short time, not less than 100 cars so equipped. This exit door is opened by the passenger stepping on the treadle which is placed in front of the door inside the rear platform.

NATIONAL PNEUMATIC COMPANY

Executive Office, 50 Church Street, New York

General Works, Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building



Two of 44 busses owned and operated by the United Electric Railways Company, of Providence, R. I. The entire fleet is 100% General Cord equipped.



Puts 44 busses on Generals to get the lowest possible tire cost per mile

The cost sheets of the United Electric Railways Company, of Providence, R. I., explain why the management recently standardized on General Cords for its entire fleet of 44 busses.

Written there in black and white is the dollars-and-cents record of General Cord performance alongside tires of other makes—more profit-earning miles, greater comfort for passengers, lower operating costs per bus.

Riding on less inflation—and

with less internal wear—Generals cushion the bus against the jolts and jars of the road, hence virtually eliminate costly lay-ups for repairs.

General's unusually low rolling-resistance assures a tremendous saving in power and gasoline consumption, and the lowest possible cost of operation.

Small wonder fleet operators everywhere are swinging to the tire that "goes a long way to make friends."



The

GENERAL

CORD

—goes a long way to make friends

BUILT IN AKRON, OHIO, BY THE GENERAL TIRE AND RUBBER COMPANY

Seats—for 55 passengers!

**FIFTH
AVENUE
BUSES**
(Type L)
with
Adjustable
All-Weather
One-Man
Tops



With top closed in

Summer and Winter

Full Seating Capacity is Always Available

IT'S only the work of a few moments to convert the open air upper-deck to a protected, fully enclosed compartment.

Capitalize on the public's liking for the open-air ride in fair weather. At the first signs of a shower your bus operators can adjust the all-weather top, raise the drop sashes, and in a few moments the upper-deck is enclosed, protected and warm, its full seating capacity still available. Our traffic studies have shown that passengers use enclosed upper deck as freely in winter as they do the open upper deck in summer.

A 55-seated passenger vehicle, occupying only 3.4 sq.ft. of street area per seat, is the solution of the transportation problem in crowded city streets.

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

No. 3 of a series showing
the utility of Mack Buses
during non-peak hours



M. Miller


 1900 1925
 For a full quarter
 century Mack interests
 have been centered
 on the
 manufacture of
 transport vehicles



atre Parties

HOW often does it happen that residents in an outlying community find it almost impossible to go to a theatre in town because of the lack of any adequate transportation after about eight o'clock in the evening?

And how popular would be the inauguration of a luxurious Mack Bus "theatre service" with one or more buses leaving outlying sections in the early evening and returning when theatres are out?

Such service, profitably operated at a special round-trip fare, helps keep the buses on the road, and earning profits, when lack of traffic in non-peak hours might necessitate temporary laying off. And what is equally important—builds up goodwill for the railway among the

more substantial residents of the community.

Use Mack Buses—built for passenger comfort and attractive appearance as well as sound practical utility.

The Mack bus is all bus. Its chassis, its powerful improved engine, its wide front axle and dual reduction rear axle, its transmission—every factor is planned to contribute to efficiency of bus operation.

Let Mack bus men work with you on your transportation problems and give you the benefit of their experience.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

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

The Mack Bus



Sedan Type Bus

Performance counts!



Car Inspection Dials on Power-Saving Railway Meter.

There is no mystery about Power Saving with Economy Meters.

Meter The Energy—

CLEVELAND

orders

1076 Economy Meters

Every passenger motor car operated by the Cleveland R'way Company will be equipped with an ECONOMY Meter with power-saving and car-inspection dials. This notable purchase follows a thorough investigation of power-saving devices.

Energy input is the correct measure of the relative efficiency of different men operating under similar conditions. The motorman has faith in a meter because with it he can prove that good operation gives him a good record and poor operation a poor record, in actual energy consumption. This power-saving device actually tells the motorman and the management whether power has been saved or wasted, and how much.

That, in brief, is the underlying reason for the success of the ECONOMY Meter.

The ECONOMY "Power-saving" and Car Inspection Meter provides a method that accurately and automatically shows the car inspection interval. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much

work the car has done previous to the failure. All this without any clerical labor.

The ECONOMY Meter is a rugged device which requires remarkably little maintenance. Its principal element is also produced for central station and general metering. For this purpose more than 500,000 have been built. It is a standardized product, easy to maintain on a railroad at a cost averaging less than \$2.00 per year, per meter.

More than two hundred street or interurban railways are equipped and the saving resulting has more than wiped off the capital charges plus operating expenses of the meters in the first year.

The records from ECONOMY Meters are of high value for managerial and engineering purposes.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago

General Sales Agents

Sangamo Economy Meters
The Air Rectifier

The Aluminum Field Coils
Economy Track Greaser

District Agents for

Peter Smith Heaters
Miller Trolley Shoes

Woods Fare Boxes
Chausse Kerosene Torch
Bemis Boyerized Truck Specialties

That's What You Want To Save!



Human Reasons Behind Garford Excellence

In the mind of the man who really knows commercial cars, Garford Trucks and Coaches occupy a decidedly distinctive place. They have been put there by a definite creative policy pursued consistently for twenty-two years.

We have compiled into an attractive book some interesting and illuminating stories about the men in whose hands rest the administration and development of this policy. Reading this book will give you a better understanding than you've ever had

before of the reasons behind Garford solidity and permanency.

And you will realize better why it is that users who own, and dealers who handle, Garford Trucks and Coaches evince but little interest when someone talks about other similar vehicles at a lower first cost

This advertisement is printed as a cordial invitation for you to ask us—on your business stationery, please—for our book, "Behind the Garford." You'll find it well worth while.

Buses
15 to 35
Passengers

GARFORD

Trucks
1 to 7½
Tons

Beginning in 1902, Garford is now among the eight companies manufacturing 78% of the bona-fide trucks
THE GARFORD MOTOR TRUCK COMPANY, LIMA, OHIO

BUILDING TODAY FOR TOMORROW'S REQUIREMENTS



Galena Brake Cylinder Lubricant

A special grease for a special use

AIR BRAKE lubrication has peculiarities all its own.

After years of study of these conditions Galena developed a special lubricant to meet them. It has these characteristics:

1. The highest melting point yet reached in this class of lubricant.
2. An even texture that permits free action of pistons while

maintaining a perfect seal of compression.

3. A persisting body that resists the wiping action of the brake cylinder.
4. A spreading power that makes Galena Brake Cylinder Lubricant cover more surface and thereby reduce lubricating costs.

Whether or not you are standardizing on Galena Products, try this Brake Cylinder Lubricant.



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities





RAILWAY AND MINE HAULAGE MOTORS
FIELD COILS FOR TYPE GE MOTORS

Motor	Volts	Amps	Speed	Coil	Resistance	Inductance	Capacitance	Notes
E 234	440	60	1150	1	1.5	0.001		
E 234	440	60	1150	2	1.5	0.001		
E 234	440	60	1150	3	1.5	0.001		
E 234	440	60	1150	4	1.5	0.001		
E 234	440	60	1150	5	1.5	0.001		
E 234	440	60	1150	6	1.5	0.001		
E 234	440	60	1150	7	1.5	0.001		
E 234	440	60	1150	8	1.5	0.001		
E 234	440	60	1150	9	1.5	0.001		
E 234	440	60	1150	10	1.5	0.001		
E 234	440	60	1150	11	1.5	0.001		
E 234	440	60	1150	12	1.5	0.001		
E 234	440	60	1150	13	1.5	0.001		
E 234	440	60	1150	14	1.5	0.001		
E 234	440	60	1150	15	1.5	0.001		
E 234	440	60	1150	16	1.5	0.001		
E 234	440	60	1150	17	1.5	0.001		
E 234	440	60	1150	18	1.5	0.001		
E 234	440	60	1150	19	1.5	0.001		
E 234	440	60	1150	20	1.5	0.001		

The best field coil is a new field coil

Sometimes it is cheaper and better to renew entirely than to make repairs. Maintaining field coils is a case in point.

Take G-E Coils for instance. They are filled with an asphaltum compound by the vacuum pressure process; the compound so penetrates the winding that it seals the coil against the entrance of moisture. improves its thermal conductivity and greatly increases its capacity.

Our factory facilities are being enlarged to meet the increasing demand.

Your Text Book on Equipment Standards



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



GENERAL ELECTRIC

Electric Railway Journal

Consolidation of *Street Railway Journal* and *Electric Railway Review*

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65

New York, Saturday, February 14, 1925

Number 7

Every Company Should Enter the Coffin Prize Contest

FOR the third time the invitation has been issued to the electric railways of the United States to compete for the Coffin Prize. This contest, which is one of several instituted by the Charles A. Coffin Foundation, has as its chief object the stimulation of progress by electric railways. In the past two years successful competitions have been held in which not only the prize winners but the other contestants have shown the great amount of improvement, material and financial, that could be made in electric railway operation, often under what appeared to be adverse conditions.

The best practices of and results obtained by the companies that competed in the two previous contests have been published in considerable detail in the *ELECTRIC RAILWAY JOURNAL*. The American Electric Railway Association itself collected similar material from the 1923 competition in an attractive book which has had wide circulation among electric railways. It is now preparing a similar book based on the 1924 contest.

With such examples before them it would seem that it is not only the privilege but the duty of every electric railway management to take all steps possible to secure similar improvements. And having embarked on a modernization program, it is a further duty to publish to the industry the results that have been obtained and the methods through which they have been achieved. There is no better way of accomplishing this than by entering the Coffin Prize contest.

Some managements have refrained from entering these contests because of a feeling that there was no one in the organization with time and ability to prepare a brief.

In order to make a creditable showing it is neither necessary that a railway go to great expense to collect data nor engage the services of a professional writer to present them. Any railway man with fairly broad experience ought to be able to give in simple language a good description of the noteworthy things his company is doing.

Let every railway, large or small, get together its list of achievements and submit them in this year's competition.

A Practical Scheme for Starting Educational Work

ONE of the convincing signs that electric railways have come back is their increasing interest in vocational training of employees. Only industries which are firmly established and are looking forward to larger opportunities and responsibilities are interested in education. Any railway manager will assent to the value of mental training. As a family head he wants it for his children; as a utility head, for his staff. But,

generally speaking, managers are not educators; they do not know how to start instructional work. They ought to be helped in this direction by the experience of the Boston Elevated Railway this season, as described in an article in this issue. On that property, under the personal direction of General Manager Edward Dana, five series of "departmental group conferences" are being held with remarkable results as to attendance and spirit.

The plan is not radically new. That is one of its best features, as it utilizes methods that have proved out in practice. It is merely a systematizing and amplifying of conferences such as all progressive railways hold from time to time. The *ELECTRIC RAILWAY JOURNAL* believes that other railways would profit by following this plan as a foundation for later, more intensive, educational work.

New York Transit Situation Has Been Clarified

JUDGE McAVOY'S report on the New York transit situation clears away the fog of misunderstanding that has existed for years. It puts the blame for the existing rapid transit status where it belongs, and it pillories the Mayor as a subject for the scorn and the contempt of his fellow citizens. Had the McAvoy report been made as the result of hearings by a legislative committee, it would not have possessed anywhere near the influence which it now has. The present Legislature of New York is Republican, and a report by a bipartisan investigating committee would have been open to the charge of bias. But the McAvoy report is by a Democratic Judge to a Democratic Governor about a Democratic Mayor, and it is a Democratic administration which is so strongly criticised in the statement just made public.

Baiting of street railways has been a popular political pastime ever since there have been such railways. The baiting has differed in degree but not in kind. In this respect the situation in New York under the Hylan régime is not unique. It is unique, however, in the ferocity of the attacks upon the companies and in the consequences that have followed to the general public in the impairment of the services rendered to them. Many other instances will occur to railway men of demagogues who have bid for popular support by attacks on local transit systems. In some of these instances, political preferment has been gained—for a time. The ultimate result, however, has always been the same—final acceptance by the public at large that oppression of its transportation utility is a public injury. When that fact comes to be realized, the rejection of the politician who advocates persecution follows quickly. This is the result that may reasonably be expected to follow in the wake of the so-called McAvoy report in regard to the responsibility for the failure to

supply transit relief. In fact, this is the result that will follow in New York City unless that city is politically degenerate beyond belief.

McAvoy Report Is Essentially Constructive

SO MUCH for the political aspects of the matter. There is, however, an entirely different side to the report. This is the constructive side. The judge's duty was, of course, to fix the responsibility. This he certainly has done, but in so doing he has found it expedient to make suggestions for the future. They are necessarily a by-product, but they are significant. Many of these suggestions have for their purpose the correction of things obvious even to the casual observer. Now the weight of unbiased authority has been added to them. The constructive recommendations include suggestions that the 14th Street and the Ashland Place link should be completed by the city with all possible speed; that subway platforms be lengthened to accommodate 10-car trains on the Interborough and eight-car trains on the Brooklyn-Manhattan system; that the Nassau Street loop be built at once; that more trains be run in the non-rush hours, and that more guards be employed in train operation. These are only some of the things. For many of them the railways have been persistent advocates. Very few of them are within the powers of the companies to correct themselves without the co-operation of the city. As for the suggestion of additional guards, there is no benefit to any one in having a train overmanned. Reduced service in non-rush hours was imposed largely by the lack of shop facilities.

But all the shortcomings for which the companies can reasonably be held to be accountable are insignificant compared with the indictment of the Mayor and the Board of Estimate for their repeated and persistent refusals to validate new routes and to approve construction contracts and by so doing frustrate provisions for increasing transit facilities. On the very few counts made against them the railways have now obtained a clear-cut statement of how the matter appears to the unbiased outsider. They will miss a great opportunity if they do not set to work at once to correct these minor omissions and then do not capitalize the improvement by going before the public and making it plain to it wherein they have sought to do their part. It is a fact that the Transit Commission and the companies themselves were not held to be entirely blameless, but as the *New York Times* has so aptly pointed out, all the things for which they are held to be remiss are only trifles compared with the way in which Mayor Hylan has thrown himself athwart rapid transit progress. As for the Mayor's pet schemes of bus operation and the construction of the freight tunnel to Staten Island, they are both severely condemned by Judge McAvoy as now sought to be carried out.

Possibilities of broad relief for the future remain to be determined. An extension of the city's borrowing powers for the construction of additional subways, even if such a measure had smooth sailing, would take several years, and if the city had this additional borrowing power it might easily devote the money to the recapture of the existing lines. In that case the public, with municipal operation, would undoubtedly be

far worse off as regards transit than at present. The precedent in other cities indicates that the logical step is some form of fare increase to attract capital, but no one in public office yet has dared to indorse such a plan. Until some one in authority has the courage to advocate that the lines be placed on a self-supporting basis, the outlook for any great expansion of New York's rapid transit systems is poor.

Specifying \$10,000,000 Purchases of Special Trackwork

THE use of standard specifications for the purchase of materials has taken great strides in the last decade. The work of such bodies as the American Society for Testing Materials, the American Railway Engineering Association and the American Electric Railway Engineering Association in the preparation of specifications for various materials has had a marked influence in propagating the use of standard specifications.

Such specifications, if adequate, are of benefit both to seller and purchaser. There is little need to emphasize this. But there may well be a need for pointing out to the industry that it will be amply repaid if it will see to it that those charged with the purchase of special trackwork shall apply the several specifications of the Engineering Association covering their requirements.

To a certain extent, it appears, the method of specification at present consists in telling some manufacturer that a crossover, for instance, is wanted, made of girder rail and of hard center construction and that it is needed "yesterday." The manufacturer is left to his own devices as to many important details. It is a tribute to him to say that he usually furnishes satisfactory material, largely on his honor.

Without adequate, verified data but with some study given the subject, it is judged that the industry normally purchases special trackwork renewals to the value of more than \$10,000,000 yearly. If this purchase were all made by one company the standard specifications certainly would be applied and the material would also be most carefully inspected at the mill.

It was to cover the diversified purchases by many companies that the Engineering Association adopted its special trackwork specifications. When the aggregate of individual purchases is contemplated, there can be no doubt as to the wisdom of making purchases under them.

The matter of inspection, however, is rather difficult since competent service by inspecting firms is believed to be somewhat rare. This may be due, in large measure, to the quite general failure of the industry to require shop inspection of special work before shipment. A reasonable demand for such service would soon develop a reliable supply, and some recent observations indicate the growth of a real need for adequate shop inspection. The word adequate is used advisedly. No shop will object to competent inspection, but the incompetent work of an inspector is justly disliked by the producer and, in the end, is apt to react against the purchaser. No inspection can be adequate without proper specifications. The latter are available and the industry should see that they are used. The former is available to some extent, and fair, adequate inspection services can be developed, once the need is apparent.

Transporting Workers in Washington

Sharp Traffic Peaks Caused by the Simultaneous Opening and Closing of Many Government Offices Are a Serious Problem—Long-Haul Business Has Been Increasing with the Expansion of the City—Buses Are Used Extensively in Outlying Districts

By John A. Miller, Jr.

Associate Editor ELECTRIC RAILWAY JOURNAL



When the Employees Are Leaving the Government Offices at 4:30 P.M. a 20-Second Headway Is Required on Pennsylvania Avenue to Handle the Traffic

ELECTRIC railway operation in the city of Washington is carried on under conditions that differ in many respects from those encountered elsewhere in the United States. Washington, which now is co-extensive with the District of Columbia, is not an industrial city, nor is it to any considerable extent a commercial city. Its chief activities are all connected with the federal government. It is said that approximately 90 per cent of the people using the street railways in the District are government employees. As nearly all of the governmental offices open simultaneously at 9 o'clock and close at 4:30, two extremely sharp traffic peaks are produced. The sharpness of the peaks is accentuated by the lack of early morning and late afternoon industrial workers.

Washington, being the capital city and attracting many visitors, is one of the show places of the entire country. Constant effort is being made to beautify it, and the railways spare no expense to conform to all plans for civic improvement. To eliminate poles and wires from the streets the underground conduit system is in use in the central portion of the city in preference to the overhead trolley. This, of course, makes construction and maintenance more expensive for the railways.

On the other hand, according to President Coolidge's recent statement at the budget meeting the average salary of government employees is something less than \$1,800 a year. Although this may necessitate many of

these people riding in street cars instead of in their own automobiles, it also causes them to favor the lowest possible street car fare. The problem of the companies, therefore, is to keep the quality of service as high as is demanded by the special situation in Washington, while keeping the rate of fare down to a minimum.

A third unusual phase of the railway situation in Washington is the existence of two large independent companies. The Washington Railway & Electric Company, with about 500 passenger cars and approximately 173 miles of track, is somewhat larger than the Capital Traction Company, which operates 350 cars on about 64 miles of track. The annual gross revenue of the latter is slightly under \$5,000,000, while that of the former is about 30 per cent larger. Both companies are engaged in bus operation, but the activities of the Washington Railway & Electric Company are at present somewhat the more extensive. Three other electric railways connect Washington with surrounding towns, but they fill no important rôle in local transportation.

CAPITAL TRACTION COMPANY HANDLES MUCH SHORT-HAUL TRAFFIC

Speaking generally, the Capital Traction Company has been carrying more short-haul traffic and has been faced by a more serious problem of rush-hour congestion than has the Washington Railway & Electric Company. The principal lines of the former are on 14th

Street and Pennsylvania Avenue. The routes are shown in detail on the accompanying map.

Probably the point of most serious traffic congestion in the city is the intersection of Pennsylvania and New York Avenues at 15th Street. Through this bottle neck the Capital Traction Company operates the greater part of its service. At this point the 14th Street and the Pennsylvania Avenue routes of the Capital Traction

sengers in the non-rush hours, and during the rush hour 100 passengers per 100 seats plus 1 passenger for every 7 sq.ft. of standing area in the car. From the point of view of passenger comfort, this ruling is liberal. It is claimed, however, that to insure seats for all, when the passengers present themselves at irregular times, more seats must be provided than for the actual number of people carried in the cars. It may be noted that the average carrying value in every 15-minute period of the check tabulated here was greater than the average number of passengers on the cars during this period.

Illustrating the severity of the peak condition, throughout the day the average number of cars passing 14th and K Streets in a 15-minute period is fewer than 10, whereas during the maximum period shown in the table it was 43. That means an average headway of approximately 20 seconds. When a United States Senator recently complained of inadequate service on 14th Street, it was pointed out that the present service practically equals the track capacity during the rush hour. In fact, it is said that on account of the continuous stream of cars going north and south there is hardly sufficient time for the movement of east and west traffic.

The headways on Pennsylvania Avenue are nearly as short as those on 14th Street. An accompanying illustration shows the afternoon rush-hour condition on the avenue at the time when the government workers are leaving their offices on their way home. Traffic congestion on Pennsylvania Avenue itself is not particularly bad, as the street is straight and wide between the Capitol and the Treasury. But where the stream of cars meets those from west of the White House and those from 14th Street the congestion is extreme. In fact, it is only because of a special handling of vehicle traffic at 15th Street and New York Avenue that the street cars can be moved without interruption. The wye intersection of the tracks has been roped off so that vehicles cannot enter upon or cross them at this point. Vehicles can proceed east or west, but through traffic on 15th Street is prohibited. Even with this assistance careful supervision is required to get the cars through the intersection without delay. Considerable improvement was effected some little time ago by the relocation of stops and the installation of loading platforms as recommended by John A. Beeler, consulting engineer.

In order to accommodate the people with through service of the kind they have been taught to expect, a very complicated system of interlocking schedules is in effect on the lines of the Capital Traction Company. For example, the time-table specifies that alternate cars going in the direction of Georgetown shall cross the new bridge over the Potomac River to Rosslyn while the rest go to 36th and M Streets, the old terminal. Similarly on 14th Street the schedule distributes out-bound cars among five different terminals. A sample headway sheet for use by a street inspector and reproduced here shows the same thing.

UNIFORM EQUIPMENT FACILITATES ROUTING

The Capital Traction Company is fortunate in having rolling stock that is almost uniform. A standard double-truck, double-end, two-man car was adopted some

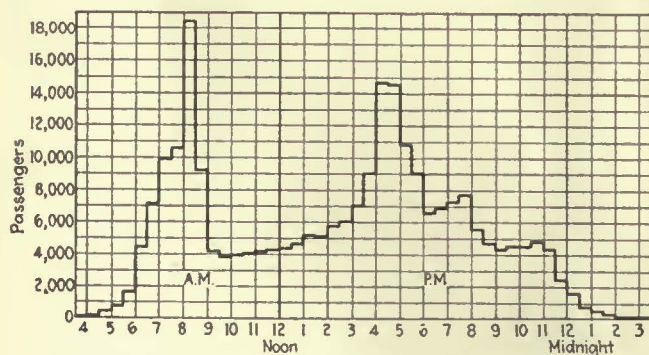
TRAFFIC READINGS—MORNING RUSH, SOUTHBOUND
Location: 14th and K Sts., N. W.

Period Beginning A. M.	Passengers				Carrying Value				Cars			
	First Day	Second Day	Third Day	Average	First Day	Second Day	Third Day	Average	First Day	Second Day	Third Day	Average
6.30	202	264	249	238	377	433	433	414	6	7	7	6.7
6.45	255	245	248	249	417	426	426	423	7	7	7	7.0
7.00	360	289	259	303	489	426	425	447	8	7	7	7.3
7.15	385	369	426	393	480	491	556	509	8	8	9	8.3
7.30	470	503	458	477	547	610	547	568	9	10	9	9.3
7.45	581	566	563	570	749	751	749	750	12	12	12	12.0
8.00	917	786	918	874	1,131	1,012	1,140	1,094	18	16	18	17.3
8.15	1,630	1,817	1,659	1,702	1,703	2,057	1,927	1,896	28	34	32	31.3
8.30	2,128	2,293	2,239	2,220	2,546	2,554	2,449	2,516	43	44	42	43.0
8.45	1,501	1,319	1,434	1,418	1,710	1,382	1,565	1,552	29	23	26	26.0
9.00	536	582	576	565	679	726	724	710	11	12	12	11.7
9.15	401	341	386	376	948	1,015	958	974	16	17	16	16.3
Total.	9,366	9,374	9,415	9,385	11,771	11,883	11,899	11,851	195	197	197	196.3
Avg.	9,385				11,851				196.3			

Weather—First day, clear; second day, cloudy; third day, cloudy.

Company join. Pennsylvania Avenue is no longer the principal traffic artery on the system. Fourteenth Street has for several years exceeded it in volume of business and in cars operated. A good idea of the serious congestion may be obtained from the accompanying table which shows the traffic carried on southbound cars passing 14th and K Streets during the morning rush.

An interesting point in this connection is that the morning peak on the lines of the Capital Traction Company is more severe than that in the afternoon. This is accounted for in large measure by the fact that the government employees must get to work promptly and they all move simultaneously toward the central part of the city where most of the offices are located. They



Total Passengers Carried on All Lines of the Capital Traction Company During a Typical Fair Day

are in less haste to return home and are likely to do some shopping on the way.

Traffic checks are taken several times a year by the time-table department of the railway and the Public Utilities Commission in order properly to adjust service to actual conditions. In parallel columns in the table are shown by 15-minute periods the passengers carried on three successive days and the carrying value of the cars passing the point where the check was taken. This carrying value is established by the Public Utilities Commission on the basis of 125 seats per 100 pas-



Car and Bus Lines of the Capital Traction Company and the Washington Railway & Electric Company Do Not Duplicate Each Other's Service to Any Considerable Extent. Two Bus Lines Are Jointly Operated

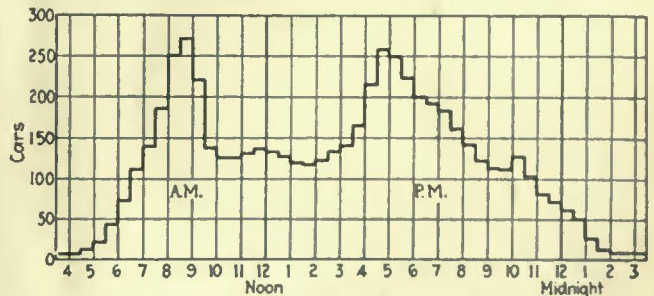
time ago. Except for minor changes this design has been followed in recent purchases. That the cars are so nearly alike is a great help to the time-table department, which is thereby enabled to combine trips from one section of the city with trips to any other section on the same run, and without the necessity of giving special consideration to the type of car. In this connection the roller signs have been arranged to display all destinations on the system.

Every effort is made to have the cars attractive in appearance both inside and out. Even in the latest design of car the monitor roof has been retained because the management feels that there is a certain psychological advantage in making it possible for the passenger actually to see the open ventilators. It is thought that this is largely lost with the arch roof and inconspicuous ventilators. All cars have electric heat. Thermostatic control has recently been installed. Another improvement has been the removal of fenders. At one time a city ordinance required both fenders and life guards, but now the fenders have been done away with and only the life guards are used.

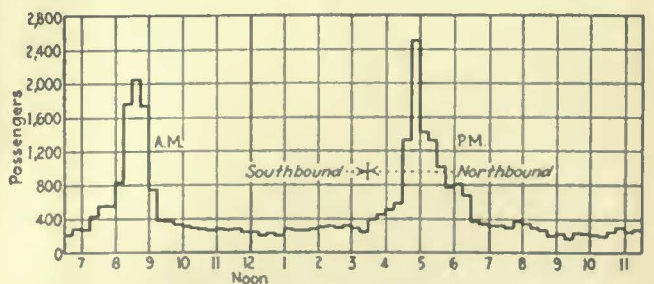
For nearly 30 years the Capital Traction cars have been painted the same color. Variations have occurred in striping and painting of the window posts, etc., but the bright green body color has remained unchanged. An interesting feature of the policy of this company is that there is no definite date when a car is sent to the shop and entirely repainted. On the contrary, small defects are repaired as soon as they are noticed and painting is done whenever and wherever it is needed. Every car is, however, entirely revarnished once a year. A recent change in the headlining color from the former greenish tone to an ivory white has improved the interior appearance. The wood trim is rubbed down and left with a dull finish. This rubbing down is thought to be important because it re-

moves the effect of extreme newness. A passenger does not feel when he gets into a car that has been recently revarnished inside that it is fresh from the paint shop; it simply looks neat and clean and like the other cars of the company.

To reduce the noise of operation the Capital Traction Company is using helical gears with Westinghouse 514-C ventilated motors and American Electric Railway Engineering Association standard axle and journal box assembly. These gears have been in use since 1919 and it is believed by the company's engineers that they are as quiet today as when they were new. Old spur gears are being replaced by helical gears as rapidly as



Cars Operated by 1-Hour Periods During a Typical Day



Traffic Curve at 14th and K Streets

they wear out. The management of this company believes that the helical gears show less wear under the difficult service conditions in Washington than do the spur gears.

Another step which the company has taken in the direction of noise elimination is the use of seam and thermit welded rail joints. The underground conduit construction which is used in Washington has a tendency to exaggerate the noise of car operation, and great care must therefore be taken to eliminate as much rattle and bang as possible. In 1909 this company adopted a standard type of track construction using A.E.R.E.A. 7-in., 122-lb. grooved girder rail, and has adhered to it ever since.

WASHINGTON RAILWAY & ELECTRIC COMPANY OPERATES MANY LONG LINES

The traffic situation facing the Washington Railway & Electric Company differs in many respects from that of the Capital Traction Company. The first-mentioned railway has many long lines where, in the past, the riding has been comparatively light, and which have been operated at a loss.

The remarkable growth of the city during and since the war has resulted in a shifting of the center of population and business to the west and north. New centers have sprung up in the outlying portions of the District and in Maryland, where the Washington Railway & Electric has been running cars for years through sparsely settled territory. Business has shifted to some extent from the lower streets of the city and has invaded sections that were previously strictly residential. This has brought increased traffic to the company, but despite such expansion the traffic density is considerably less than that on the lines of the Capital Traction Company.

Routes of the Washington Railway & Electric Company run out through Georgetown and along the Potomac River to Cabin John Bridge, far out Massachusetts and Wisconsin Avenues to Rockville, north to Forest Glen, and also northeast to Laurel and East Riverdale, Maryland.

Because traffic is light on a number of the company's lines one-man cars are used to good advantage. Experiments have been made with automatic rear-exit doors on two of such cars, as told in this paper for Aug. 30, 1924. To differentiate them from the other one-man cars, the dashers of the automatic-door cars have been painted yellow. Some objection has been made to the operation of street cars in Washington by

only one man and the whole subject is under general discussion.

Not all of the lines, however, are light-traffic suburban routes. The Mount Pleasant line operates out Connecticut Avenue to Columbia Heights through one of the most rapidly growing portions of the city and has extremely heavy riding. Moreover, the character of the population in this section is such that scrupulous attention must be paid at all times to the quality of service. When snowstorms occur, as happens occasionally in Washington, this is one of the first lines on which the railway operates its plows and sweepers. In spite of the unusually difficult weather conditions the present winter, with snowstorms that were said to be of greater severity than occurred for many years, all the city lines were kept open. Riding on the Ninth Street line is also very heavy now due to the increase in population in the Georgia Avenue neighborhood.

In May, 1922, the Washington Railway & Electric Company first undertook bus operation on a line between Mount Pleasant and Petworth connecting three of its car lines, Mount Pleasant, 11th Street and Georgia Avenue. Since that time the company has added bus service to Rock Creek Park, to Potomac Park, in the eastern portion of the city to serve the new Eastern High School and at the terminus of its Congress Heights line in Maryland. Rail service on Bladensburg Road to Riverdale has been replaced by bus service with the consent of the people there and with the approval of the Public Service Commission of Maryland. The Washington Railway & Electric Company is at present operating 23 buses. Permission has been asked to operate on a new crosstown line. If the permit is granted the company plans to purchase five new six-wheel buses to operate on this route.

BOTH COMPANIES ARE USING BUSES

Two bus lines are operated jointly by the Washington Railway & Electric Company and the Capital Traction Company. These are the Woodley Road and Southwest routes. No boulevard bus service is now being operated by either railway. A service having some such characteristics, however, is operated on 16th Street by an independent concern, the Washington Rapid Transit Company. The Capital Traction Company has a number of feeder lines of its own in addition to the joint routes. The locations of the various bus lines are shown on the accompanying map.

Efforts are being made in certain quarters to have all future bus operation under separate control rather than in the hands of the railways. This issue is acute at the moment in connection with a proposed crosstown bus line. Both the Rapid Transit company and the Washington Railway & Electric Company desire to operate this route. It is thought by experienced transportation men that separate control of bus and railway service in Washington would be particularly undesirable because of the sharpness of the traffic peaks already described. The number of passengers to be carried during the rush hour is so much greater than during the rest of the day that none but a large and well-organized transportation agency could possibly provide adequate facilities. Buses under the control of the railways and operated in conjunction with their cars are much more likely to fit in with the general transportation system than are privately owned buses. The agitation in favor of separate ownership, therefore, appears to be a move in the wrong direction.

Southbound on 14th Street in A.M. Rush—Weekday—1-19-25

Run No	Takoma	14th & Colo	14th & Dec.	14th & Park	14th & U Sts.	For
272	—	8-08 ²	8-11	8-17	8-22 ²	USta
291	—	—	—	8-17 ²	8-23	PP
73	—	—	8-11 ²	8-17 ²	8-23	P Mt.
5	—	—	8-12	8-18	8-23 ²	8 & F
16	—	—	8-12	8-18 ²	8-23 ²	USta.
274	—	8-10	8-12 ²	8-18 ²	8-24	Gtn
522	—	—	—	8-19	8-24 ²	N.Yd.
67	Train	—	8-13	8-19	8-24 ²	PP.
64	—	—	8-13 ²	8-19 ²	8-25	USta.
292	—	—	—	8-20	8-25 ²	26 & G
239	—	—	8-15 ²	8-21 ²	8-27	PP.
58	—	8-13 ²	8-16	8-22	8-27 ²	N.Yd.
259	—	—	—	8-22 ²	8-28	PP.
40	—	—	—	8-17	8-23	C & L
43	—	—	—	8-17	8-23	USta.
252	—	8-02	8-17 ²	8-23 ²	8-29	P Mt.
543	—	—	—	8-24	8-29 ²	N.Yd.
404	7-59	8-15 ²	8-18	8-24	8-29 ²	N.Yd.
293	—	—	—	8-24 ²	8-30	USta.
268	—	8-16	8-18 ²	8-24 ²	8-30	USta.
7	—	—	8-19	8-25	8-30 ²	PP.
6	—	8-17	8-19 ²	8-25 ²	8-31	8 & F
266	—	—	—	8-26	8-31 ²	Ross
51	8-02	8-18	8-20 ²	8-26 ²	8-32	N.Yd.
544	—	—	8-21	8-27	8-32 ²	N.Yd.

Street Inspectors' Headway Sheet
 U Sta = Union Station
 P P = Potomac Park
 P Mt = Peace Monument
 8 & F = Eighth and F Streets
 Gtn = Georgetown
 N Yd = Navy Yard
 26 & G = Twenty-sixth and G Streets
 C & L = Capitol and Library
 Und-wd = Underwood
 Ross = Rosslyn

Efforts have been made from time to time, not only by local people but by Congress, to compel the amalgamation of the Capital Traction Company and the Washington Railway & Electric Company into a single organization. Just at present such a combination is definitely forbidden by law, but a bill is under consideration in Congress to permit a voluntary merger. It is proposed, moreover, by some of those who favor amalgamation, that the companies should be forced to combine if they fail to take advantage of the permission contained in the proposed bill.

Just how much good would result from a combination is problematical. It has been said that transfer facilities would be improved and operating economies made possible. There is undoubtedly some merit in the first of these contentions. As to the second, it would be possible to make operating economies now if the railways were permitted to reroute their cars and discontinue some of the more complicated through trips which they now make. The public, however, is opposed to any such plan now and probably would be opposed to a similar plan resulting from the combination of the companies.

At present there is little duplication of service by the two companies. In fact, the 16th Street bus line of the Washington Rapid Transit Company is a more outstanding example of duplication of service than can be found on the railways in Washington. It is curious that the people who appear strongly to favor combination of the railways favor also the separation of control of the railway and bus systems.

Headway Recorders Show Crossing Delays

The Time of Each Car Is Indicated at Points on Both Sides of the Railroad Right-of-Way, and Any Delays Due to Blockades Are Thus Indicated

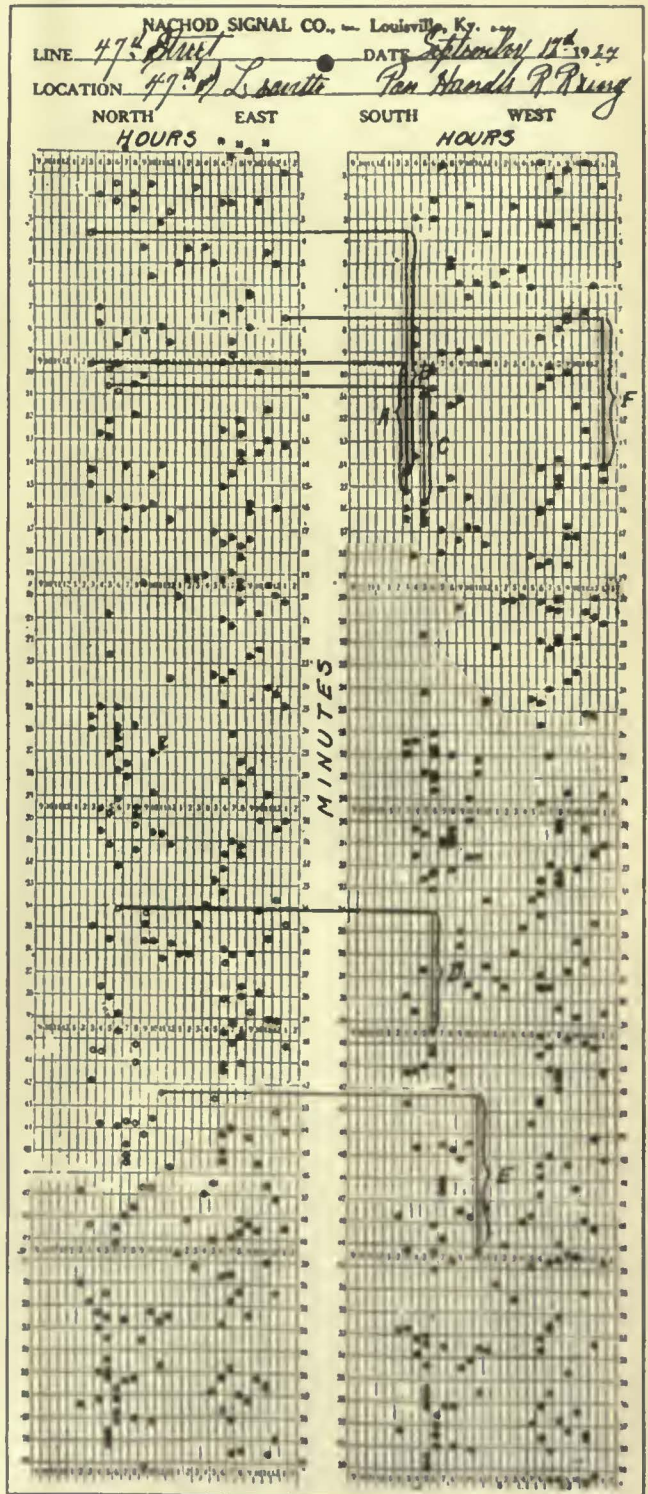
AN INTERESTING use of Nachod headway recorders is that on the Chicago Surface Lines for checking delays to street car service caused by blockades at steam railroad crossings. A time limit for railroad switching operations at crossings has been established by city ordinances. The recorders are used to make a permanent record of the time taken by each car in getting across the railroad right-of-way, and the exact time and duration of delays are thus brought to light.

The form of record obtained is shown in the accompanying illustration. This chart is divided into two parts, on one of which is indicated the time on one side of the crossing, while the second gives the time on the other side. The instrument is mounted on one track only of a double-track line, it being assumed that any serious delay will show up in the record obtained for the one track.

Heavy black lines have been drawn horizontally, and the time intervals in minutes, where delays occurred, are shown by brackets, marked A, B, C, etc. The delay marked E will serve as an illustration of the use of the chart. In this case a car arrived at the east side of the crossing at the time indicated by the small circle on the extreme left end of the heavy horizontal line. The vertical column indicates that this was during the hour of 11 and the horizontal lines show the time to be slightly less than 11:42½. The first circle in the corresponding vertical column on the right side of the

chart, after 11:42½, gives the time this car arrived on the opposite side of the crossing. As shown on the chart at the bottom of the bracket E, this was at about 11:49½, indicating a delay at the crossing of approximately 6½ minutes. The other brackets on the chart indicate delays of various durations to other cars at this crossing.

When these charts are checked in the office, a template is used to simplify reading, and the long delays are picked off quickly by a clerk. These delays are then made up in the form of a report and are brought to the attention of the offending railroad companies.

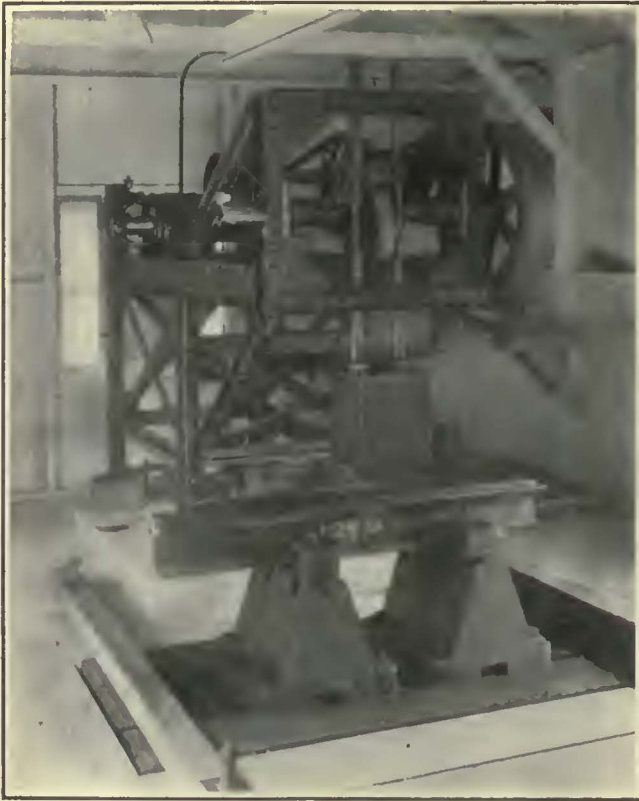


Street Railroad Crossing Delays Are Shown on This Chart Made by a Nachod Headway Recorder

Repeated Impact Tests Are Progressing

FOR some time past, a repeated impact testing machine has been at work under the auspices of the committee on welded rail joints of the American Electric Railway Engineering Association and the American Welding Society, making tests of various types of rail joints at the Bureau of Standards, on Connecticut Avenue, Washington, D. C. Bending drop and tensile tests of joints specially prepared by various way engineers throughout the country have already been made, as told in previous articles in this paper. Similar joints are now being tested in the repeated impact machine.

This apparatus consists essentially of a 400-lb. weight which drops a distance of 6 in. onto the rail joint. In conducting the test it has been the practice to have



In Making Repeated Impact Tests This 400-Lb. Weight Is Dropped 70 Times per Minute on the Rail Joint 6 In. Below

the weight strike about 2 in. away from the rail joint, simulating the condition that exists with a low joint in track. This weight is raised and dropped 65 to 75 times a minute. The joint itself rests on two supports about 22 in. apart, which are bolted down to a heavy cast-iron platform or anvil supported by springs. Special devices dampen the vibrations of the springs so that the anvil comes to rest between blows. The anvil weighs about 16,000 lb. and this mass is so great that the exact arrangement of springs underneath is immaterial, because the force of the blow is almost entirely dissipated before it reaches the spring.

No definite relationship has been established between the number of blows of the machine required to cause failure of a joint and the number of car passes which the same joint would stand. Inasmuch as many joints have failed in these experiments at between 150,000 and 200,000 blows, it is evident that the blow of the machine is more severe than that which would ordinarily be

encountered in actual service except with seriously defective joints such as are simulated by the machine. When designing the machine to determine how great the blow is with a low joint, lead inserts were installed in track actually in service and the compression caused by the passage of a car was measured. Experiments showed that a force of approximately 200 ft.-lb. was necessary to cause this amount of compression, and this force was therefore used in the testing machine.

Definite conclusions from the repeated impact experiments are not yet possible because the joints so far tested have been of two types only. Experiments are being carried out under the direction of Prof. H. L. Whittemore of the Bureau of Standards. Approximately one-fifth of the total number of joints have already been tested. It is hoped that by the end of the summer the tests will have been completed and the results will be available for publication to the electric railway industry.

Honor Roll Reduces Accidents in Dayton

THE City Railway of Dayton, Ohio, has established an honor roll among platform employees for freedom from accidents. In order to offer some form of reward for honor roll membership, each man whose name is put on the coveted list is given one day off a month with pay.

As now practiced, the rules call for freedom from accidents due in any form to the operator's negligence, where the company would be liable for injury or damage to property. When an operator has a clear record for a period of 3 months his name goes on the honor roll and he is entitled to one day off with pay, provided that he has worked at least 20 days during the month. After a man's name is once put on the list it stays there as long as he continues to be free of chargeable accidents. The names of approximately 80 per cent to 90 per cent of all platform employees are on the list each month.

At the end of December, 1924, 44 platform employees out of a total of approximately 110 were found to be free of chargeable accidents for the entire year. These men were surprised with a cash bonus of \$25 at

COMPARATIVE ACCIDENT FIGURES FOR DECEMBER, 1924, CITY RAILWAY OF DAYTON, OHIO

Division	Number of Accidents Chargeable	Other	Figures per Passengers	Chargeable Accident Car-Miles
First.....	1	23	569,221	67,408.4
Second.....	4	18	152,639	16,729.4
Third.....	0	24	407,566*	46,425.9*
Fourth.....	1	21	368,956	50,689.1

* Total figures. Ratio infinite.

Christmas time as a reward for the unusual care exercised in their work.

Another feature of the accident prevention work of the company is an honorary banner which is hung in the division having the best record at the end of each month from the standpoint of accident prevention. This banner is highly prized and results in each man being held personally responsible by his co-workers for accidents that affect the standing of the various divisions.

The accompanying table gives a comparison of accidents for each of the four divisions during the month of December, 1924.

Mayor Hylan Held Responsible for New York's Subway Ills

Governor Smith's Special Commission Criticises Board of Estimate, but Exonerates Members of New York Transit Commission—Urges Completion of Existing Lines with Shop and Yard Facilities—Demand for Larger Borrowing Capacity for City Approved

THE members of the New York Transit Commission are not chargeable with the failure to build the much needed new subway lines or extend the existing subways. The repeated and persistent refusals of the Mayor and other members of the Board of Estimate of New York City to adopt proposals for the validation of new routes and to approve contracts for construction of routes already validated or provided for in the dual contracts of 1913 completely frustrated provision for increased transit facilities. The charges made by the Mayor and the Board of Estimate against the commission are without foundation and no cause exists for the removal of the commissioners from office.

These are the principal findings made public on Feb. 9 by Justice John V. McAvoy, appointed by Governor Smith to inquire into the transit situation in New York City. Each of the eleven counts is dismissed with a statement that sufficient evidence was not presented at the public hearings before the justice to sustain the charges. The justice reached his conclusions without qualification or equivocation. His report is a concise statement of fact without flourish or adornment. The justice has dismissed the question of fare as not involved in the controversy. He did say, however, that a statute could be agreed to between the Governor and the Legislature, which would provide that the rate of fare should be 7 cents on the rapid transit lines and that the first cent above 5 cents should be paid into the city treasury monthly and the remaining cent be impounded so that the operating companies would be prevented from receiving any greater return than a fixed amount.

The one point on which Justice McAvoy fails to sustain the views of the Transit Commissioners is in his recommendation for legislation to take away their power to modify contracts with the railroad companies without the consent of the city. The commission has announced that it would not seek to exercise this power except in connection with its proposed readjustment plan for the unification of the transit companies into a single system. Justice McAvoy indicates that he considers this plan impracticable at present and declares that the absence of a provision to give the city final authority as to the lines to be included in such a system constitutes an "insuperable barrier" to its adoption without considering

any of the other possible objections that might be raised.

As the justice sees it the pressing necessity of the transit situation "called for co-operation between the Transit Commission and the Board of Estimate, and the rejection of contracts without any assigned good reason or because of hostility to the Transit Commission, which under the law was the only body which could propose them, is indefensible. Obviously, it would only prevent the building of new subways which were needed so acutely."

Subway routes which must be rushed to completion and which should have been finished long ago, had there been co-operation instead of antagonism on the part of the Board of Estimate, include the 14th Street line, the Nassau-Broad Street line, extension of the Queensboro line, the Washington Heights line, and making the West Side subway north of 96th Street into a four-track route. More cars can be run in non-rush hours, Justice McAvoy states.

The justice reaches no conclusion as to whether or not the city's proposed independent subway system can be made self-supporting at present construction costs on a 5-cent fare.

Saying that the 5-cent fare in the existing subways is unalterably fixed by contracts, and that the fare in the proposed municipal subway is fixed by statute at the same rate for the first 3 years, Justice McAvoy holds that the 5-cent fare issue does not now arise and that no anticipatory conclusion should be reached in advance of an estimate of the probable results of the operation of the proposed new lines by the Board of Transportation.

Justice McAvoy declares that the present municipally supervised system of bus operation is illegal and asserts that the city should compel the present individual bus operators to apply for franchises and certificates, with payment of a percentage of their receipts to the city, until the power of the municipality to operate buses is established by decision of the courts or by new legislation.

He also condemns the proposed Staten Island combined freight and passenger tunnel favored by the Hylan administration, and declares that the plans should be changed at once to a rapid transit tunnel, which can be built at much less cost, and that the present mandatory act for the construction of a combined freight and passenger tunnel should be amended.

From the *New York World*

THE findings are a detailed and unqualified condemnation of the Mayor's whole transit record. Unless Governor Smith rejects them the Democracy of New York cannot consider any longer the renomination of John F. Hylan.

To renominate Mayor Hylan would be to indorse him. To indorse him would be to make the whole Democratic party responsible for the indefensible record of the Hylan-Hearst faction. There is no escape from this conclusion. It is the very heart of the McAvoy report. With this report in existence, the Democratic party of New York must either dissociate itself entirely from the Hylan record or surrender body and soul to Hylan and Hearst and go down with them. There can be no compromise on a record that is indefensible.

The independent citizens of New York realize that a Democratic Governor would never have risked the dangers to his party contained in this inquiry if the evidence were not overwhelming and beyond dispute. This is no Republican report about a Democrat. This is no "reformer's" report about a "politician." This is the report of a Tammany judge to a Tammany Governor about a Mayor of their own party.

One point upon which Justice McAvoy sustains a contention of the city administration is his declaration for a constitutional amendment to exempt sufficient sums from the city's debt limit to provide funds for new subway construction. This, however, is the suggestion made by Comptroller Craig and not that of Mayor Hylan.

These suggestions are incidental. The main purpose of the report was to fix responsibility. The full report would cover 10 pages of space in the *ELECTRIC RAILWAY JOURNAL*. The attempt made here is merely to touch the high spots so far as these suggestions are contained. The justice's review and decision on the 11 allegations have been summarized as follows:

Charge 1

The first charge is substantially to the effect that the commissioners failed and neglected to perform their duty with respect to securing safe and adequate rapid transit services; in particular it is claimed that an accident happened on the elevated railroad in Brooklyn whereby two wooden cars fell to the street; that portions of the structure, in particular the guard rails and wooden ties, were defective and bolts were loose; that a device termed "dead man's button" was not installed upon the trains of that company; that under contract No. 4, wooden cars should not have been allowed to be used in trains operated upon that structure; that on July 30, 1924, a wreck occurred at the Sunnyside yard of the Long Island Railroad through the throwing by hand of a switch under a moving train, causing the derailment of the last three cars of the train; that on August 5, 1924, a wreck occurred at the Ocean Parkway station of the Brighton Beach line of the B.-M. T. system, and that the transit commissioners were guilty of negligence.

THE ANSWER

In support of this charge the Mayor's counsel urges that the transit commissioners, though in office from April 26, 1921, did not commence any public hearings into the service upon the rapid transit lines, until March 15, 1922, and that no order affecting that service was made until May and July of that year. The Transit Commission, however, did undertake the investigation of the service in November, 1921, preliminary to instituting the public hearings mentioned by the Mayor's counsel. It does not appear to me that there was any delay in making the inquiry which can fairly be criticised as amounting to a dereliction of duty.

The powers of the Transit Commission were regulatory in character, but that does not mean that the commissioners are chargeable with knowledge of each and every detail of the structure and equipment of the companies operating in this city. . . . I am certain that they were not guilty of misconduct because they did not at an earlier date take the steps now urged by counsel. Upon receipt of the report of the joint board of engineers in January, 1924, as to the condition of the elevated structure in Brooklyn steps were taken to carry out the recommendations of that report.

It is erroneous to say that the structure of any of the elevated railroads in Brooklyn was found by these engineers to be "unsafe." The converse is the fact. It would indeed be surprising if structures which have borne their burden for so many years had been found to be unsafe for use. Moreover, if the city authorities had or have evidence proving that the structure was

and is actually unsafe steps could have been and can still be taken by them through application to the courts to require its abatement as a public nuisance.

The accident on the Fifth Avenue line did not occur on a curve and seems to have been caused by the dropping upon the track of some portion of the car equipment, which caused a derailment, and it is difficult to see in what respect the most approved "dead man's

From the

New York Herald-Tribune

THIS report is not the work of the political enemies of the Mayor. It was written after a searching examination into the cold facts by a man belonging to Mr. Hylan's own political organization, who happens to possess the honesty and the intelligence to subordinate party interests to public service. It is a pitiless and an unanswerable indictment of the Mayor's colossal failure to do the job which he promised to do in two campaigns and which the voters elected him to do.

The report is calm and dispassionate. It displays a thorough familiarity with every detail of the vast mass of testimony and exhibits submitted at the investigation, supplemented by a first-hand investigation of subway conditions.

Mr. Hylan's utter unfitness for the job which he has held for 7 years and which he hopes to hold for 4 years more stands revealed. A Governor of his own party accorded him the hearing of his charges against the Transit Commission that he so loudly demanded. A distinguished justice of his own party conducted the investigation, acquitted the Transit Commission, and fixed the responsibility for keeping the people out of subways on Mr. Hylan himself. Judge McAvoy's report ought to bring the Mayor's political career to an end.

button" would have averted that accident.

The accident in the Sunnyside yard resulted from the negligent conduct of an employee in turning a switch while a train was passing in front of him upon the track. The criticism is made that this switch should have been included in the interlocking system. There is no justification for the contention that the transit commissioners were charged with the responsibility of investigating every switch in every railroad yard to see whether it is properly controlled, in the absence of proof, as here, that the defect was one which was readily apparent or had been called to their attention.

The further contention that under contract No. 4 the wooden cars were required to be retired from service at the dates fixed in the schedule mentioned in Article XLVII of that contract, appears from a study of the contract to be fallacious. From the evidence before me it appears that these cars and their equipment were being maintained by the operating company in a serviceable condition by renewals and repairs, so that while for valuation purposes they might as a matter of contract stipulation be agreed to be worthless, when the city should exercise its right of recapture prior to the termination of the contract, nevertheless, if so maintained in good order there appears to be no reason why they should be scrapped unless all wooden car equipment is to be removed from operation. The retirement of these serviceable cars would not have aided in reducing, but would have necessarily tended to increase the congestion, due to the heavy traffic upon those lines.

Charge 2

The second charge condemns the transit commissioners for approving the reorganization of the Brooklyn Rapid Transit Company.

THE ANSWER

It is claimed that the Transit Commission, in the performance of its quasi-judicial function, approved a reorganization which it should have disapproved. The city of New York, although it took part in that proceeding, having been represented by counsel who called witnesses and presented arguments in support of its contention, did not seek to review its decision in the courts. It abided by the result. The organization was achieved. Now it criticises the determination of the Transit Commission upon the ground among others that the Transit Commission permitted an overcapitalization of the Brooklyn-Manhattan Transit Corporation because that company issued 769,911 shares of non-par value common stock.

The charge is made that after the approval by the Transit Commission, the Brooklyn-Manhattan Transit Corporation, which had been organized under the business corporation laws of the state of New York, entered upon its books the sum of \$40,000,000 as the valuation of the 769,911 shares of non-par value common stock. It does not appear that the Transit Commission had any jurisdiction over the book entries of the Brooklyn-Manhattan Transit Corporation, after it approved the form of capitalization which had theretofore been approved by the United States District Court.

The prices at which the shares of that company sold in the market were not matters which fell within the scope of the Transit Commission's jur-

isdiction, nor will the declaration of a dividend by the corporation, organized under the business corporation law, come under the Transit Commission's control.

The courts have ruled that the legislation giving public utility commissioners power to regulate the issuance of stocks and bonds of a public utility corporation was not designed to make the commissioners financial managers of the corporation, nor did it empower them to substitute their judgment for that of the board of directors or stockholders of the corporation as to the wisdom of a transaction.

Nothing has appeared to indicate that the Transit Commission did not bring to the matter the exercise of its discretion in good faith under the law.

Charge 3

The third charge embodies a claim that the Transit Commission was negligent in failing to require the operation of sufficient railroad cars and adequate train crews and their equipment by the companies operating under contracts Nos. 3 and 4, and that as a result the traveling public, especially during the rush hours, received inadequate and insufficient accommodation and were crowded into the cars beyond their capacity.

THE ANSWER

That there is and has been an intolerable overcrowding of passengers, both upon the stations and upon the cars of the operating companies, is of course admitted by everyone. That the companies appear to be operating substantially all of the trains which could with safety be accommodated on existing lines during the so-called rush hours was conceded by the Mayor in the written memorandum which he submitted upon the hearing. There are points of congestion upon the trunk lines through which no more trains can be safely operated during the rush hours, and naturally the outlying districts through which these rush-hour trains are distributed suffer from an inadequate number of trains. Obviously this situation could have been alleviated by the employment of more cars, provided the inspection and shop facilities had been adequate for the proper maintenance of a greater number of cars than were in service. With the completion of all the required shop and inspection facilities additional cars ought to be required. There is no evidence tending to show that the transit commissioners have been neglectful of their duty in this respect.

Charges 4 and 5

Charges 4 and 5 may be grouped, inasmuch as both relate to the alleged failure of the commission to enforce the provisions of the dual contracts with respect to depreciation.

THE ANSWER

Contract No. 3 provides that from the pooled revenue there shall annually be deducted 12 per centum thereof to provide for maintenance, exclusive of depreciation. It is then further provided that for the first year of operation under the lease 5 per centum of the revenue shall be placed in a depreciation fund, and that annually, within

30 days after the 30th day of June, the commission and the lessee shall determine the amount to be paid to such fund and the classification thereof.

The precise meaning of the language of these provisions in the contract is in dispute. The city, through the Transit Commission, contends that in addition to the 12 per cent provided in

From the New York Times

THE sweeping condemnation of the Mayor's course is the thing which to most eyes will stand out in Judge McAvoy's report as of chief importance. Judge McAvoy asks nobody to take his word for this. He recites and analyzes the evidence. He traces the Mayor's vacillation and obstruction step by step; showing what contracts were violated, what promises were repudiated, what official undertakings were concealed, even what orders of the court were defied. The result is a terrible arraignment, all the more death-dealing for being couched in judicial and restrained language. The whole report is, in fact, a model. It is clear without being wordy, condensed without being obscure, and marches from premises to conclusion with an irresistible sweep of logic.

The report is not an indiscriminate defense of everything that has been done by the operating companies or even by the Transit Commission. The judge thinks that the Transit Commission should have insisted upon better sanitary conditions in the subway and elevated stations. He objects to permitting the companies to cut down too sharply the force of guards on the trains. There are other minor improvements which should have been required. But all these things are only trifles compared with the way in which Mayor Hylan has thrown himself athwart rapid transit progress.

Judge McAvoy embodies in his report a constructive subway program. Its details, most of them admirable, must be left for future discussion. The great thing is that we have at last a judicial determination in regard to scandalous acts of the city administration which have too long afflicted us. The report certainly ought to be the beginning of better days for rapid transit relief. It ought also to be, if there is left in New York anything like a reasoning public, the end of Mayor Hylan politically.

paragraph 4 and such further sums as may be necessary to maintain the equipment, which sums have been denominated "excess maintenance," there is an obligation upon the company to take further sums from the annual revenue and place them in a depreciation fund. The company, on the other hand, contends that it has fully maintained the equipment and that there has been in fact no depreciation and therefore no necessity for payments due to any depreciation fund.

The Transit Commission has steadfastly adhered to the city's view of

the proper construction of these provisions of contract No. 3, but has under the advice of its counsel deemed it inexpedient to press the matter to a determination at this time. The commission has not waived the city's rights, but has apparently fairly exercised its judgment and discretion, and there is nothing in its conduct which would justify the charge of malfeasance.

Charge 6

The sixth charge is to the effect that the commissioners have not compelled the operating companies, under contracts Nos. 3 and 4, to put into the pool all the revenues derived, directly or indirectly, from the operation of the properties.

THE ANSWER

The items, specifically referred to, are sums received as rentals from cars leased to other corporations, share of joint revenues with other companies and the amounts received from interest on bank balances. It appears that the first of these items has been adjusted, and the company has acceded to the city's contention as maintained by the Transit Commission. The other two items are in course of adjustment, and the Transit Commission has steadfastly maintained the city's contention with respect thereto.

Charge 7

The seventh charge relates to the inclusion of the receivership expenses in cost of operation, under the provisions of contract No. 4, and further asserts that the transit commissioners have failed to provide adequate examination of the operating accounts of the lessees, and have failed to exclude from the cost of operation items of expense said to be improperly charged against operation under contracts Nos. 3 and 4.

THE ANSWER

The evidence shows that a fraction of the total amount of these expenses, consisting mainly of the compensation of the receiver and his counsel, were permitted to be charged against the cost of operation, being a sum about equal to what would have been the salaries of the officials of the companies, had there been no receiver. The accounting department of the Transit Commission is well organized and has performed its duties in connection with the examination of accounts.

Charge 8

The eighth charge relates to the action of the Transit Commission with respect to items in the 12th and 19th quarterly determination of costs by the engineers under contract No. 4, and the claim likewise that the Transit Commission has failed to urge objections made by its predecessor and to cause the removal of unwarranted items charged thereunder.

THE ANSWER

When the Transit Commission came into office, the disposition of these matters was 5 years in arrears, and within 9 months they were brought up to date. Subsequent determinations have been made from time to time, as appears from the volumes relating thereto, which have been introduced in evidence

before me. There is no ground for believing that the Transit Commission has been derelict in its duty in this respect.

Charge 9

The ninth charge consists of the claim that the transit commissioners have violated their duties by creating and maintaining useless appointees in office, who were unfit for the work imposed upon them.

THE ANSWER

The Transit Commission continued to employ those who had been performing similar duties under its predecessors. Nearly all of these positions were in the classified Civil Service. The only person mentioned by the Mayor as being unfit was called before me and I found him to be a competent man who was performing his duties. A comparison of the amount expended by the Transit

Commission, with that now being incurred by the two bodies, covering the entire field, with which the Transit Commission was invested under the law, prior to July 1, 1924, shows that the expenditures of the Transit Commission were less than that of the two bodies now doing the same work.

Charge 10

The tenth charge accuses the transit commissioners of failing to restore the unified service which existed prior to the receivership of the railroad companies in New York and Brooklyn, and refers in particular to the fact that the Brooklyn City Railroad is being operated independently of the B.-M. T. system of which it was formerly a part.

THE ANSWER

That railroad company became a separate unit during the B. R. T. receiver-

ship by virtue of a court order, and manifestly the Transit Commission could not as a matter of law fail to regard the determination of the United States District Court in that respect. There is no reason to believe that the transit commissioners did not act in entire good faith in connection with its consideration of this matter and there is no warrant for any finding of neglect or malfeasance.

Charge 11

The eleventh charge relates to the alleged failure to retire the wooden cars in accordance with the provisions of contract No. 4.

THE ANSWER

This charge is substantially included in the first charge and is disposed of by the views expressed by me with respect thereto.

Boston Begins Educational Program

Eight Hundred Elevated Railway Employees Meet Regularly Under "Departmental Group Conference Plan" Devised to Help Ambitious Workers Secure Best Information Available in Their Specialties—Power, Transportation, Maintenance, Shop Practice and Special Subjects for Women Included

THIS winter there is being carried out on the property of the Boston Elevated Railway a comprehensive educational program under what, for want of a shorter term, is known as a "departmental group conference plan." Five groups are holding meetings, practically each week, as follows: Rolling stock and shops; maintenance (track, elevated structures, subways, buildings, signals, etc.); power; transportation, and women of several departments. Upward of 800 employees are registered in these groups and a high percentage of attendance is being maintained.

The first step in preparing the present program was to consult a large number of representative employees who had taken courses in previous years. The unanimous desire was for an opportunity to discuss departmental problems and the principles underlying the work of the several departments.

Next, the general manager, Edward Dana, in consultation with department heads, appointed a committee on education for the property. This consists of men selected by the department heads to act as group chairmen, with the general manager as chairman of the educational committee. To the educational committee was assigned the task of preparing a program for the season. The committee asked each departmental representative to prepare a list of topics for a maximum of 20 meetings, and to plan to secure speakers to present these topics and lead the discussions. In this work the committee was assisted by Henry H. Norris of the McGraw-Hill Company staff. The schedule, as approved by the committee, is shown in the accompanying table.

The meetings, in general, are held in a large and well-equipped instruction school recently completed at the Sullivan Square terminal in Charlestown. Here there is seating capacity up to 700 persons, and the main auditorium is provided with motion and still picture projection apparatus, sound amplifiers of the latest

type, radio, piano—in short, everything needed for the comfort, convenience and entertainment of the groups.

The program of each meeting is designed to run from 7:30 to 9 p.m.; a half hour each for the informal talk or series of talks, for the discussion, and for such other features as may be provided.* This is subject to frequent modifications to take advantage of the presence of visiting electric railway men or company officials. The talks are given by experts from the railway's staff or by outsiders, with such illustrations as the subject permits. Motion pictures and stereopticon slides are freely used. At some meetings entertainment features, such as group and solo singing, educational and humorous motion pictures and radio selections, are introduced by the group leaders.

LECTURE OUTLINES DISTRIBUTED IN ADVANCE

Men who accept invitations to address the groups are asked to furnish outlines of their talks at least two weeks before the meetings. These are mimeographed and distributed in advance, to serve as reminders of the dates and to assist in formulating questions for discussion. The outlines for each group will serve as a syllabus of the series. Where full manuscripts are prepared in advance by the speakers, they are filed with the railway librarian for subsequent binding. Condensed records of the discussion are also made for the same purpose, and to insure attention to the suggestions for service improvement which are brought out. Attendance at the meetings is recorded on individual cards, printed in a different color for each group. Group members are also provided with pocket cards containing the meeting schedules, each printed on stock of the same color as the group record cards.

*The power group conferences, which are administered by the Massachusetts Department of Education, follow a modified plan, as explained in the schedule on page 257.

Five joint meetings, under the direction of the general manager, form part of the winter's program, and bring the five groups together. The first was held in November, with the editor of the *Boston Evening Transcript* as the principal speaker. One-minute reports were made by a score or more men who had represented the railway at the American Electric Railway Association convention or the National Safety Congress. At other general meetings prominent city officials and railway managers will speak.

The group conferences have already produced several by-products, notably a series of "talks" on accident prevention by the claim department staff. (See *ELECTRIC RAILWAY JOURNAL*, Jan. 31, 1925, page 185.) A joint committee from the auditing and maintenance departments, appointed to consider ways of minimizing stocks of stores, is a very recent development.

One lesson which the planning of this program showed early was that a uniform scheme could not be devised to fit all departments. For example, the power department found its needs best met by courses of lectures delivered by experts from outside the staff. Two series of 10 lectures each were arranged, one covering mechanical engineering, the other electrical engineering. The maintenance department divided its topics among its several sub-departments, with attendance optional to men not directly interested in a topic under discussion. The interest has been so great, however, that few men have been willing to miss any of the meetings. The transportation conferences are held in two sections, one in the morning for night men, the

other in the evening for day men. The rolling stock group expected to hold some of its meetings at the Everett shops, but the large registration interfered. The women's group found it desirable, to insure sustained interest, to limit the list of topics to the 10 most essential for a general understanding of local railway operating methods. The women have shown an intense interest, with an enrollment, as in the other groups, much larger than expected.

The management of the Boston Elevated Railway does not regard the "departmental group conference plan" as an ultimate educational program. It lacks the home study element; but it has great instructional value and is stimulating. Moreover, it forms an excellent foundation for later study by those who desire such.

Its development on a large scale on the Boston Elevated illustrates the interest of the public trustees and the general manager in industrial education. One of the trustees, J. Frank O'Hare, is a trustee of the Franklin Union, a thriving vocational school founded on a bequest made to Boston by Benjamin Franklin. Mr. Dana is chairman of the committee on education of the American Electric Railway Association.

The railway's present educational activity began 3 years ago, when arrangements for instruction of a large group in practical electricity were made with the Massachusetts Department of Education. This was followed by other electrical courses and by one on public utility economics, delivered by L. R. Nash of Stone & Webster. The group conferences form the third stage in this educational development.

Schedule of Meetings of Departmental Group Conferences Boston Elevated Railway

Season of 1924-1925

GENERAL MEETINGS—Nov. 12, 1924; Feb. 9, March 27, April 15, May 13, 1925

Women's Group

Meets at 7:30 p.m.

1924

- Nov. 17. Auditing.
- Dec. 1. Purchasing.
- 8. Track.
- 15. Training transportation employees.

1925

- Jan. 12. Power.
- 19. Schedules.
- 26. Snow.
- Feb. 2. Accidents.
- 16. Car operation.
- March 2. The "Elevated" problem as a whole (Mr. Dana).

Power Department Group

Power Department Group Conferences are under the direction of the Massachusetts Department of Education, Division of University Extension, and meetings are held on Thursdays at 7 p.m., as scheduled.

The power department group is considering the following topics: Modern boiler practice; fuels and firing; combustion; fundamental principles of steam turbines; general features of turbine construction; development and operation of steam turbines; auxiliaries in high-vacuum turbine plants; steam—its properties and generation; economy as affected by power-plant operation; electrical generation—with reference to the construction and operation of generators, switchboards and meters; transmission—including oil circuit-breakers, protective devices, auto transformers and the advantages of high voltages; substations—manual and automatic operation, storage batteries, transformers, rotary converters, and protective relays; distribution—typical overhead and underground feeder system, together with switchboards, high-speed and air circuit-breakers, and cable testing; motors and controllers—direct

current apparatus including car equipment, shunt and compound motors, hand and automatic control equipment, alternating current apparatus, including single-phase, polyphase and synchronous motors and starting compensators.

Transportation Department Group

Meets at 10:30 a.m. and 7:30 p.m.

1924

- Nov. 7. Accident prevention.
- 21. Accident reports.
- Dec. 5. Employment and instruction of new men.
- 12. Relations with employees.
- 19. Selection and training of sub-officials.

1925

- Jan. 16. Treatment of passengers.
- 23. Complaints against employees.
- 30. Relation of maintenance to transportation.
- Feb. 6. Power saving.
- 20. Carhouses and stations.
- 27. Cars and equipment.
- March 6. Complaints against service and equipment.
- 13. Revenue accounting.
- 20. Handling of passengers off cars.
- April 3. Traffic surveys and time-tables.
- 10. Dispatching and maintaining schedules.

Maintenance Department Group

Meets at 7:30 p.m.

1924

- Nov. 4. Introductory meeting.
- 18. Practices in Cleveland, Ohio.
- Dec. 2. Development of rapid transit in Boston.
- 9. Railway signaling.
- 16. Stores—accounting.

1925

- Jan. 13. Manufacture of steel.
- 27. Accident prevention.
- Feb. 3. Ordering and distribution of materials and equipment.
- 17. Erection of Boston Army Base.
- 24. Heat treatment of metals.
- March 3. Stores—purchasing materials.
- 10. Uses of laboratory in preparing specifications and checking materials.
- 31. Welding and cutting of metals.
- April 7. Maintenance of power circuits.
- 21. Relation of maintenance department to public officials and labor organizations.

Rolling Stock and Shops Group

Meets at 7:30 p.m.

1924

- Nov. 5. Car construction, specifications, contracts, etc.
- 19. Car construction, review of designs.
- Dec. 3. Car-body repairs.
- 10. Car-body painting.
- 17. Trucks—general principles and design.

1925

- Jan. 14. Truck maintenance, wheels, axles, brakes, etc.
- 21. Railway motors—general principles and design.
- 28. Railway motors—service requirements, etc.
- Feb. 4. Railway motors—maintenance.
- 18. Control equipment—principles and design.
- 25. Control equipment—multiple-unit.
- March 4. Control maintenance.
- 18. Air brakes—principles and design.
- 25. Air brakes—maintenance.
- April 1. Shop practices and handling stores.
- 8. General review.

Repair Shops Keep Busy

THE Department of Commerce announces that, according to the data collected at the biennial census of manufactures for 1923, the repair shops of steam and electric railroad companies reported work done during that year to the aggregate value of \$1,520,902,751, an increase of 19.9 per cent as compared with 1921, the

STATISTICS FOR ELECTRIC RAILROAD REPAIR SHOPS, 1923 AND 1921

	1923	1921	Per Cent of Increase or Decrease (a)
Number of establishments.....	547	560	-2.3
Wage earners, average number (b).....	34,925	33,279	4.9
Maximum month.....	Nov. 35,492	Jan. 33,985	.....
Minimum month.....	Aug. 34,250	Nov. 32,571	.....
Per cent of maximum.....	96.5	95.8	.....
Wages.....	\$49,225,583	\$48,775,235	3.0
Cost of materials.....	\$31,981,650	\$33,560,133	-4.7
Paid for contract work.....	\$110,949	\$105,862	4.8
Value added by manufacture (c).....	\$54,430,995	\$53,752,293	1.3
Horsepower.....	62,360	(d)	.....
Coal consumed (tons of 2,000 lb.).....	135,216	(d)	.....
Total value of work or products.....	\$86,412,645	\$87,312,426	-1.0
Motive power and machinery departments, value.....	\$7,303,972	\$7,715,044	-5.3
Electric locomotives built:			
Number.....	17	(d)	.....
Value.....	\$198,775	(d)	.....
Repairs to motors, etc., value.....	\$6,692,410	\$7,226,905	-7.4
Work for other corporations, value.....	\$101,754	\$78,472	29.7
All other work or products, value.....	\$311,039	\$409,667	-24.1
Car departments, value.....	\$75,070,768	\$75,529,519	-0.6
Cars built, value.....	\$3,523,648	\$1,246,267	182.3
Passenger:			
Number.....	299	127	135.4
Value.....	\$3,287,447	\$822,398	299.
Freights:			
Number.....	47	2	.....
Value.....	\$103,738	\$7,200	1,340.8
Other:			
Number.....	37	48	.....
Value.....	\$132,463	\$418,669	-68.4
Repairs to cars of all kinds, value.....	\$65,420,854	\$69,131,546	-5.4
Work for other corporations, value.....	\$1,486,380	\$1,249,497	19.0
All other work or products, value.....	\$4,639,886	\$3,900,209	19.0
Bridge and building departments (shop work only), value.....	\$438,624	\$516,942	-15.2
Repairs and renewals, value.....	\$434,590	\$420,445	3.4
All other work or products, value.....	\$4,034	\$96,497	-95.8
All other work or products, not classified, value.....	\$3,599,275	\$3,550,921	1.4

(a) A minus (-) sign denotes decrease. Per cent omitted where base is less than 100.
 (b) Not including salaried officers and employees nor proprietors and firm members. Statistics for these classes will be given in final report.
 (c) Value of products less cost of materials.
 (d) Not reported.

last preceding census year. For steam railroad repair shops alone the total was \$1,433,680,106, an increase of 21.5 per cent as compared with 1921, and for electric railroad repair shops it was \$86,412,645, a decrease of 1 per cent.

Details of the statistics on electric railway repair shops appear in the accompanying table.

Measuring Rail Deflections Under Load

INTERESTING experiments are being conducted on the lines of the Capital Traction Company, Washington, D. C., with a machine just developed by the Bureau of Standards, to measure the deflections of rail in paved streets caused by the passage of cars. This is being done jointly by the engineering staff of the company named and that of the Washington Railway & Electric Company. Measurement is not made of the actual deflection distances, but the comparative deflections under different conditions of service are obtained. Tests have been made with cars of different weights and having various types of truck. It is planned also to study the effect of flat wheels passing over the instrument.

In making these tests an aluminum bar, about 8 in. long and provided with two contact points, is placed on the base of the rail in contact therewith. One contact point is a part of the aluminum bar, while the other is

attached to a hinged arm. Movement of this second contact and its connecting arm causes the compression of carbon particles contained within the bar, and this varies the resistance of the electric circuit.

This circuit is one arm of a wheatstone bridge, the other arms of which are housed in a portable box. A mirror carried on the galvanometer of the wheatstone bridge reflects a beam of light on a photographic film, which is moved at a predetermined rate by a small electric motor. Similar bars are placed on the head of the rail and in the center of the web.

After a small amount of pavement alongside the rail has been removed, the bars are placed in contact with the rail. The box containing the rest of the apparatus is carried on a small motor truck which stands near by in the street. When a car passes over the instrument the deflection of the rail is recorded in the shape of curves on the photographic film. Tests will be made at joints and also in the center of the rail. At present experiments have not been carried far enough to permit reaching definite conclusions. After several types of rail have been tested under different conditions of service, it is expected that the curves will furnish information valuable for study in connection with rail and car design.

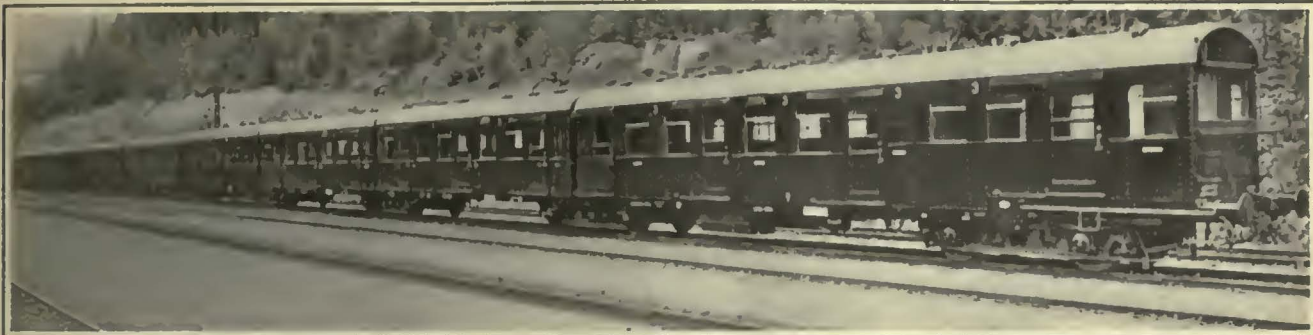
Capital Traction Has 25 per Cent 10-Year Men

FIGURES just compiled by the Capital Traction Company, Washington, D. C., show that at the beginning of the present year more than 25 per cent of its employees had been in service for 10 years or longer. One man who first went to work for the company in 1868 had a service record of 56 years. Another had 51 years. Altogether nearly 1 per cent of the total number of employees have had more than 40 years of service. About 5 per cent have had between 30 and

LENGTH OF SERVICE OF OFFICERS AND EMPLOYEES OF THE CAPITAL TRACTION COMPANY

Year Employed	Number of Full Years Service	Number of Employees	Per Cent	Year Employed	Number of Full Years Service	Number of Employees	Per Cent
1868	56	1	0.8	1905	19	9	6.8
1873	51	1		1906	18	10	
1881	43	3		1907	17	18	
1883	41	3		1908	16	19	
1884	40	2		1909	15	24	
1885	39	1	1.1	1910	14	9	6.9
1886	38	3		1911	13	11	
1887	37	1		1912	12	28	
1888	36	4		1913	11	18	
1889	35	4		1914	10	16	
1890	34	9	3.8	1915	9	10	32.0
1891	33	7		1916	8	30	
1892	32	8		1917	7	82	
1893	31	12		1918	6	134	
1894	30	8		1919	5	121	
1895	29	14	2.0	1920	4	111	30.3
1896	28	1		1921	3	77	
1897	27	3		1922	2	66	
1898	26	2		1923	1	104	
1899	25	4		1924	..	147	
1900	24	6	3.8				100.0
1901	23	8					
1902	22	11					
1903	21	11					
1904	20	9					

40 years. Nearly 6 per cent have had between 20 and 30 years. Others over 10 years constituted 13.7 per cent. Listed among those with 30 years of service were J. H. Hanna, vice-president in charge of operation, and R. H. Dagleish, chief engineer. The number of employees and the length of their service is shown in the accompanying table.



Each Half of This Berlin Articulated Train Has Five Car Bodies and Six Trucks

German Railways Try Articulated Trains

Tests Are Being Made at Berlin and Hamburg—Each Unit of the Berlin 10-Car Train Has Five Car Bodies and Six Trucks—This Train Is Being Used in Rapid Transit Service—The Hamburg Unit with Two Car Bodies Is Used on a Single-Phase Electric Railway

THE advantages accompanying articulation of car bodies have attracted attention in Germany as well as in this country and England. In fact, the claim is made that in Germany the principle of car body articulation was developed in 1901, although it has been applied in actual practice only during the last two years. There are at present two German railway properties operating articulated cars. One of these and the first to put them in service is the Berlin Stadtbahn, a part of the German government railroad system which extends through the city of Berlin and does a large short-haul business. It is soon to be electrically equipped but is now running by steam.

On this road there is one articulated train in service. This is in two halves, each unit having five car bodies and six trucks. This train has been in regular service in Berlin since Aug. 17, 1923, being hauled by steam locomotives.

An article in *Glaser's Annalen* for July 1, 1924, from which the following particulars are taken, states that a speed of 63 m.p.h. has been attained without troublesome side sway and with no sluggishness in the springs. The main dimensions of the entire train (10 bodies and 12 trucks) are as follows:

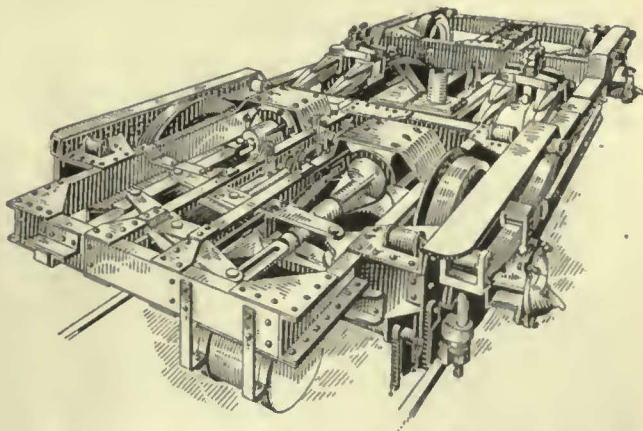
DIMENSIONS OF BERLIN 10-CAR ARTICULATED TRAIN

Length over all.....	140	m. (459 ft. 8 in.)
Distance between king pins.....	12.45	m. (40 ft. 10 in.)
Wheelbase of pilot truck.....	2.5	m. (8 ft. 2 in.)
Wheelbase of pivot trucks.....	3.5	m. (11 ft. 6 in.)
Length of middle car bodies.....	12.1	m. (39 ft. 9 in.)
Length of end car bodies.....	15.4	m. (50 ft. 7 in.)
Bulkhead clearance between middle car bodies.....	0.4	m. (15½ in.)
Bulkhead clearance at end car body with the two halves coupled.....	1.3	m. (51 in.)
Wheel diameter of pilot trucks.....	1.0	m. (39 in.)
Wheel diameter of pivot trucks.....	0.85	m. (33½ in.)
Weight of train.....	218.5	metric tons
Weight of like capacity train made up of motor cars on trucks and of trailers with ordinary running gear.....	226.6	metric tons

It is pointed out that an equivalent motor car would require a king-pin distance of 14 m. instead of the 12.45 m. on the articulated car. This difference permits the latter to be built 40 mm. (15½ in.) wider, thus reducing the gap between car and platform at stations along curved track. Without load the car floor is 1 m. (39.4 in.) above the head of the rails, but as the station platforms are 760 mm. (30 in.) high no intermediate car step is needed. Sliding side doors are used.

The pilot trucks at the outer ends of each unit are of the ordinary swiveling type and carry the motors. The pivot trucks are of special design and built under the Jakob patent. As shown in the drawing of this truck on page 261, the load is transmitted from the cylindrical king-pin *Z* through the brackets or bolster *D* to central semi-elliptic springs, thence to the side frames of the truck and through semi-elliptic springs to the journals.

King-pin guide blocks *K* are attached to the end sills *S* of adjacent car bodies, these guide blocks being of greater diameter than the king pin. The inclination of the car bodies toward one another in a perpendicular plane due to change of grade, bending of springs, etc.,



Inner Truck Used in Articulated Trains at Berlin and Hamburg

is so small that a slight bulge in the king pin suffices to take care of it.

The car bodies are allowed to slide on side bearings which are located as close to the king pin as possible. Any tendency of one car to sidesway is modified by the action of the spring system of the articulated truck common to adjacent cars. The conditions of train make-up do not call for passenger communication between cars, but if required it would cause less difficulty than on ordinary cars.

The wheelbase of the pivot trucks between bodies has been made long, thus offering another factor to give

smooth running. The manner of carrying the load places so little stress on the side frames that comparatively light members are possible, even in the present instance with a wheelbase for the articulated truck of 3.5 m. (11 ft. 6 in.). The longer springs, of course, are of further advantage. In spite of this long wheelbase, the truck, including a Kunze-Knorr Type B braking cylinder, weighs no more than the customary truck of 2.5 m. (8.2 ft.) wheelbase, exclusive of braking equipment.

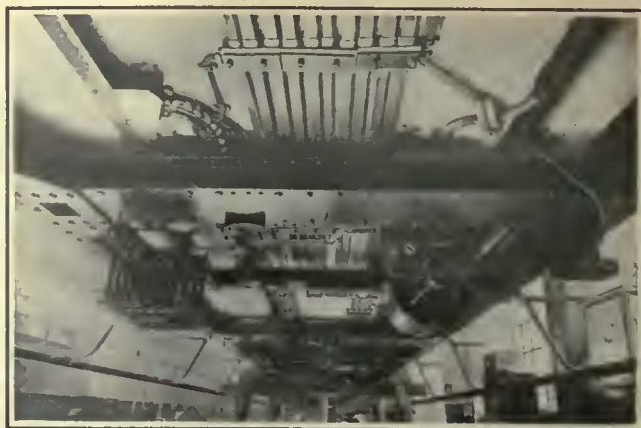
Although the articulated train described has a number of advantages, it is considered unlikely that it will become standard on the Stadtbahn. It was built on the assumption that with the line electrically equipped, the trains would consist of a mixture of motor and trail units and that four motors (two trucks) per half-train would serve. The latest plans, however, call for all motor-car units in order to secure maximum flexibility in variation in train length. This would double the number of motor trucks per train and so make the use of articulated trucks too costly.

HAMBURG IS TRYING DUPLEX MOTOR CAR

A second installation of an articulated train in Germany has been made on the Hamburg Stadt- und Vorortbahn, which is equipped with the single-phase system. This train, which has two bodies and three trucks, was supplied by the Gornitz Car & Machine Company, which also built the Berlin unit. The forward truck of the articulated train is equipped with two motors, and the other trucks carry no motors.

The principal dimensions of the train are given in the accompanying table.

The forward car is divided into five third-class compartments, one baggage compartment and one service compartment. The second car has four second-class compartments, two third-class compartments, and one



Underside of the Hamburg Car Body Showing Bare Rectangular Conductors Used for Low-Voltage, Single-Phase Circuits

service compartment. There is no passageway between the cars. The pivot truck is of the Jakob type, similar to that under the Berlin train.

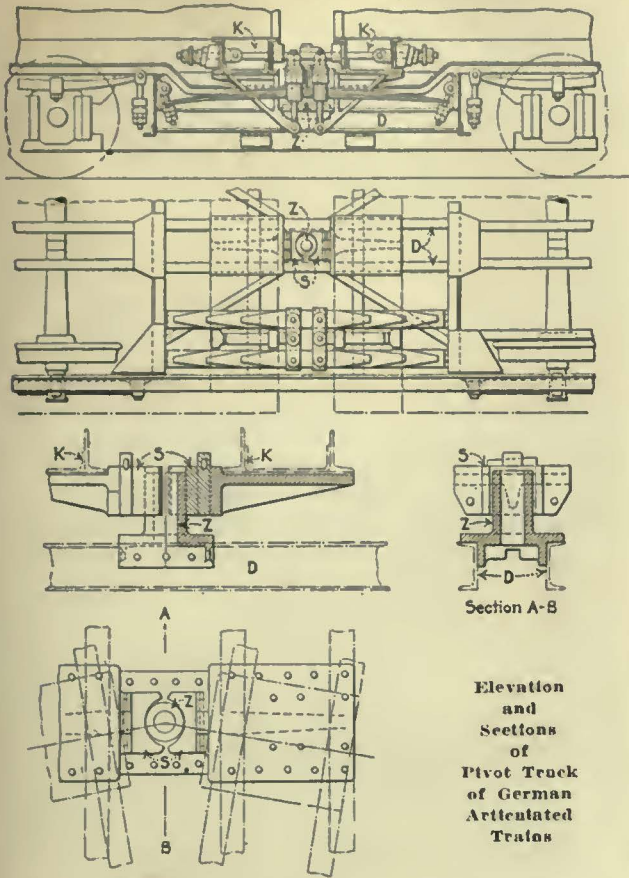
The electrical equipment includes two compressed-air bow-type current collectors which take 25-cycle, 6,000-volt, single-phase current to a transformer, having an hourly rating of 300 kva. and a continuous rating of 200 kva. The two Brown-Boveri motors have each a continuous rating of 320 hp. and an hourly rating of 410 hp. Multiple-unit control is employed, so that any

DIMENSIONS OF HAMBURG ARTICULATED UNIT

Length of each single car body.....	14,222 mm. (46 ft. 6 in.)
Total length of articulated unit over buffers.....	30,000 mm. (98 ft. 6 in.)
Weight of unit, with complete equipment.....	66,000 kg. (145,000 lb.)
Outside width of car body.....	2,550 mm. (8 ft. 4 in.)
Wheelbase of motor truck.....	2,500 mm. (8 ft. 2 in.)
Wheelbase of pivot truck.....	3,500 mm. (11 ft. 6 in.)
Wheelbase of rear truck.....	2,500 mm. (8 ft. 2 in.)
Diameter of wheels.....	1,000 mm. (3 ft. 3 in.)
Gage of wheels.....	1,435 mm. (4 ft. 8 in.)



This Two-Car Articulated Train Is Used in Hamburg Suburban Service on the Single-Phase System



number of these double-end units can be operated together.

Instead of carrying the main low-voltage circuits in cable, use is made of bare conductors or busbars of 30x6 sq.mm. and 20x6 sq.mm. cross-section. They are carried from the underside of the car floor by means of wooden spacers and clamps. These bare conductors can be readily shifted and they are free from the arcing troubles possible from deteriorated cables.

An interesting feature of the heating is that the heaters are in circuit only when the controller is off, thus avoiding excessive peaks.

The forward car carries the motors and the transformer; the second car carries the compressor and a number of auxiliary devices. The compressor supplies air for brakes, current collectors and signals.

Silk Screen Sign Printing Used in Detroit

Special Equipment Built in Shops of Department of Street Railways Facilitates Work of Printing Route and Destination Signs for Maintenance

BY H. S. WILLIAMS

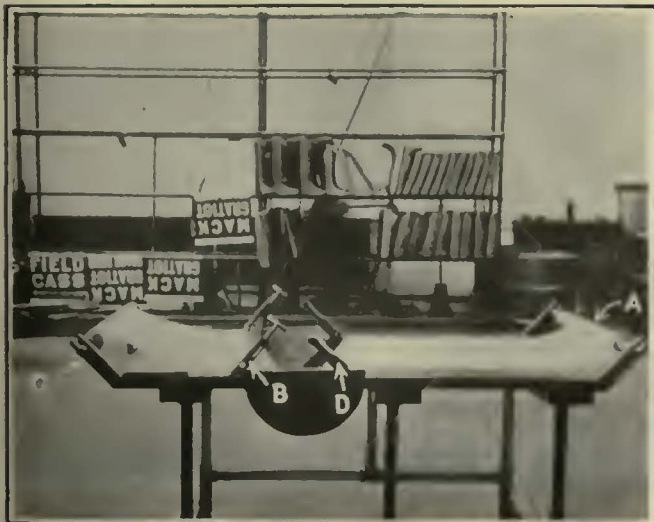
Assistant Superintendent of Equipment, Department of Street Railways, City of Detroit, Mich.

PRODUCTION of sign rolls for transparent route and destination signs on electric cars has undergone radical improvement in the shops of the Department of Street Railways, City of Detroit.

It was noted a year ago that several large electric railways were still making sign curtains by the old, laborious process of hand lettering. On most properties, however, stencils are used. This necessitates some hand work, but is a marked step in advance of the hand-lettering method. About 2 years ago a new process was instituted, which eliminated all hand lettering, and reduced costs materially. This was the silk bolting cloth and opaque letter method.*

The sign-making process as now used in Detroit is an adaptation of the silk bolting cloth process. The first step is the preparation of the sign cloth. A high-grade shade cloth is used, and is given a preliminary treatment with fish oil to increase its transparency as well as to make it easy to clean. This is menhaden oil purchased according to Navy Department specification 52-0-6. The oil is mixed with gasoline in the proportion of one part fish oil and one part gasoline. This mixture is then placed in the semi-circular trough of the table shown in an accompanying illustration. A roll of curtain cloth, which is cut to correct width on a band saw, is then put on roller A, from which it is run

*The silk screen or silk bolting process as used in Brooklyn was described in the ELECTRIC RAILWAY JOURNAL for December 15, 1923, page 1007.—ED.



The Shade Cloth on Which Signs Are Printed is Treated in Advance with Fish Oil

As shown in the illustration at the left, the cloth mounted on roller A is passed through the bath of oil contained in the tank at the center of the table. Lever D connects with

a weighted roller which holds the cloth down in the oil. B is a squeegee for wiping off the surplus oil as the cloth is wound up on roller C with a hand crank. The right

hand illustration shows the treated cloth suspended for drying. The racks are arranged so that they can be lowered into a position handy for stringing the cloth.

under a weighted roller which holds it in the oil bath. Coming out of the bath, the cloth passes under an adjustable squeegee, *B*. This wipes off surplus oil as the cloth is wound on roller *C* with a hand crank. The weighted roller in the bath is provided with a handle, *D*, by which the roller can be lifted out of the way when a new roll of cloth is being started through the apparatus.

After the cloth has been treated with fish oil the roller *C* is lifted off its support and placed in a similar holder on the drying rack. The cloth is threaded over the bars of the drying rack, where it is left until dry as shown. This rack, as the illustration shows, is similar to a very wide ladder and is arranged on pulleys so that it may be lowered for convenient handling and then raised up out of the way where the cloth is suspended in the warmest zone of the room to hasten drying. Experience indicates that it takes about 72 hours properly to dry the material in this way. After that the cloth is transferred to another roll preparatory to the printing operation.

HOW STENCILING IS DONE

The next step concerns the type of stencil to be used. The stencils are made up in units 26 in. x 39 in. and contain five names each. They consist of substantial wood frames over which No. 10 silk bolting cloth is stretched. The letters are then applied to make the desired words. Here a change has been made from the customary silk cloth process. Instead of making the letters with opaque paint, they are cut out of paper and applied to the bolting cloth with shellac. Sharper edges on the letters result from this method in comparison with the use of opaque paint.

Each stencil has attached to it a brass hinge, slotted to receive a thumb screw on the table. The prepared sign cloth is hung on the roller *E*, which is provided with a small crank and pawl. The cloth is then run over the table and clamped in a groove, after which tension is applied with the crank and retained by the pawl. This stretches the cloth smooth for the printing.

The stencil frame is swung down and locked firmly by means of two cam levers, *F*. Paint is applied to one edge of the stencil and one sweep of the squeegee completes the process of printing. The stencil is then swung up out of the way, and the printed section of the sign is cut and removed for drying. When not in use, the stencil frames are stored in the rack shown in another illustration.

Maintenance signs are made up in small sections because, in general, only comparatively small sections of the sign curtains wear out. Consequently, only these worn sections need to be cut out and replaced.

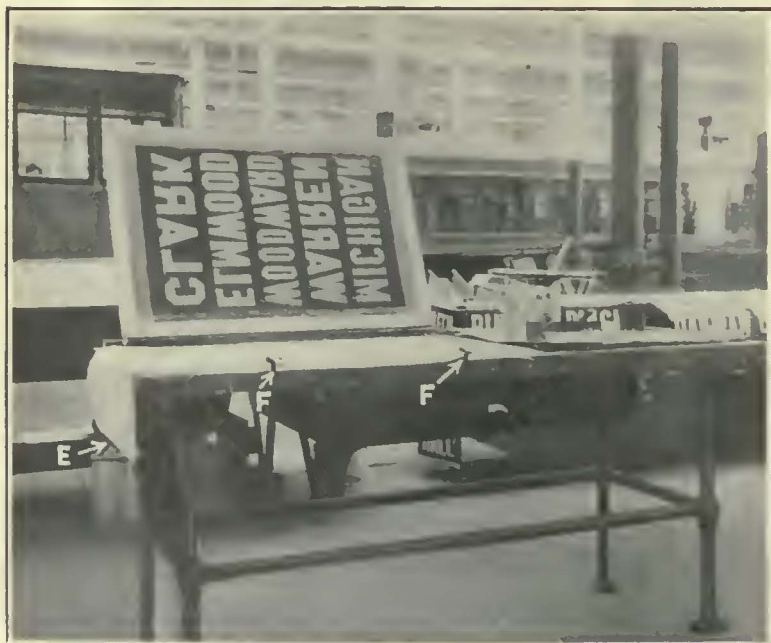
The black paint used for the printing is made according to the following formula: 5 lb. ivory black ground in linseed oil, 1 pt. raw linseed oil, $\frac{3}{4}$ pt. gold size Japan, and $\frac{1}{2}$ pt. turpentine.

The previous cost of painting signs averaged \$14.30 per sign including material. The new method has reduced this cost to \$5.22 per sign.

Service Stripes for Detroit Trainmen

THE use of service stripes to designate length of service was recently begun by the Department of Street Railways, city of Detroit. A silver bar will be given for each year of service up to 5, when a gold bar will supplant the four silver bars. In addition to a gold bar for each 5 years of service a silver bar is shown for each year between 5 and 10 and 10 and 15. After 15 years of service gold bars only are worn, unless future developments indicate that the men themselves prefer to have the detailed service record displayed. Previous service with the Detroit United Railways will be counted.

The management believes that public relations will be improved by this step. When a trainman insists upon the observance of regulations by passengers, some people think he is only a novice. This idea will be changed by displaying evidence of the employee's service. On the other hand, the awarding of service stripes will tend to improve the morale of the trainmen.



Signs Are Printed on the Handy Table Shown at the Left, and When Not in Use Stencils Are Stored in Convenient Racks Shown at the Right

The stencil of silk with paper letters applied with shellac is hinged to the side of the table so that it can be readily lowered into position over the cloth. The roller *E* has a crank and pawl by means of which the cloth is stretched tight for printing.

One-Man Cars Successful in Denver

Approximately 40 per Cent of Both City and Interurban Service Is Now Operated by One-Man Cars—Older Rolling Stock Was Rebuilt with Front Entrance and Center Exit

DURING the past year the Denver Tramway instituted one-man car service on several of its city lines and on the interurban division. This has been extended gradually with satisfactory results. Since Jan. 1, 1924, all owl service has been operated in that way as well as the day schedules on the Cherokee, Platte &



Front-Entrance and Center-Exit Arrangement on the Rebuilt Denver One-Man Cars. Note the Low Partition Which Incloses the Operator's Position

Globeville line. One-man operation has also been adopted on the Lyden & Golden division of the Denver & Intermountain Railroad, and on the Fifth Avenue line, serving an exclusive residential section of the city.

It has been general practice to increase the service up to 25 per cent in the number of cars when one-man operation is commenced. Approximately 40 per cent of the cars now in service are of the one-man type. Experience has shown that schedules are maintained as well as, or in some cases even better than, with two men. Operation by one man has not been found a handicap to carrying out the general policy of speeding up service on the entire property. Average schedule speeds are now approximately 10.4 m.p.h., including all layovers, dead time and stopping time. This also includes trailer operation during the rush hours.

On one-man city cars the practice is to have the passengers enter at the front and leave at the center of the car. This "circulating type" of construction has been found to give such rapid loading and unloading of the one-man cars as to have permitted a general increase in schedule speeds. On one-man interurban cars the exit and entrance are both at the front end. This is necessary for the collection of zone fares. The custom is to collect the city fare when the passenger boards the car and when he alights from the car to collect the proper interurban fare, which is based on the distance the passenger rides. Inbound to the city, the passenger pays the interurban fare on entering the car and is not checked to intermediate points if he is not riding all the way into the city. The city fare is then paid upon leaving the car.

The success with which the general program of increasing schedule speed has been carried out in Denver is strikingly illustrated in the accompanying tabulation:

AVERAGE SCHEDULE SPEEDS ON ALL LINES IN DENVER

Year	Schedule Speeds M. p. h.
1917	9.66
1918	9.63
1919	9.40
1920	9.03
1921	*9.90
1922	10.30
1923	10.23
1924	10.40-10.50

*New men after strike.

Some of the older, double-truck cars, which were formerly operated with two men, have been rebuilt for one-man operation. These cars are built of wood with concave-convex side panels. Motor and truck equipment was in fairly good condition, but the side panels, body floors and other parts of the structure in some cases required attention. Consequently, the wood panels were removed, necessary repairs were made to wood posts, new floors laid where needed and the entire body overhauled. The former wood panels were replaced with Haskelite. This material was used to add strength to the side structure.

Pneumatic door equipment and full safety car devices were installed on the cars, and body changes necessary for the construction of a single-exit door at the center were made. The finished appearance of the interior of these cars is shown in the accompanying illustration.

Two-Sided Car Window Cards Used in Chattanooga

IN THE merchandising of the trolley service and of the electric power service in Chattanooga, Tenn., the Tennessee Electric Power Company utilizes a part of the window openings in the manner illustrated. Cards are mounted in alternate windows and, being narrow (not



Car-Card Holder Used to Advertise Railway and Power Service in Chattanooga

more than 9 in. wide) they do not prevent the use of the windows for their primary purposes, permitting the passengers to enjoy the view outside and admitting light to the interior of the car. The card face presented to the interior of the car carries an individual advertisement, while the side facing the street carries one or two words of a legend which extends from end to end of the car.

The fixture for holding the card consists of a metal strip at top and bottom, spanning from casing to casing and bent over to form a groove. Its width is about 1 in. The two strips are joined near each end by flat vertical pieces of metal $1\frac{1}{4}$ in. wide. Steel springs $\frac{3}{8}$ in. wide slip into the grooves and hold the cards in place.

Side Cars Reduce Package Freight Costs

IN CONNECTION with its package freight service the Hydro-Electric Railways, which operates an inter-urban service out of Toronto, Canada, has recently installed a system of pick-up and delivery service by motorcycles with side cars. These are used principally for the long hauls on the outskirts of the cartage area served by the railway. According to W. R. Robertson, general superintendent, a motorcycle with side car will handle up to 1,000 lb. of packages and make 75 miles per day on $1\frac{1}{2}$ gal. gasoline and $\frac{1}{4}$ pint of oil. The average weight of packages handled by one of the cars is 5,000 lb. per day. The side cars have been found of particular advantage in getting around traffic blockades, and are able to make better speed than standard trucks. While considerable snow has already been encountered, no more difficulty has been experienced with the side cars than with ordinary motor trucks.

Previous to installing the new service which is given with three side-car motorcycles, the railway was operating as many as 10 gasoline trucks, each of which was making an average of 28 miles per day. It has been found possible to reduce this number, making a total of seven vehicles for the improved service.

Gasoline-Driven Car Float Effects Economy*

AMONG the physical difficulties encountered along the route of the San Francisco-Sacramento Railroad are 1 mile of $4\frac{1}{2}$ per cent grade, a single trestle 13,571 ft. in length, a tunnel 3,500 ft. long and the presence of Suisun Bay in the middle of the route. All trains, both freight and passenger, have to be taken across this body of water on car floats. For this purpose steam-operated floats were formerly used, but

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

the company has lately built a gasoline-driven ferry.

This boat was designed and built by the railway and its operation shows a considerable saving over the former steam floats. In the case of the latter it is necessary for steam pressure to be maintained continuously during 24 hours of the day in order to give day and night service. With the gasoline-driven car float the engine is shut off as soon as the boat has docked. The saving accomplished is considerable because the trip across the bay consumes only 10 minutes and the layover is approximately 1 hour.

For the convenience of passengers a dining room is operated on this boat and the deck has been built up to the level of the top of the rail so that passengers can walk around and enjoy the trip.

The Readers' Forum

Snow Renewal in the Smaller City

YORK RAILWAYS

YORK, PA., Jan. 27, 1925.

To the Editor:

I have read with much interest your editorial in the issue of Jan. 24 entitled "Must the Railway Remove Snow from the Whole Street?"

Snow conditions as outlined therein are prevalent in this community and have resulted in slowing up our service considerably. However, notwithstanding the effect on service since the first heavy fall of snow this month, we have shown a considerable increase in railway revenue, due to the fact that, at least, some of the private automobiles have been parked in the garage until streets and roads are again in normal condition.

I estimate for the month of January a $7\frac{1}{2}$ per cent increase in railway revenue as compared with the same month in 1924, due almost entirely to the recent snowstorms. Previous to the snow, we were showing decreases each day.

In this city, if we should clear the snow from the sides of the streets on which we operate, it would result in increased expense and decreased revenue, as we would be providing additional roadway for automobiles.

J. E. WAYNE,

Vice-President and General Manager.



All Trains of the San Francisco-Sacramento Railroad Cross Suisun Bay on this Gasoline-Driven Car Float

Association News & Discussions

New England Club Discusses Car Weights

Savings in Operating Cost Due to Weight Reduction, Use of Gas-Electric Buses and Pulverized Fuel Fill Program

THE Feb. 5 meeting of the New England Street Railway Club was devoted to rolling stock and power plant topics, the principal speakers being John Lindall, superintendent rolling stock and shops, Boston Elevated Railway, on "Weight Carrying Costs"; J. C. Thirlwall, railway department, General Electric Company, on "Gasoline-Electric Buses," and W. C. Slade, vice-president United Electric Railways, Providence, R. I., on "The Pulverized Coal Installation of the Manchester Street Station in Providence." President T. H. Kendrigan occupied the chair, and the usual afternoon meeting, dinner and evening session were held at the Copley-Plaza Hotel. J. A. Queeney, president Philadelphia Rural Transit Company, gave an informal address on the gas-electric motor bus problem at Philadelphia, and Charles C. Peirce of the General Electric Company, Boston, outlined the changing conditions in equipment which traction men have met during the past decade and made a plea for open-minded consideration of future methods of public transportation in urban and suburban territory.

Mr. Lindall reviewed a comprehensive study of the cost of dead-weight haulage made by him a few months ago and summarized in ELECTRIC RAILWAY JOURNAL, issue of July 26, 1924. Following the presentation of these figures, E. P. Locke, engineer of car design Boston Elevated Railway, described the analysis of the East Boston Tunnel car design which preceded the building of these rolling stock units, in which a total saving of about 10,000 lb. per car was achieved. These cars were described in this paper for Aug. 23, 1924. In passing it may be recalled that weight reduction was secured among other ways by the use of outside doors and a wall of one thickness, by special floor construction, by using a semi-arch type of roof and equipping the cars for one-end operation each and in trains. It is estimated that the additional cost of hauling cars in tunnel service would have been \$108,000 per year had they been designed along the general lines of the previous Boston Elevated rapid transit cars.

Mr. Thirlwall said that figures made by his company agreed with Mr. Lindall's on the cost of weight haulage. For city service a fair average of 150 watt-hours per ton-mile is acceptable at the direct-current bus. A car running 36,000 miles per year thus consumes 5,400 kw.-hr. per ton (d.c.) per year. Maintenance may be 0.2 cent per ton-mile. Computing the power

cost at \$81 per ton per year and the maintenance at \$72 per ton per year the total is roughly \$150. Modern street cars have a first cost of about \$800 per ton. One ton of car weight calls for the equivalent of 2-kw. capacity in generating plant and substation.

R. D. Hood, Haverhill, Mass., estimated that when maintenance costs reach 10 cents per car-mile, it is time seriously to consider retiring the rolling stock.

OPERATING RESULTS WITH LIGHT CARS

A. J. Boardman, manager Brockton division Eastern Massachusetts Street Railway, said that in his opinion the one factor that stands between the street railways and prosperity is excess and unnecessary weight of cars. In

The decrease in energy consumption with the light-weight equipment is not always accomplished unless the light-weight cars are put into the service for which they are designed and geared. It was found on one line of the Eastern Massachusetts that when a light-weight, double-truck car of 16 tons was substituted for a standard 21-ton double-truck car, both operating on the standard schedule with the same number of stops per mile and the same gear ratio, there was a saving of only 5 per cent in energy. Using a properly geared light-weight car on the same route, the saving in energy consumption over the heavy double-truck car was approximately 19 per cent on a few trips, and would probably be greater still over a fair period of time.

A study of another line showed that the substitution of a light-weight double-truck car for a standard double-truck car with the same gear ratio would save on this route with a schedule of 197,467 car-miles \$1,760 per

INCREASE IN SINGLE-TRUCK MILEAGE

	Single Truck		Double Truck		Light-Weight Double Truck		Total	Per Cent Light-Weight Cars
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent		
1920....	265,635	10	2,288,603	90	.....	0	2,554,238	10
1921....	598,277	26	1,692,778	74	.....	0	2,300,945	26
1922....	549,033	24.7	1,490,231*	65	259,250*	11.3	2,298,414	36
1923....	437,666	19.8	998,190*	45	775,625*	35	2,211,481	64
1924....	508,366	24.2	785,576*	38	775,625*	38	2,069,567	62

*Estimated.

1917 the standard semi-steel double-truck car on his property weighed 900 lb. per seat. The so-called light-weight car weighs 685 lb. per seat and the Birney car 530 lb. per seat. The Twin City experimental light-weight double-truck car weighs 375 lb. per seat.

The bearing of equipment weights on power consumption is shown by the following figures:

The direct-current kilowatt-hours per car-mile of the Brockton division of the Eastern Massachusetts for the past 5 years was: In 1920, 4.76; 1921, 3.699; 1922, 3.879; 1923, 3.80; 1924, 3.52—a reduction in 5 years of 1.24 kw.-hr per car-mile, or of 26 per cent. Had the company operated in 1924 at 4.76 kw.-hr. per car-mile, the power charge in the Brockton district would have been increased last year by \$45,422 at a rate of 1.77 cents per kw.-hr. According to Mr. Boardman this decrease is due to (1) modern light-weight equipment; and (2) better track return by welding and bonding. The reduction in passenger car weight has been due (a) to the use of the Birney type safety car, and (b) to the use of double-truck cars weighing about 32,000 lb. against 42,000 lb. for the standard double-truck car. The increase of the mileage of the Birney cars and the light-weight, double-truck cars has been from zero in 1920 to about 62 per cent in 1924.

year in energy alone. The schedule speed is 15 m.p.h.

Again the company was operating double-truck, light-weight cars on a city and suburban line with a schedule speed of 9.5 m.p.h. Business fell off on account of industrial conditions, and these cars were replaced with standard Birneys. The light-weight, double-truck cars were put on another line with a schedule speed of 12.5 m.p.h. and they maintained this without difficulty. Temperature readings of the motors were satisfactory and it was also found that these cars could be operated on the route nine months in the year with a material saving in energy; for the other three months a heavier type of car was needed on account of the need for better traction to surmount grades and to fight snow.

Frequent use of single-truck Birney cars is made wherever traffic and service conditions warrant, care being taken to avoid overcrowding. If there is overcrowding the saving in power is offset by popular prejudice against this type of car. By service checks it is possible accurately to determine when to use these cars. It has been found that the reasonable variation in their mileage from summer to winter on the Eastern Massachusetts is as high as 260 per cent, the maximum use of these cars being in summer.

F. B. Walker, chief engineer maintenance of way Eastern Massachusetts Street Railway, Boston, pointed out that Massachusetts is assessing the electric railways a high proportion of bridge rebuilding costs, figuring these on a theoretical 100,000 lb. car used for computation purpose by the Department of Public Utilities. This allocation should be successfully disputed with the advent of light-weight cars.

GAS-ELECTRIC BUSES DISCUSSED

In discussing the gas-electric bus problem, Mr. Queeney said that the approach was through the inquiry as to what could be done in order to carry the maximum number of passengers, regardless of the type of motive power involved. Last year New York taxicabs earned \$25,000,000 more than all the street cars of the metropolis. He outlined the study which led to the selection of gas-electric as against straight gasoline motor drive. It is expected that there will be economies in running gear maintenance and that faster and more comfortable schedules will be secured by the gas-electric bus. There have been 125 double-deck buses of this type purchased for the Philadelphia company (capacity 66 passengers) and 75 single-deckers holding 33 passengers each. The street railway man who goes into the bus field must be prepared for a surprise in the increased cost of maintenance compared with electric car service.

An abstract of Mr. Slade's paper will appear in a later issue.

Association Secretaries Meet

THE annual meeting of the Association of Public Utility Secretaries was held on Feb. 9 at St. Louis. Discussion of ways and means of increasing the effectiveness of utility association work constituted the business transacted. The following subjects were discussed:

"Committee Organization and Work," D. L. Gaskill, Ohio; "Section Meetings Within State Associations," J. N. Cadby, Wisconsin; "Entertainment at Conventions," R. V. Prather, Illinois, and F. D. Beardslee, Missouri; "Program Materials and Arrangements," K. R. Noyes, American Gas Association; "The Extent to Which Organization Should Be Carried," H. M. Davis, Wisconsin, and H. L. Jones, Kansas, and "Bulletins and Publication," J. W. Colton, editor *Aera*.

Following the exchange of ideas, Secretary E. N. Willis of the Southwestern Association was re-elected president and J. N. Cadby of the Wisconsin Association, secretary.

Bluff Point Selected for New York State Meeting

BLUFF POINT, N. Y., on Lake Champlain, has been selected by the executive committee of the New York Electric Railway Association as the place of its annual meeting.

In view of the importance of the subjects confronting the industry today and the interest shown at previous meetings it was decided to hold a 2-day meeting on June 26 and 27.

Further details regarding the program will be published later.

Overhead Line Material Standardization

A CONFERENCE on the unification of overhead line materials was held at New York on Jan. 13, representatives of nineteen interested organizations being present.

The conference recommended by unanimous action that an extensive program on the unification of overhead line materials go forward, under the procedure of the American Engineering Standards Committee. It was decided that the work should include cross-arms, pins, pole steps, brackets and molding; pole line hardware, including such items as anchor rods, bolts and lag screws, brackets, cross-arm braces, guy fittings, pins and strand for suspension and guying, and strain insulators, spools, knobs, etc.

There was an extended discussion as to whether work on insulations should be limited to low-voltage material or whether the other important types of insulators should be included. A small committee appointed to formulate definite recommendations reported the following recommendations, which were unanimously approved:

Certain classes of insulators have reached a stage of development which seems to warrant standardization; others can be standardized as to certain important dimensions; still others are in a development stage which makes attempted standardization, other than along the broadest of lines, of questionable wisdom.

It is recommended that standardization in this general field be undertaken to such an extent as the facts developed by a sub-committee, or such other agency assigned to this work, may seem to warrant.

Of the other types, strain insulators for low potentials, spools, knobs, etc., which are used in common by the several branches, standardization is recommended.

The conference agreed that the work should include nomenclature, material specifications and dimensional data.

The following committee, advisory to the A.E.S.C. in the organization of the work, was appointed: R. F. Hossford, American Telephone & Telegraph Company, chairman; Alexander Maxwell, National Electric Light Association; G. C. Hecker, American Electric Railway Association; C. C. Beck, Associated Manufacturers of Electrical Supplies; J. C. Johnson, Telephone Section, and George Eisenhauer, Electrical Section, American Railway Association.

An important part of this committee's work will be a recommendation on the question of sponsorship. All interested groups will participate in the work through representation on one or more sectional committees which will be set up for the work.

C. E. Skinner, chairman of the A.E.S.C., acted as chairman of the conference.

Oklahoma Convention Will Be Held March 10-12

A NUMBER of well-known public utility executives will address the seventh annual convention of the Oklahoma Utilities Association, to be held at Oklahoma City, March 10, 11 and 12. "Community Transportation" will be the subject of a paper by F. R. Coates, of Henry L. Doherty & Company, New York. M. H. Aylesworth, managing director National Electric Light Association, New York; Miss R. E. McKee, national chairman Women's Public In-

formation Committee of the N.E.L.A.; W. S. Vivian, director of public relations Middle West Utilities Company, Chicago, and John C. Hall, St. Louis, are among the other speakers.

Illinois Association Meets March 18-19

THE Illinois Electric Railway Association will hold a joint convention with the Illinois Electric Association and the Illinois Gas Association at the Sherman Hotel, Chicago, March 18 and 19.

As announced by Secretary R. V. Prather, there will be a joint session during the morning of each day, and separate meetings of the gas, electric and electric railway associations in the afternoons. The annual banquet will be held on Wednesday night.

Two new features of this convention will be a group luncheon on Wednesday, at which time tables will be arranged for executives, accountants, engineers, etc., and a utility advertising exhibit.

The program of the electric railway sessions follow:

March 19, 1:30 P.M.

"Merchandising Electric Railroad Transportation," by D. W. Snyder, Jr., vice-president Illinois Traction System, Springfield; J. F. Egolf, general manager Aurora, Elgin & Fox River Electric Company, Aurora; John J. Moran, commercial manager Chicago Rapid Transit Company, Chicago.

"Bus Transportation."

1. "As Replacing Railway Operation," by C. G. Moore, general manager and purchasing agent Plainfield & Joliet Railroad, Joliet.

2. "As a Feeder to Electric Railway Operation," by B. W. Arnold, manager motor coach department Chicago, North Shore & Milwaukee Railroad, Milwaukee.

3. "Joint Service," by M. L. Harry, division manager Illinois Power & Light Corporation, Decatur.

March 18, 1:30 P.M.

"Maintenance."

1. "Equipment."

2. "Overhead Construction," by F. V. Skelley, superintendent Tri-City Railway, Rock Island.

3. "Track," by J. I. Catherman, engineer maintenance of way Illinois Traction System, Springfield.

"Safety and Insurance," by C. B. Scott, Bureau of Safety, Chicago.

"General Discussion of Railway Problems," by J. R. Blackhall, J. H. McClure, R. F. Palmblade, George A. Mills, W. H. Sawyer, F. E. Fisher, W. C. Sparks and W. L. Arnold.

Locomotive Motor Design Discussed by A.I.E.E.

FACTORS affecting the design of direct-current motors for locomotives were discussed by Ralph E. Ferris, Westinghouse Electric & Manufacturing Company, in a paper presented at the midwinter convention of the American Institute of Electrical Engineers at New York on Feb. 9-12. A comparison was made between different types of motor mounting, as regards the amount of power which may be developed in the available space with direct-current motors. The comparisons are largely qualitative, the author states, but within reasonable limits they may also be considered quantitative. Designs for 1,000 volts and 3,000 volts only were considered, although the same principles are stated to be applicable to other voltages.

The various factors are taken up in a mathematical discussion, which covers

the effect of various limitations which were imposed by the conditions of track, method of motor mounting and output.

The output factor increases, in general, with increase of armature diameter, the relation being quite complicated. There is a real limit to the amount of power which may be placed between the wheels with an axle mounting, regardless of wheel size. Fortunately, this limit is sufficiently high to permit of a fairly heavy axle loading with speeds of between 15 m.p.h. and 20 m.p.h. This, coupled with the simplicity of drive and ruggedness of motor construction, place the combination well toward the front as a solution of the d.c. heavy traction problem. With quill drive it is found desirable to have somewhat more clearance between the wheel flange and the end housing of the motor than in axle mounting. Otherwise the proportions of space are the same and, therefore, the curves of output will be approximately the same as those for axle mounting. The quill drive does, however, permit the use of a twin motor construction and thus, unless limited by the drive, gives twice the power

per axle as with an axle-hung motor. In the case of frame-mounted motors, with side rod or gear and side rod drive, if the motor is made self-contained, so that it may be lifted out of the locomotive frame complete, there will be less room available for active material than if the armature bearings are mounted in the side frame of the locomotive and end housings are omitted.

In his conclusions, the author states that axle-mounted, direct-current motors may be built which have sufficient power to permit fairly heavy axle loadings. Quill drive d.c. motors may be built, of which the power per axle will probably be limited by the method of transmitting power to the wheels rather than by the motors themselves. On the contrary, d.c. motors for side-rod or gear and side-rod drive may be built to develop practically any desired power. Gearless motors may be built which have sufficient power for comparatively light axle loadings, this light loading necessitating a larger number of axles for a given locomotive rating than would otherwise be used. A lower-voltage motor has a definite advantage in possibilities of greater output for a given armature diameter.

whether the company receives the award or not.

The presentations made in the year 1923 were printed in bound book form, which has had the widest possible distribution throughout the country and has been received everywhere as tangible evidence of the progress of the industry. The 1924 presentations are now in the course of preparation for printing in similar book form, as the committee desires to perpetuate this record of the industry's accomplishments.

The announcement of the award will be made at the annual convention of the association in October, 1925. Presentations should be addressed to the Charles A. Coffin Committee of the American Electric Railway Association, 292 Madison Avenue, New York City, N. Y.

Engineering Symbols

A MEETING of the special committee on engineering symbols was held at association headquarters, New York, on Feb. 2. Members present were H. R. Stamm, chairman; R. C. Cram, H. W. Coddling and C. W. Squier. The work of previous committees in preparing engineering symbols was gone over and it was decided that the work of the 1925 committee should include the preparation of all engineering symbols which are applicable to the electric railway industry.

The various types of symbols were divided into six groups as follows: (1) Topographical, (2) buildings and structures, (3) electrical, (4) railroad, (5) mathematical, (6) mechanical equipment.

Assignments were made to various members of the committee to work up symbols in each group.

Metropolitan Section Grows

AT THE meeting of the Metropolitan Section of the American Electric Railway Association held at the Engineering Societies Building, New York City, on Feb. 6, announcement was made by President W. E. Thompson that the membership had reached a total of 796, an increase of 25 since the last meeting. Before adjournment the total had swelled further to more than 800.

The technical papers presented at the meeting included one on power generation in the metropolitan district by J. H. Williams, assistant engineer motive power department, Interborough Rapid Transit Company, and one on power conversion and distribution by W. O. Wentworth, engineer transmission department, New York Central Lines.

According to Mr. Williams the electrical output in the metropolitan district is now 6,200,000 kw.-hr. annually, being 11 per cent of the total output of the entire United States.

Discussing the paper H. D. Sheflin of the Westinghouse Electric & Manufacturing Company stated that the coal rate for energy generated in the metropolitan district can be reduced by installation of larger units utilizing higher steam pressures and temperatures, and by the elimination of small isolated plants.

American Association News

Coffin Prize Conditions Changed

THE Charles A. Coffin Prize Committee of the American Electric Railway Association, consisting of President J. N. Shannahan, James H. McGraw and F. R. Coates, has recently sent out a circular letter describing the terms of the 1925 contest.

Under the terms of the Charles A. Coffin Foundation this award is given annually to the electric railway company within the United States which during the year has made distinguished contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry. The award consists of a gold medal for the winning company and \$1,000 which is given to the company's employees' benefit association or similar organization.

Inasmuch as there has been some change in the form of the measuring stick which the committee will use in determining the winner, the factors used are given below in full:

1. The success in gaining public good will as indicated by the initiative, skill and enterprise manifested in popularizing electric railway service—more riders and more revenue.

2. The economies which had been introduced in operation resulting from original ideas, as well as the extent to which the company has taken advantage of new developments in operating and maintenance practice and equipment originating with others.

3. Improvements in construction practice which have resulted in reduced first cost, reduced maintenance, or greater reliability of service.

4. Particular success in conducting a safety program and actually reducing

the number and seriousness of accidents.

5. Outstanding accomplishment in development of good relations between management and employees.

6. Special accomplishment in financing, which reduces the cost of new capital, such as the distribution of securities among customers and employees, rearrangement of the financial structure, etc.

All participants are requested to present financial and operating statements on a unit basis covering the period of the last 12 months available in comparison with the previous 12 months, or for a period of years (revenues, expenses, taxes, fixed charges traffic and mileage figures, shown in accordance with A.E.R.A. detail classification, all of which, if desired, will be considered confidential).

The preference of the committee is that all presentations be made on standard typewritten sheets and accompanied by such supporting figures and drawings as may be required. All presentations must be in the hands of the committee by Aug. 1, 1925, and companies are requested to limit their accomplishments as far as possible to those occurring in the year ending as nearly as possible with this date. However, any accomplishment extending over a period of years and reaching its fruition in this period will be considered by the committee as relevant. The committee requests that each presentation be made in such form that it may be retained as the property of the association and that consent be given to its publication either in whole or in part with the name of the company, except such as may be marked confidential,

Maintenance of Equipment

Portland Signal Failures Decrease

By H. J. CHARTERS

Portland Electric Power Company, Portland, Ore.

THE number of operations per failure of the block signals on the interurban lines of the Portland Electric Power Company at Portland, Ore., has increased nearly 100 per cent, as shown by the annual signal report for 1924. During the past year 17,088 movements of the signals occurred for every failure recorded as compared with 9,103 for 1923. [See ELECTRIC RAILWAY JOURNAL for April 12, 1924, page 588.—Ed.]

But one failure of the actual signal mechanism of the Type G-1 United States signals in use on this

SIGNAL FAILURES BY MONTHS AND YEARS

	1921	1922	1923	1924
January.....	..	6	22	2
February.....	..	5	10	3
March.....	10	3	13	5
April.....	13	8	8	5
May.....	17	4	8	4
June.....	9	15	16	10
July.....	16	8	6	8
August.....	12	1	8	5
September.....	8	1	4	3
October.....	6	8	2	7
November.....	16	6	6	1
December.....	10	9	5	5
Total.....	117	74	108	58

road took place. This failure was caused by moisture corroding the winding on a semaphore coil, which could not be seen by the maintainer and which eventually caused an open circuit. While no indication could be received under this condition, complete protection was afforded as the relay governing the signals was set to protect the train entering the block; hence an opposing train could not receive a clear indication from

Decrease in the proportion of contactor failures is to be noted in the report, although during December the coldest weather in 50 years was experienced in this locality. Failures from blown fuses also decreased during the year, principally due to the absence of electrical storms. The manufacturers recently increased the size of the fuses in this type of signal from 2 amp. to 5 amp., but no changes have been made by this company as the smaller fuse gives satisfactory results.

Directional relay and contactor

BLOCK SIGNAL FAILURES, INTERURBAN LINES OF THE PORTLAND ELECTRIC POWER COMPANY, 1921-24

Number of miles of track blocked:	1921	1922	1923	1924
All divisions.....	21	21	21	21
Number of blocks.....	20	20	20	20
Number of signals.....	40	40	41	41
Total movement of signals.....	843,464	991,082	991,082	991,082
Average movement per block.....	42,173	49,554	49,554	49,554
Average daily movement per block.....	138	136	136	136
Number of movements per failure..	7,148	13,393	9,103	17,088

ANALYSIS OF FAILURES

	1921		1922		1923		1924	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Line wires.....	5	4	5	7	6	5.56	0	.....
Switch and pole wiring.....	2	2	3	4	12	11.11	3	5.17
Blown fuses.....	7	6	3	4	15	13.89	5	8.62
Directional relay.....	29	25	22	30	34	31.48	16	27.59
Signal trouble.....	6	5	1	1	3	2.78	1	1.72
Contactors.....	44	38	26	35	24	22.22	13	22.42
No. 5 switch.....	7	6	2	3	8	7.40	10	17.24
Miscellaneous.....	6	5	1	1	0	.....	4	6.89
No trouble found.....	11	9	11	15	6	5.56	6	10.34
Total.....	117	100.00	74	100.00	108	100.00	58	100.00

troubles continue to be the main source of interruptions, although during the year different types of contactors were tried without much success.

No. 5 contactor switch failures increased considerably during the period due to a shortening of the scheduled running time between terminals. Under such conditions the signals are of more value than before, but it is difficult to control the speed of trains while passing under these contactors.

No changes were made during the year in the number of scheduled trains. Therefore the figures for average movements remain the same as in the two preceding years.

No additional signals were in-

stalled on the interurban lines in the period, but several betterments were made in the form of repeating indicators so that it might not be necessary for the motorman to look back to see the signal clear as he leaves the block when approaching stations or obscured crossings.

Line Truck Used for Many Jobs

AN UNUSUALLY well-equipped truck is used by the United Railways of St. Louis for the maintenance of overhead and underground distribution systems. It is equipped with an overhead collapsible tower and a full complement of ladders, tackle and hand tools. In addition



This Line Truck Is Equipped so that It Is Handy for Many Different Jobs on the Property

to the storage space in the bed of the truck body, two long tool boxes extend along either side to give additional capacity for materials and tools, and a locker below the bed makes use of the space between the rear wheels, and the rear step.

For underground work, a spotlight is mounted at the back end in such a position that it is convenient for lighting up manholes. An extension on the hub of one of the rear wheels forms a convenient point for wrapping a rope, so that by jacking up the rear wheel it becomes a very effective windlass for pulling in underground cables or other similar work requiring considerable power.

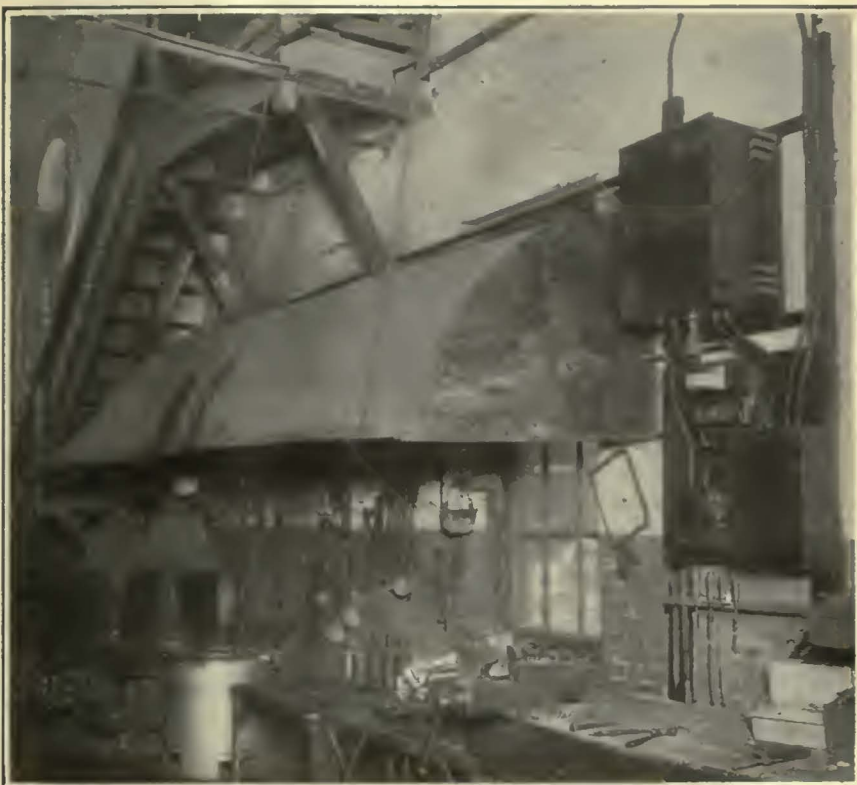
A removable snow plow is handy for clearing up snow around the yards.

Preventing Freezing of Air Pipes

CONSIDERABLE trouble was experienced during the cold winter season by freezing of the air lines on safety cars of the Northern States Power Company, Fargo, N. D. A patented device filled with wood alcohol was tried with considerable success. The suggestion was made to pour wood alcohol into the pipes on cars not provided with the device. This latter method has given good satisfaction and has eliminated all freezing. About every 5 days 4 oz. of wood alcohol are poured into the pipe leading from the double check valve to the outside air reservoir. The amount of alcohol used will vary somewhat with weather conditions. The air reservoir is drained whenever new alcohol is added, but no draining is permitted between these intervals. It is found that the cost of alcohol used in this manner is more than justified by the improvement in service resulting from reduced number of delays due to frozen air.

Close Temperature Control Insures Good Babbitt Metal

AN ELECTRICALLY heated babbitt melting pot with thermostatic control has been found by the Washington Railway & Electric Company to be a great improvement over older types because it is possible with this apparatus to maintain the molten babbitt at a certain definite temperature. High grade babbitt metal can be made almost worthless for use in bearings by allowing it to become too hot. Similarly, pouring



This Babbitting Outfit in the Shops of the Washington Railway & Electric Company Has a Temperature Range of Only 4 Deg.

at too low a temperature is not conducive to good results. In the opinion of R. D. Voshall, superintendent of equipment and buildings, 915 deg. F. and 850 deg. F. are limits between which it is desirable to do babbitting.

To accomplish this the company has installed in its P Street shops a Westinghouse electric babbitt pot

with a Brown pyrometer to regulate the temperature. This is set at 900 deg. F. and is arranged to cut in at 2 deg. below that or cut out at 2 deg. above. The railway has found that the use of this apparatus is enabling it to effect economies in bearing maintenance that more than offset the cost of the outfit.

New Equipment Available

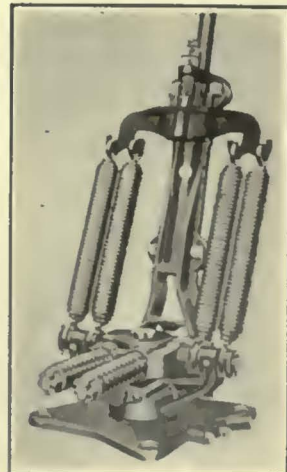
Trolley Base with Roller Bearings

A DESIGN of trolley base with several interesting features is being placed on the market by the Ohio Brass Company, Mansfield, Ohio. Standard Timken roller bearings have been embodied in the main bearings between the turret and the center of the stem casting. Two sizes of roller bearings support the base. The top one can be lifted off with the housing.

The base is fully bushed throughout at wearing parts and the tension springs, of which four are used, are held on bearing sleeves and forked casting bearings, which are also bushed.

The pole is held in place by two

bolted clamps, with a long support to provide a firm grip. The pole is held in its down position by a latch

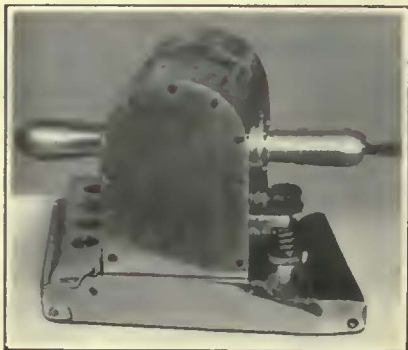


New Type Trolley Base

which engages with forked castings. The pedestal housing has a solid phosphor bronze brush, held against the pedestal post by a spring. This brush is electrically connected to the outside of the housing by a laminated copper jumper. The current is thus carried through this contact instead of through the roller bearings. A leather cup washer below the bottom bearing acts as a grease seal. The base is applicable to both city and interurban service. It weighs but 110 lb. and provides a uniform tension, regardless of the height of the trolley pole.

Portable Electric Sander

A NEW type of portable electric sanding and grinding machine which is said to do hand work at machine speed is being placed on the



New Type of Portable Sander

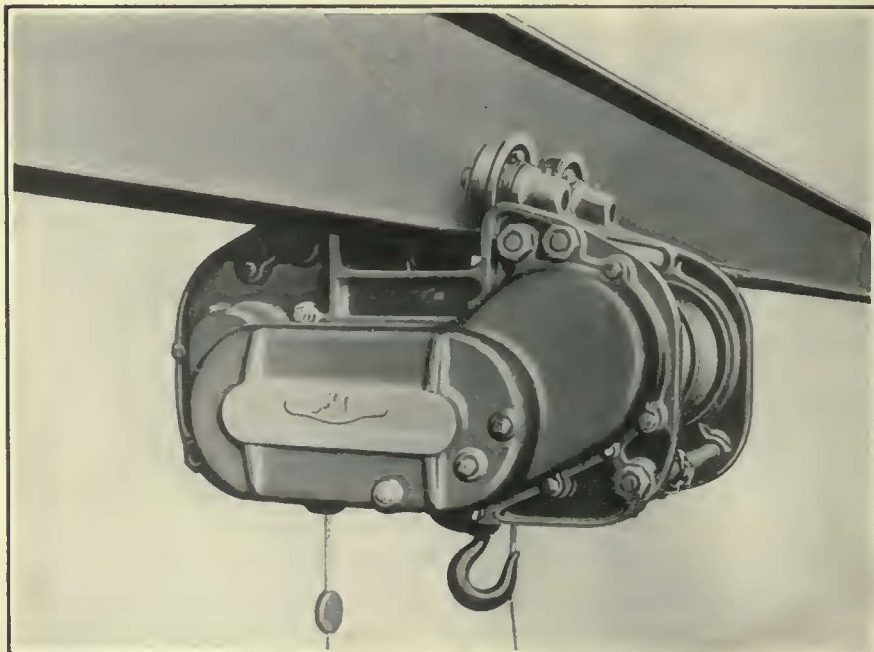
market by R. L. Barker & Company, Chicago, Ill. The outstanding mechanical features include gears and ball bearings which are totally inclosed in dustproof compartments

and run in oil. A universal motor of about $\frac{1}{2}$ -hp. rating is used for driving. This also is mounted in a dust-proof compartment. Motors for operating on either 110 or 220-volt circuits can be furnished.

The drum around which the sand or emery paper is clamped is dynamically balanced with all parts inclosed in the upper housing. The base is provided with rollers to guide the machine over the work, and the depth of cut can be accurately adjusted by means of a screw attachment underneath one of the handles. When the work of sanding or grinding is finished, a spring raises the machine from the work, so as to leave no mark. Metal abrasive paper can be used and applied in place of sandpaper, so that the machine is suitable for any kind of flat grinding as well as sanding. The cover is arranged so that all dust is held in and does not fly about the shop. The machine complete is 9 in. x 10 in. x 15 in. and weighs 23 lb.

Low Headroom Hoists

A LINE of electric hoists designed particularly to operate in locations with minimum headroom has been placed on the market recently by the American Engineering Company, Philadelphia, Pa. These hoists operate on a monorail with a minimum free space underneath the beam of from 10 to 15 in., depending on the size used. The motor and drum are arranged on opposite sides and parallel to the I-beam rail and the load block can be drawn up between them



Gear Side of Hoist Showing the Low Headroom Features

into the body of the hoist to within 1 in. of the bottom of the rail.

Accessibility of all working parts has been given particular consideration. Outer covers are provided which can be removed easily for inspection of parts and the motor can be taken out without removing the main frame or body of the machine. All gears are of drop-forged steel, and positive automatic lubrication is provided for all bearing parts. Hyatt high-duty bearings are used on the gear shaft and in the trolley wheels. An automatic lowering brake, a holding brake and an upper limit switch are provided to insure safe operation, and the brakes take effect instantly so as to stop the load without drift.

The hoist, which is being marketed under the trade name of "Lo-Hed," is built in capacities of from 1,000 to 12,000 lb. There are five types, four of which are arranged for operation from the ground. The fifth type is cab-controlled and has a motor-driven trolley.

Improved Snow Scrapers

TWO new types of snow scrapers for electric railway cars have been designed by the Root Spring Scraper Company, Kalamazoo, Mich. The No. 8 scraper is an improvement over the No. 7 and is designed particularly for safety cars and other types with low bodies. The improvements include reinforced spring



Improved Scraper, Type No. 8, with Reinforced Springs and Improved Blades

wrappers to give added strength for removing wet or hard packed snow.

A new design, type No. 9, has been brought out particularly for cars with higher bodies than the safety car type. The springs are 4 in. shorter than those of the No. 8 scraper. The material in the spring is high carbon steel with tungsten and other ingredients which, when oil tempered and drawn, make them tough and prevent crystallization.

The springs of the scrapers are shaped so that they yield when going forward or backward, but will not turn under the car.

The News of the Industry

Pay Increases Refused

Employees of San Francisco Municipal Property Told Company Is Without Funds—Ordinance to Seek Adjustment

Three groups of employees of the San Francisco Municipal Railway, San Francisco, Cal., have been refused raises in pay by the Board of Public Works and the matter is now in the hands of the Supervisors, to which body all power to change salaries has been delegated by a recently adopted amendment to the city charter.

Charles E. Stanton, a member of the Board of Public Works, told the representatives of the men at a conference held over the pay question:

"There is no money in the Municipal Railway's operating fund to meet the raises you demand."

To this F. P. Holling, president of the carmen's union, replied:

"You have lots of money. It's your bookkeeping system."

William Nanry of the Board of Municipal Research, supporting Colonel Stanton, declared that the proposed increase would add \$296,000 a year to the payroll.

"If these increases are granted," he added, "the road will face an annual deficit of from \$140,000 to \$150,000."

Supervisor Rossi, the author of the charter amendment standardizing city salaries, then asserted that he will prepare an ordinance for introduction to the Board of Supervisors to classify municipal railway employees, thus paving the way for a salary adjustment.

The increases asked are as follows:

Platform men from \$5.40 to \$6.40 a day, car repair men from \$6.40 to \$7.40 a day and trackmen from \$5.40 to \$6.40 a day.

POLITICAL CAREERS IN BALANCE

The San Francisco Supervisors find themselves placed in an embarrassing position. On the one hand, the Supervisors are advised by financial experts that it will create a deficit and throw the finances of the road into chaos if the demands are met. On the other hand, the Supervisors are faced with the problem of a coming election in which most of them will be candidates to succeed themselves. If they take a stand against the men it is possible that the labor element will back other candidates that will pledge more pay to the men. Labor, it must be remembered, holds the balance of power in San Francisco politics.

Another element to be considered is the taxpayer. His representatives have raised the cry that the road is losing money, that it will probably be in worse shape soon, with resultant higher taxes, and that the only solution of the difficulty is an increase in revenues. They are advocating a 6-cent fare.

Meanwhile, there are extensions that must be made if the road is to live up to its promises and keep up with the times. There is seemingly a lack of funds to make these extensions.

While the Supervisors are trying to find ways and means to meet the demands of the men George Lull, the city attorney, has been asked to rule on the question of the right of the Supervisors to take the matters of salaries out of the hands of the Board of Public Works and to decide whether or not the new charter amendment has been correctly interpreted.

Bus Regulation in Massachusetts Discussed

Street railways and bus companies are before the Massachusetts Legislature over the question of regulation. A hearing was held during the week ended Feb. 7 on the bill offered by Clinton Q. Richmond, general manager

of the Berkshire Street Railway, to require bus lines to secure a certificate of convenience and necessity from the Department of Public Utilities, in addition to holding a license from the local city or town authorities. Day Baker, chairman of the legislative committee of the motor coach committee, offered a bill at the hearing which, in substance, concedes that the buses should be regulated, but places the power of regulation with the Department of Public Works instead of with the Department of Public Utilities. Wide differences of opinion are expected to develop over the selection of the regulating body. James M. Swift, counsel for the Motor Coach Association of New England, seems to reflect the feeling that if the right of regulation were reposed with the Public Utilities Department that body might be constrained so to regulate the buses as to make it impossible to expand in a way they deem is their right.

\$603,000,000 Traction Ordinance in Chicago

Purchase Figures for Both the Surface Lines and the Elevated Go Before Council—Mr. Insull Discusses with Mayor Sale of "L" on Basis of \$90,000,000

A MUNICIPAL ownership traction ordinance totaling \$603,000,000 was submitted to the City Council of Chicago on Feb. 13, with conditions final except for the elevated lines terms. In a last-minute call on Mayor Dever, Samuel Insull consented to reopen negotiations for the sale of the elevated lines with his first definite price offer. The sum he fixed was \$90,000,000. The ordinance as adopted by the traction committee carried a tentative price of \$79,000,000 for the elevated. The ordinance is subject to referendum in April. It provides for the following expenditure by the city to be met entirely with notes: Surface Lines, \$163,091,038; elevated inside city, \$79,000,000; elevated outside city, \$1,200,000; subway and extensions to surface lines and elevated, \$360,000,000. There is an optional plan for additional subway and elevated construction by the city if Mr. Insull and the city cannot agree on the sale of the elevated lines operated by the Chicago Rapid Transit Company.

The fine hand of former Mayor William Hale Thompson, actuating the Federation of Labor mouthpiece in the Chicago City Council, had a few days before thrown into confusion a traction committee meeting, at which Mayor Dever presented the price figure for the purchase of the Chicago Surface Lines. The cardinal purpose—the setting of a price limit for negotiating with the elevated lines—was frustrated, however, and the committee subsequently

adopted a figure submitted by Major R. J. Kelker, Jr., its engineer.

The Mayor had hardly completed the presentation of the surface lines terms of \$162,000,000 than Alderman Oscar Nelson, a political stepchild of Thompson, adopted to keep the traction question in politics, sprang to his feet with questions taken literally from the Hearst newspapers. The Mayor strove to make himself heard over the babble and the pounding of Chairman Schwartz's gavel. The chairman asked the Mayor not to answer questions directed from outside the committee, but the Mayor insisted upon doing so. He prefaced his statements with the remark that nothing he would say could change Nelson anyway, but might help to inform other listeners.

The questions were typical of Hearst, Thompson and Hylan, full of innuendo and misstatements. A few hours before the meeting the Hearst afternoon paper came out with big headlines: "New Joker Found in Car Plan." The "joker" turned out to be the legal form of the referendum proposition for the purchase and operation of the lines, which is prescribed by state law. That the opposition is based on demagoguery is evidenced by the fact that the hostile element is as bitter toward the company as toward the city and never offers a constructive plan to replace what it seeks to destroy.

The Mayor declared the deal whereby the city sought to acquire the finest

traction system in the country without paying a nickel or obligating itself to pay a nickel regardless of the success or failure of the project was the most unusual in the history of finance. If the purchase fails, he said, the lines will be thrown into federal receivership in 1927.

"Chaos," he said, "will be at hand. Money could not be had and the lines would decay. We could not hope to get it out of receivership before 1930.

The Mayor departed when Chairman Schwartz told one of the intruding Aldermen that he had no time to waste on "a silly and insulting fool" and the row went on without the presence of the chief executive.

Chestnut Street Tube Ordinance Signed

Mayor Kendrick of Philadelphia, Pa., signed on Feb. 2 the ordinance authorizing the construction of the Chestnut Street surface subway under agreement between the city and the Philadelphia Rapid Transit Company. In a message to Council the Mayor told why he had signed the Chestnut Street ordinance. He quoted a record of approval of the subway project even extending back to the previous city administration. He explained that every dollar of the cost was to be returned to the city and said the project eliminated expensive proposals to widen the thoroughfare. Following the receipt of the message Councilman Walter, chairman of the transportation committee, moved suspension of the rules to place another transit ordinance on third reading and final passage. He then called up the ordinance granting the request of the Philadelphia Rapid Transit Company for permission, as the city's partner, to sell \$10,000,000 of bonds of the issue of 1912 and to increase the interest from 5 to 6 per cent. These bonds have been used chiefly as collateral for short-time loans.

In connection with the bond proposal Coleman J. Joyce, counsel for the company recently explained that 100 cars and 213 buses were to be purchased and that the first payment would be \$1,072,000. Next \$60,000 would be spent on shop equipment, \$128,000 on electric equipment and \$270,000 on extension of track. In addition, \$170,000 would be spent for improvements to tracks and other work in connection with the city street paving program. There would be \$1,700,000 as additional capital left for other improvements.

Rerouting and Through Routing in Pittsburgh

In a decision made public on Feb. 4 by Chairman Charles A. Findlay of the Pittsburgh Traction Conference Board, Pittsburgh, Pa., rerouting and through routing of cars of the Pittsburgh Railways, are authorized for a period of 60 days. This matter of short routing as proposed by the company has been the subject of discussion for many weeks. The board explains that the schedule which it has prepared has been arranged to maintain the best possible service for the largest number of riders, and at the same time to reduce as far as possible the number of cars passing

through the areas of greatest congestion.

The report stated that the unprecedented increase in vehicular traffic during the past few years had made it impossible to conduct a satisfactory system of transportation over the routes now operated in the congested section of Pittsburgh, because of insufficient street area. The opinion said that it was not unusual for a car with a schedule of 12 or 14 minutes to consume from 30 to 40 minutes in negotiating the congested area.

The rerouting plans offered two elements of possible relief: First, the introduction of fewer cars in the congested area of the triangle; and second, rerouting. The report stated that the changes involved in the proposed plans were advanced as a tentative method of meeting difficulties in the downtown section.

Following the announcement by the railway officials that the plans would be placed in effect "in about a week," the downtown merchants said they would "fight to the last ditch" to prevent the modified short looping plan.

Petition Filed for Buses in Richmond

The Virginia Railway & Power Company has petitioned the Common Council of Richmond, Va., requesting that body to adopt an ordinance granting the company permission to operate 8 bus routes extending to every section of the city and suburbs. The company says that if the Council acts promptly it is prepared to start its supplemental bus service as soon as the equipment can be obtained.

Coincident with the company's plan to obtain an ordinance, announcement was made that the Richmond Rapid Transit Corporation, an independent bus line, would fight to the limit the entry of a competitor in the motor transportation field. H. V. Godbold, vice-president of the corporation, said that his company would protest the granting of a permit; that he held a 30-year franchise, and that he stood ready to extend bus service to any part of the city that the Council might require. He said he believed that the Council would protect the interests of a pioneer in the local bus transportation field.

It is the contention of the railway that the ordinance requested by it would not necessitate any action for which the Council has not established a precedent. An official of the company pointed out that the Council had granted the Rapid Transit people permission to parallel the street car lines on Broad Street and that the railway company in turn was merely asking the right to parallel the bus lines in the West End section.

The railway company emphasized the fact that it was offering the public the bus-to-street-car transfers which the bus corporation was unable to meet. In the case of a transfer from a street car to a bus the passenger will be required to pay the difference of 2 cents between the fares. If the plan is adopted it is said that it will establish a remarkably inclusive transportation system, embracing the suburban sections of the city.

Important Improvements in Track at Montreal

Formal announcement has been made of some of the new work to be carried out by the Montreal Tramways, Montreal, Que., hinted at in the *ELECTRIC RAILWAY JOURNAL* for Jan. 24, page 162. Perhaps the principal work in sight during the coming season is for the relief of congestion in the downtown districts. For some time past the company had been considering plans to relieve congestion in the main arteries of trade downtown and these plans are now being considered by the Montreal Tramways Commission, the executive committee of the city and the officials of the company.

A terminal loop will be built around the Power Building on Craig Street, so that cars from east and west, as well as north, will turn around the new loop. A sheltered transfer station is to be built at this terminus.

In order to carry out this work, the tramway has bought the properties extending from the Power Building on Craig Street to Cote Street, and also at the northeast corner of St. Urbain and Craig for a distance up St. Urbain.

This will make room for cars to run on a loop from St. Urbain to Cote Street around the block, all cars on this loop stopping at the new covered waiting platform which is to be at the corner of Cote and Craig Streets, the old buildings now at that corner to be pulled down.

Franchise Discussion Revived in Columbus, Ohio

Members of the City Council of Columbus, Ohio, recently authorized Councilman Henry Worley, head of the utilities committee, to reopen negotiations with the Columbus Railway, Power & Light Company, Columbus, Ohio, in an effort to obtain a 25-year franchise, to become effective upon the expiration of the present contract on Feb. 1, 1926.

Representations of the city are agreed upon fixing a ticket charge based on the actual cost of carrying passengers plus a fair return on the property value. They also would have the rate question readjusted every 5 years. Another plan is to have present car lines extended according to the increase in population as against a maximum of 10 miles a year proposed by the company in a former meeting.

It is said that representatives of the city favor seeking to require the company to continue its former method of assisting in the paving of streets in which there are tracks by caring for the street between the rails as well as 1 ft. on each side.

Wages Increased.—P. J. Murphy, vice-president and general manager of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., known as the Laurel Line, recently announced an increase of 2½ cents an hour in the pay of trainmen retroactive to Dec. 1, 1924. He said that by the terms of the new scale the men of the Laurel Line would receive 69 cents an hour. A number of minor changes were made in the working conditions.

New Era in Utility Relations in Dallas

Dallas, Tex., has recently been through a period of inquiry with respect to the need for continuing the 6-cent fare on the lines of the Dallas Railway. The whole proceeding was most amicable, and this has led the *Dallas Dispatch* to contrast the present situation with the one that existed 10 years ago. That paper said that those who recall the acrimonious days of 10 years ago when the railway and light companies' affairs were a matter of the most intense public interest will read of the 6-cent fare hearing with interest and satisfaction. As that paper saw it, the outstanding feature of the inquiry was the frankness and directness of Messrs. Hobson, Meriwether, Worsham and others intimately connected with the management of the railway. The *Dispatch* said:

It was quite palpable they were dealing with the public's representatives openly and above-board. It is well. The city and the car company have the same aims. The city wants good service from a profit-making street car system. The company wants to give it because it knows that that is the real way to continued success. The city is willing to pay for good service and the company perhaps would not take a higher fare than 6 cents, even if it could get it.

The *Dallas Dispatch* has frequently said that the greatest contribution made to the development of Dallas in 20 years was the settlement of the public utility problems started by Henry D. Lindsley as Mayor. He lost his political life bringing about the present satisfactory conditions, and incidentally Dallas thereby lost its most valuable public servant and citizen. But the good that men do lives after them and this applies also to Henry D. Lindsley, now a resident of New York.

Another outstanding feature of the investigation was the dominance of the city of Dallas brought about by the unequalled public service of John W. Everman, city supervisor of public utilities, and his assistants. The people, the City Commission and the traction interest equally benefit by his demonstrated fitness for his position.

Approves One-Man Cars in Little Rock

A protest against the operation of one-man cars in Little Rock, Ark., was overruled by the Public Utilities Committee of the Little Rock City Council at a recent meeting. The report of the committee on the protest against the operation by the Arkansas Central Power Company of the lately installed one-man safety cars was brief and in favor of the use of the new cars. The report was adopted by a unanimous vote.

L. P. Newton, local attorney, representing the protestants, outlined the objection to the one-man cars. He contended that the use of the cars was an inconvenience to the public; that it interfered with the enforcement of the "Jim Crow" law and that the operation placed too much responsibility on one man.

Five motormen who have been operating the new cars since they were installed Dec. 25, testified that their duties were less burdensome than under the two-man system; that the schedule was being maintained without difficulty, and that they had experienced no trouble in segregating white and negro passengers.

The report of the committee said in part that after hearing all evidence introduced by both sides it was of the

opinion that, while there was some confusion and delay during the first few days in the operation of the cars, the company had eliminated the causes and the cars are now being operated on schedule. The committee was further of the opinion that the company was to be commended for its efforts to provide the most modern and adequate facilities.

New Idea in Coach Service

A no-transfer motor coach route from the Hill district to the business section of the City of Toronto, Ont., is to be started in the spring by the Toronto Transportation Commission. The service, which will consist of single-deck buses run at a 10-cent fare, will tap districts where patrons travel in their own cars. Heretofore, the bus has been used in Toronto merely as a railway auxiliary and has provided service on outlying routes in Rosedale. The new service will, in a sense, compete with the T.T.C., but actually it is designed to secure traffic which the tramway company does not now get at all. D. W. Harvey, general manager, said that this new service would be self-supporting and its accounts would be kept separately from the railway accounts. He said the purpose of the new line was entirely different from the company's bus activities in the past and it was his belief that inasmuch as the coaches would serve passengers who now use their own cars the downtown parking situation would be greatly relieved.

Buses Get Through When Railway Suspends

The New Jersey Interurban Traction Company, Washington, N. J., on Feb. 7 abandoned efforts to clear its line, discharged the men who have been shoveling snow and started a bus running between Port Colden and Phillipsburg. Three more buses are to be added. Permission will be asked of the Public Utilities Commission to extend the bus service to Hackettstown, 10 miles east of Washington, to Oxford and to High Bridge.

The trolley line, 20 miles long, was built 30 years ago. The original organization, the Easton & Washington Traction Company, went into bankruptcy. The road was taken over by the Northampton, Easton & Washington Traction Company and that in turn was superseded by the present corporation.

The trolley fare was 7 cents for each of the seven zones, but the rate will be increased to 10 cents on the bus.

Baltimore-Washington Bus Permit Refused

The Public Service Commission of Maryland has refused a permit for the establishment of a de luxe bus line between Baltimore and Washington. It holds that present transportation facilities are adequate and that the traffic on Washington Boulevard already is unduly heavy. The proposed bus line would have come into competition with the one electric line and the two steam railroads operating between the two cities.

Rates Working Out Satisfactorily

In its annual report submitted recently to Governor Silzer the Board of Public Utility Commissioners of New Jersey said that the rates now charged by the Public Service Railway were working out to the satisfaction of the public and to the advantage of the company better than would be the case had an attempt been made to overcome the deficit by charging a higher basic fare. The commission sees no improvement in the condition of street railway lines operating in and between the smaller municipalities. This it attributes to increases in operating costs, development of the bus and the increasing use of private automobiles.

The report says it is a matter of grave concern that several railways have been compelled to abandon franchises and discontinue service and that the largest company, the Public Service system, has failed to earn an adequate return under a system which the commission regards best adapted to conditions under which it operates.

More Rental Would Mean More Development

Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, Philadelphia, Pa., recently offered the city of Frankford more "L" rental if the money were applied to improve land in the northeastern part of the city. The additional rental of about \$110,000 would begin in 1926 and would be sufficient to release \$13,000,000 of the city's borrowing capacity. The \$13,000,000 represents the city's investment in the construction of the "L." If these suggestions are carried out much unimproved land in that section of the city will be made available for homesite development. An additional rental of \$110,000 would bring the P. R. T.'s annual payment for the "L" to \$830,000. Its total additional payments during the remainder of the life of the 50-year bonds issued for the construction of the "L" would be about \$5,000,000.

Rochester in Throes of Bus Fight

Rochester has a miniature bus war, with the New York State Railways and the Ridge Road Bus Line as the contestants and the Common Council as the referee.

The Ridge bus line operates from Rochester to Hilton, over a 20-mile route. Recently the line ended its run at the union bus terminal in the heart of the city. The New York State Railways, contending that the bus company's franchise did not call for service within the city limits, caused the buses to be halted at the edge of the city. The traction company maintained that the bus men must obtain a state certificate or special franchise. James J. Dadd, secretary of the Auto Bus Association of New York State and manager of the bus terminal, met this statement with the charge that the railway has not furnished adequate transportation for the residents of the Ridge Road section. An ordinance which would allow the buses to end their run at the terminal has been introduced into the Council.

Monongahela-West Penn Operations Enlarged

Final steps have been taken in a plan which will link together in one system a number of the large electric light and power companies operating in West Virginia, Ohio and Maryland. To this end a consolidation and unification of all the electric light and power companies of the West Penn System within the three states had been effected. This was done through the transfer of the properties concerned to the Monongahela-West Penn Public Service Company. The properties and assets thus involved were of the Brooke Electric Company, which operates in Brooke, Hancock and Ohio Counties, West Virginia; the West Virginia and Maryland Power Company of Preston, Taylor, Barbour, Randolph and Mineral Counties, West Virginia; the Parsons Electric Service Company of Upshur County, West Virginia; the St. Mary's Power & Light Company, Pleasant County, West Virginia, and the West Maryland Power Company of Garrett County, Maryland.

The Monongahela-West Penn Public Service Company, already operating in Monongalia, Marion, Wetzel, Tyler, Wood, Harrison, Lewis, Barbour and Braxton Counties, West Virginia, and Washington County, Ohio, will be made by the acquisition of the largest public utility corporation in West Virginia. The West Penn Company, which is controlled by the American Water Works & Electric Company, Inc., of New York, is likewise the owner of the West Penn Power Company, the West Penn Railways and the Wheeling Traction Company, together with their subsidiaries. Operation and management of the enlarged Monongahela-West Penn Public Service Company will continue under the administration of Capt. George M. Alexander, president, with headquarters at Fairmont, W. Va.

Gasoline and Weight Tax Bills Passed in Michigan

The 2-cent gasoline tax bill and the 55-cent weight tax bill have been passed by both houses of the Michigan Legislature and will be given immediate effect upon signing of the Governor, considered a certainty. The weight tax bill taxes passenger cars 55 cents per hundredweight and trucks on a graduated scale from 65 cents per hundredweight up to 2,500 lb., to \$1.25 on trucks of more than 6,000 lb. The weight tax is expected to raise about \$14,500,000 and the gas tax about \$6,500,000.

Carhouse Held Up at Chicago

Desperadoes staged a spectacular robbery in the Chicago Surface Lines Leavitt Street carhouse early in the morning of Feb. 2. They are said to have got away with \$9,000, the receipts of late Saturday and Sunday. At 2:30 o'clock in the morning the leader slid off a 10 ft. steel inclosure, dashed through three offices and confronted David Jones, cashier, with a gun. Six other bandits followed. They slid the nickels, dimes and other coins into canvas bags, tied them and passed them outside. Two conductors in the next

room would have known nothing of the robbery but for a rifle pointed at them while the bandits worked. The robbery is the first of its kind in Chicago since the notorious trio of 1903 killed two employees and two detectives and withstood a long siege in the Indiana dunes. In the round-up following the recent robbery three former employees of the lines were arrested.

Effective Good-Will Ad in Atlanta

As part of its campaign of general public utility advertising the Western Electric Company recently used in the Atlanta, Ga., papers copy that was distinctly appropriate. The appeal to



Better mix a few street cars in the mortar

YOU who are planning homes in the suburbs, should look on the cars you see on the street as part of the very foundation. Dependable cars served here a lot to do with your satisfaction as a year home—and its resale value.

That's only another way of saying that it will pay every Atlantian to see to it that the street car company is getting on a basis where they can extend and improve service.

Such an expansion and they will play a very considerable part in the expansion of Atlanta—bringing more people, more industries, more prosperity to our city.

Western Electric Company

Some Facts for the Public to Ponder

Atlantians was to mix a few street cars in the mortar of new construction. The ad carried its own message, the purport of which was that it would pay every Atlantian to see to it that the railway is put on a basis where it can extend and improve service.

Claim Agent Discusses Fakery in Daily Paper

Trevor C. Neilson, claim agent of the East St. Louis & Suburban Railway and related lines, East St. Louis, Ill., and president of the Mid-West Claim Agents' Association, was interviewed recently by James B. Clendenin of the East St. Louis *Daily Journal* on the subject "How Accident Faker Preys Upon Street Railways." He reviewed a number of accident cases entitled to a settlement for claims and some of the false ones that were either perpetrated or attempted. In the course of his article Mr. Clendenin said:

And despite the machinery that is at work in the war on fakery, some of them still get away with it, but not in the numbers of former years, in which there was no satisfactory contact between the claims departments of the various utilities.

While any number of the evils of antiquated systems of handling claims have been remedied, a number still exist that only the legislative branch of the state government can eliminate, it is Neilson's opinion. The most stubborn obstacles still in the way to a fair settlement for both sides is the Illinois law which makes it impossible for the defendant to force a medical examination in cases where claims are made for physical injuries.

Cities of New York State Favor Bus Bill

The legislative committee of the New York State Conference of Mayors, at a meeting held at Albany on Feb. 5, went on record as favoring the "purpose and principle" of the Walker-Bloch municipal bus bills which, introduced at the request of the Hylan administration, would give to New York and other cities the right to own, operate or lease municipal bus lines. The 5-cent-fare provision did not meet with the approval of the entire committee. The committee opposed a bill which would make the officials of any city individually liable for damages caused by buses which were being operated without a certificate from the Public Service Commission. This measure is said to be aimed at the Hylan buses in New York, which are being run without the consent of the Transit Commission or the Public Service Commission.

Trainmen at San Diego Receive \$10,870 in Accident Awards

Claus Spreckels, vice-president and general manager, recently presented to the trainmen of the San Diego Electric Railway, San Diego, Cal., checks totaling \$10,870 as a prorated bonus based upon each man's accident record for the year just closed. Thirty of the men were rated at 100 per cent. Each received a check based upon the hours he had served during the year.

The gifts were distributed at a meeting that followed a dinner by Mr. Spreckels to the department heads at the San Diego Hotel. A feature was the presentation for Mr. Spreckels of two beautiful watches to J. C. Boronda and T. H. Bailey, in celebration of their completion of 20 years of service with the company. The presentation was made by M. J. Perrin, who recently started his 38th year of service with the company.

Mr. Spreckels presided. He pointed out that it is the aim of the railway to assist in the city's growth by furnishing transportation that will permit the city to expand and attract additional population. He said that the railway can prosper only as the city prospers. Part of his plea follows:

You employees can influence the growth of our city, the success of the company, and consequently your own prosperity more than you realize. The ballot is one of your most effective tools. When you cast your votes in any city election, do it with the single idea of benefiting the whole city. Do not consider an individual personal benefit which may jeopardize the general welfare.

In your public relations, too, you can help San Diego grow. Choose the right men to govern the city; help them with your ballot to make it grow; give the public the best that is in you; and your little piece of real estate or your job will be worth more. You will profit, and so will the company. And the city will profit most of all.

Large Capacity Buses Under Consideration in Seattle

Plans for equipping feeder lines to the Seattle Municipal Railway, Seattle, Wash., with buses like those now in use in Chicago, Detroit, New York City and other Eastern cities have been laid before the Seattle City Council by representatives of one of the bus builders.

News Notes

Bus Operation in Greensboro.—The Greensboro Bus Company, a newly organized subsidiary of the North Carolina Public Service Company, Greensboro, N. C., recently started the operation of three buses supplementing its railway service. The bus service will accommodate residents in this vicinity not reached by railway lines. Buses are of the latest 22-passenger street car type, manufactured by Graham Brothers of Detroit. The fare on the buses is 10 cents, and free transfers are given passengers from buses to the street cars. A charge of 3 cents will be made when passengers enter the bus with a transfer received from the street cars at Jefferson Square.

Serious Accident on "L."—Two people were killed, six seriously injured and 50 received treatment for bruises when a southbound five-car shuttle train of the Interborough Rapid Transit Company telescoped another train early on Feb. 9, ramming into a stationary Third Avenue "L" express on the White Plains Road. The train was traveling through a very heavy fog which hid a sharp incline leading down to the 219th Street station. The collision caused a tie-up in service of 6 hours. Engineers of the company declared that the veteran motorman who lost his life had been guilty of violating a rule of the company which prescribes strict conditions for operation during a fog.

Indianapolis Company Purchases Bus Company.—The Indianapolis & Cincinnati Traction Company, Rushville, Ind., has purchased the Indianapolis-Shelbyville bus line from its owners, Harry J. Lay of Ridgeville, Ind., and Roy C. Lee of Shelbyville, Ind. Hudson R. Biery, assistant to Charles L. Henry, president of the traction company, said that aside from giving the public better service on the bus line little change would be made in its operation. Eight trips each way are made daily by the bus line.

Buses Will Supplant Railway Cars.—Notices have been posted in the cars of the Cumberland & Westernport Electric Railway that within the next 60 days railway service will be discontinued on the run between Frostburg and Cumberland, Md., in favor of bus service. Railway service on the Frostburg-Westernport end will be continued.

Bus Privilege Extended.—The Oskaloosa Traction & Light Company, Oskaloosa, Ia., has been granted a 90-day extension of the bus privilege now operative in First, Fifth and Fourth Wards. The extension was granted pending the placing of a franchise amendment before the voters of the city at a special election to be held as soon as it can be lawfully handled.

Official Takes Vacation.—Thomas N. McCarter, president of the Public Service Corporation, Newark, N. J., and Mrs. McCarter sailed on the S.S. *Rotterdam* on Feb. 4 for a trip to the Mediterranean. They will be gone until about April 15. This is the

longest vacation Mr. McCarter has taken in 35 years. He plans to leave the ship at Naples and motor to Paris, then to catch the Rotterdam at Boulogne to rejoin the cruising party.

Rapid Transit Course to Be Given.—Another institution which feels the need of offering instruction in rapid transit development is the College of the City of New York, School of Technology. This school will offer a special course in rapid transit and traffic, according to an announcement of Dean Frederick Skene. Aside from the study of construction of new lines, especially underground, emphasis will be placed on the means whereby the present trackage can be made most useful. The Board of Transportation, through Commissioner Delaney, its chairman, has approved the course and recommended George Abraitys, chief of the designing division of the board, to give it.

Line Will Continue.—The Washington-Virginia Railway, Washington, D. C., will be continued in operation indefinitely. This was decided on Feb. 5 by a committee representing about 90 per cent of the bonds outstanding. It had been expected that the line would discontinue operation following the granting of a permit to R. L. May to operate buses between Alexandria and Washington and the subsequent denial of a similar permit to the railway by the Virginia Corporation Commission. The company has asked a permit to run the bus line between Alexandria and Washington as a feeder for the cars which are operated to Fairfax, Falls Church and Mount Vernon.

Bus Permit Extended.—The Charleston Interurban Railway, Charleston, W. Va., was recently granted a 4 years' extension on a permit by the City Council for operation of a bus line to the Upper Glen Elk district of the city. Originally the permit was for one year. The company did not consider a one-year permit sufficient to warrant the necessary investment of more than \$25,000 that would be involved to provide adequate equipment.

Interurban Meets Steam Line Rate.—The Illinois Commerce Commission has authorized the Illinois Traction System to publish on one day's notice a rate of 91 cents per ton on coal shipments between Springfield and Decatur, Ill. This is a reduction of 10 cents and permits the interurban line to meet the steam railroad rate.

Conference to Discuss Transit.—The Cincinnati, Ohio, Rapid Transit Commission has adopted a resolution inviting representatives of the Cincinnati Street Railway and the Cincinnati Traction Company to a conference to be held on Feb. 20 for the purpose of discussing the transit situation. The resolution was offered following a statement by John V. Campbell, attorney for the commission, who said that he thought representatives of the two groups should be asked to discuss the leasing of the transit loop. Any agreement reached would have to be first submitted to the Council and later to a popular referendum. This referendum might be held during the August primary, and could certainly be held at the November election.

Experiments with Sunday Pass.—Because receipts on Sundaya fell far below the cost of operation, the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., recently started the Sunday pass, as an experiment for 10 Sundays. The passes are sold for 25 cents each.

Wage Increase Sought in Des Moines.—An increase in wages has been suggested by trainmen of the Des Moines City Railway, Des Moines, Iowa, when the present agreement expires on March 1. The present scale is based on a 59-cent hour with insurance and pension features secured under an arbitration board recommendation last year. The company contends that there can be no reduction in fares as long as operating expenses continue at the present level. F. C. Chambers, president of the company, has suggested increased use of one-man cars and the co-ordination of buses with the railway.

Employees 100 per Cent for Safety.—All operators of the cars of the Knoxville Power & Light Company, Knoxville, Tenn., have enrolled in the Safe Drivers' Club, which was recently organized, the total membership of which is now 305. The red emblem recently appeared on the windshields of autos and street cars on the streets of Knoxville, indicating that owners and operators are members of the club, and that their aim is to reduce the number of accidents. Formation of the club was urged by the Knoxville *Sentinel* in conjunction with the Knoxville Automobile Club.

Railway Refused Bus Certificate.—The Public Service Commission has refused the application of the Mauch Chunk & Lehighon Transit Company, Mauch Chunk, Pa., for a certificate to operate a bus line between Mauch Chunk and Weissport. The commission said that the company's application was for operating rights over a route already provided with service by George Arner. The railway sought to discontinue its line from Flagstaff Park to Mauch Chunk and Lehighon.

A More General Bill to Be Introduced.—Instead of the bill recently introduced to permit the Jacksonville Traction Company, Jacksonville, Fla., to operate buses charging a fare of 10 cents, the laws and rules committee of the City Council will recommend an amendment to the present "jitney bus" ordinance which will allow any one to operate buses provided operators execute a bond for the protection of property and passengers. It is expected that the bond will be \$5,000.

Weekly Pass in Leominster.—The weekly pass has been put into effect by the Worcester Consolidated Street Railway in Leominster, Mass., for a trial period of 3 months with the approval of the Massachusetts Public Utilities Department. The plan provides for the issuance of a pass at a cost of 75 cents. The city of Leominster, with a population of 20,000, has a 7-cent fare from the center to limits beyond the edge of town, or 14 cents across. The pass is good for a limited area around the center sufficient in extent to take care of practically all riding from factories, offices, stores and homes.

Foreign News

New Zealand Property Has Successful Year

Christchurch Tramway, Christchurch, N. Z., had a deficit in its operations for the year ended March 31, 1924, of about £7,000, which will be more than covered by the amount carried forward. Christchurch Tramway, the largest tramway undertaking in the dominion, consists of 78 miles of single track and has an annual revenue of approximately £261,000. As it is a publicly owned concern, it is the policy of the Tramway Board not to make a profit, but so to arrange its finances as to produce the barest possible surplus, at the same time stating that the trams must pay their way and not become a burden on the rates. On March 31, 1922, there was a surplus of £4,009. At the same date in 1923 it was £6,527, giving a total of £10,536 and leaving a balance of £10,271 carried forward to the 1924 account. The number of car-miles run was 3,374,000, a decrease of about 84,000. The passengers carried totaled 25,450,000, an increase of about 350,000.

In his report, which antedated the closing of the year by about one week, A. S. Taylor, chairman of the Christchurch Tramway Board, discussed at length the fare situation in the past and offered some suggestions for the future. On the subject of bus competition he said the board's experience in that direction had not been a fortunate one, and further, that losses had been made both on the Hornby and South Brighton buses. He suggested the board considering the advisability of obtaining a fleet of half a dozen buses which could be used to test new routes.

Electric Buses for Lyons

Tramway service in Lyons, France, has recently been supplemented by the establishment of a bus line, after consideration of several types of vehicles. During 1923 a test was made of an electric storage battery bus of a type similar to those in use in Rome, Milan and other Italian cities. Following this successful trial it was decided to adopt substantially the same design for the new vehicles.

Electrical equipment was furnished by Rognini & Balbo of Milan and the mechanical equipment by De Dion-Bouton. This storage battery bus has five forward and two backward speeds. The speed is varied by changing the motor connections without making any change in the mechanical transmission. The controller is actuated by a pedal. Power is furnished by two motors mounted just back of the rear axle, one motor driving each rear wheel. Seats are provided for 28 passengers, while standing space for 12 more is provided on the rear platform. The bus is operated by two men, the driver being in a closed compartment at the front.

The new service was inaugurated by M. Herriot, now Premier of France,

and formerly Mayor of Lyons, on the fifteenth anniversary of the electrification of the suburban lines.

British Tramway Statistics

There are 243 tramway undertakings in Great Britain, operating 2,624 miles of track, according to the annual return of the Ministry of Transport for the year ended Dec. 31, 1923, for municipal properties, and March 31, 1924, for privately operated companies. Of this number municipal authorities operate 170 undertakings, comprising 1,839 miles of track, and 73 companies, totaling 785 miles of track, are privately operated. The capital expended by local authorities was £71,341,947 and by private companies £20,876,610, the total being an increase of £3,128,053 as compared with the previous year. The total gross receipts were £29,433,647 and the expenditures £22,882,028, leaving net receipts of £6,551,619, or a decrease of £880,999 as compared with the previous year.

The net income available for distribution was £7,956,147, out of which £2,195,039 was appropriated for interest and dividends, £1,913,930 for payment of debts and £2,143,066 for reserve and renewal funds.

The number of passengers carried was 4,443,326,581, an increase of 2.18 per cent; the number of car-miles operated, 363,057,881, an increase of 3.17 per cent, and an increase of 5.31 per cent in electric energy used. The average receipt per passenger was 1.53d. as compared with 1.66d. the previous year.

The municipal tramways received from local rates the sum of £256,777 and contributed in relief of rates £280,537. The tramways requiring most help were those of municipalities in the outskirts of London, where bus competition is intense. West Ham required help to the extent of £63,000; East Ham, £35,000; Croydon, £18,000, and Walthamstow, £15,000. Of the tramways operating at a profit the most successful were Leeds, which contributed £65,000 to the relief of local rates; Birmingham, £27,000; Cardiff, £22,000; Hull, £21,000, and Blackpool, £15,000.

Travel in Berlin Falls Off

During the first 11 months of 1924 passengers on the various transportation lines in Berlin, Germany, numbered a little more than 1,231,400,000.

THOUSANDS OF PASSENGERS CARRIED IN BERLIN, JANUARY TO NOVEMBER, INCLUSIVE

	1924	1923
Stadtbahn.....	565,000	850,000
Elevated and subway.....	162,000	153,589
Surface railways.....	462,800	278,476
Omnibuses.....	41,635	21,730

This was a slight decrease from the 1,304,693,000 of the previous year. There were very notable changes, however, in the distribution of this travel, as shown by the accompanying table.

New Route Number System for Glasgow

A new system of route numbers on the municipal tramcars of Glasgow, Scotland, came into use on Oct. 1, 1924. These numbers, which are displayed at the top of the center vestibule window at either end of the car, indicate the destination as well as the route. For example, on the Ronken Glen route all cars turning at Shawlands, the nearest terminal from the center of the city, display the number 2. Cars turning at Newlands show 2A, at Merrylee 2B, at Giffnock 2C, and those going all the way to Ronken Glen show the number 2D.

The numbers are also being displayed at the most important stopping places, and a small map showing the numbering of each route has been prepared for the public.

Paris Metro Subway Fined. — The Metropolitan and Nord-Sud subways in Paris have been fined 600,000 francs for their failure to supply their temporary employees, as well as regular employees, with old-age pension books. The case has been in the courts for more than 2 years, but unless the companies appeal further the matter is now settled.

British Tramway Abandonments. — Buses are to be operated by the Sunderland District Tramways Company, Sunderland, England, the tramway rails removed and equipment sold, due to the bad condition of the equipment. Trackless trolleys will be substituted for tramways in Chesterfield. It would cost approximately £90,000 to put the tramways into proper repair and renew the rolling stock, while the cost of the trolley bus system is estimated at £39,000.

Weekly Pass Successful in Hull, England.—The number of weekly passes sold by the Hull Tramways has increased from 2,453 in the first week to 4,600 in the last week for which figures are available. The total tramway receipts, which had been decreasing, now show an increase over the corresponding weeks of the previous year. Reference to the installation of the pass in Hull was made in ELECTRIC RAILWAY JOURNAL, issue of June 14, 1924.

Bradford Proposal for Relief of Congestion. — Construction of terminal sidings near the curb at fare stages, with the necessary deflection of the car tracks, is now being considered by the Town Council of Bradford, England. It is thought that this will reduce obstruction to general vehicular traffic, caused by stationary tramcars in the middle of the street, thus relieving traffic congestion in a measure.

Electric Buses to Be Tried in Paris. —The Paris Transports en Commun is to experiment with a new storage battery bus, of the same type as those put in service in Lyons last October. It is expected that the electric bus will serve for suburban traffic running from the big centers, rather than general interurban traffic. The disposition of the French to develop the electric vehicle is to secure freedom from foreign sources of supply for liquid combustible.

Financial and Corporate

Denver Reorganization Progressing

Committees Are at Work on Plans for Discontinuing the Receivership—Earnings Greatly Improved

Representatives of the stockholders, the holders of a defaulted \$10,107,750 bond issue and holders of approximately \$2,500,000 in notes of the Denver Tramway, Denver, Col., are working on the formulation of the reorganization program for the company. Tentative plans have been advanced to effect the rehabilitation on the basis of an assessment of \$10 on each share of the \$5,948,000 of stock outstanding, cutting the bonded indebtedness of \$10,107,750 in half by substituting \$500 in stock and a new \$500 bond for each \$1,000 bond of the defaulted issue and by the creation of an issue of preferred stock to be given to the holders of the collateral trust notes to the amount of \$2,498,000 now outstanding. Other issues would apparently be left undisturbed.

Ernest L. Stenger, who has been in charge of the company as receiver, has been mentioned for president under the contemplated reorganization.

Interest has been paid during the receivership only on underlying securities. Interest has been defaulted on the first and sinking fund 5s, on the 7 per cent notes and on a \$278,100 issue of Denver & Northwestern first and collateral bonds of 1932.

The net income of the company for 1924 was \$261,000, as compared with \$199,842 for 1923, a gain of 31 per cent.

It will be recalled that the federal court recently ruled that the city of Denver should be permanently restrained from enforcing fare contracts and ordinances and that the court construed the company's franchise as perpetual. At the same time the valuation of the company was fixed at a figure which permits the earning of a sum sufficient to warrant continuation of the present 7½ and 8-cent schedule.

Bearing on the movement for the reorganization is the fact that the company has shown a deficit only four months during the receivership and that its average net earnings have been \$200,000 a year.

During that period interest amounting to \$2,776,000 has been defaulted on bond issues, but \$2,750,000 has been spent upon improvements and renewals.

Engineers Buy Attleboro Road

The Interstate Consolidated Street Railway, Attleboro, Mass., was sold at receiver's sale on Jan. 30, to Hemphill & Wells, New York City. This firm has also concluded negotiations for the purchase of the Attleboro Branch Railroad. It is planned to operate both properties as a single system. The two properties operate 30 miles of track.

The proposed new company will be a local industry under local management, including local business men among its directors. George W. Wells will be vice-president and general manager.

The firm of Hemphill & Wells consists of Albert W. Hemphill and Gardner F. Wells, who formed a partnership 6 years ago as consulting engineers specializing in public utilities. Both are Massachusetts Institute of Technology men and both were formerly with Stone & Webster. They are convinced that the Attleboro system can be put on its feet and made a permanently successful enterprise by applying modern methods.

The companies at Attleboro are operating, in conjunction with the United Electric Railways, Providence, R. I., two through bus lines. One of these runs between Attleboro and the center of Providence and the other connects Plainville, North Attleboro and the center of Providence.

It is planned to establish permanent bus service from Attleboro and North Attleboro to Pawtucket and Providence. This service will be co-ordinated with the trolley service.

Traffic and Revenue Lower in London, Ont.

The gross earnings of the London Street Railway, London, Ont., for the year ended Dec. 31, 1924, were \$665,302, a decrease of \$28,109 compared with 1923. This fact was disclosed in the report of the company submitted at the annual meeting on Feb. 4. The operating expenses were \$546,364, a decrease of \$25,718. Net earnings from operations were \$118,938. After the deduction of fixed charges, depreciation and Dominion income tax, the balance of net income was \$33,903. In 1923 this item was \$42,166.

Although the net income for 1924 was \$33,903, being an earning of 5.32 per cent of the outstanding capital stock, no dividends were paid for the year. On a mileage basis, the revenues show a decrease of six-tenths of a cent per mile operated as compared with the revenues per mile received during 1923. Charles Currie, president of the company, said that the funds representing the net income were used for capital improvements to the property. The company continued its policy of making improvements to its property, reconstructing and relaying trackage wherever the occasion demanded. The equipment was augmented by the purchase of two Peter Witt cars, making five cars of this type now in operation. Approximately forty cars were repainted during the year. In 1924 the number of passengers carried was 13,299,634, against 13,865,148 in 1923. The total number of passengers, including transfer passengers, was 15,048,868 in 1924 and 15,647,343 in 1923. The railway operated 36.10 miles of track.

Scope of Recent Merger

United Light & Power Company Largely Expanded by Continental Gas & Electric Purchase

Reference has been made several times recently in the *ELECTRIC RAILWAY JOURNAL* to the purchase negotiations by which ownership of the Columbus Railway, Power & Light Company, Columbus, Ohio, would pass to the Continental Gas & Electric Corporation interests and so to the United Light & Power Company. Other phases of the negotiations for the expansion of the activities of the United Light & Power Company are of interest.

Some little time ago the United Light & Power Company announced through its president, Frank T. Hulswit, that the company had acquired more than 75 per cent of the outstanding common capital stock of the Continental Gas & Electric Corporation, which controls, through stock ownership, among other valuable properties, the Kansas City Power & Light Company and the Columbus Railway, Power & Light Company. In turn the United Light & Power Company offered to acquire all of the remaining outstanding common shares of the Continental Gas & Electric Corporation, in exchange for its class "B" preferred stock and class "A" common stock.

OPERATIONS ENLARGED

It was stressed in recent statements that the consolidation brings together a number of men who have been long associated with the successful management and operation of public utility enterprises in the Middle West, of whom several will be included on the board of directors of the enlarged company, including C. S. Eaton, Cleveland, Ohio; Joseph F. Porter, Kansas City, Mo., and Rufus E. Lee, Omaha, Neb.

The United Light & Power Company, succeeding a company of similar name organized in 1910, owns all or a very large amount of the common stocks of the following companies: Continental Gas & Electric Corporation, the Tri-City Railway & Light Company, the Chattanooga Gas Company, the Fort Dodge Gas & Electric Company, the Cedar Rapids Gas Company, the Peoples Gas & Electric Company, the Ottumwa Gas Company and the La Porte Gas & Electric Company.

The greatest interest to readers of the *ELECTRIC RAILWAY JOURNAL* attaches to the groups embraced in the properties of the Continental Gas & Electric Corporation and the so-called Tri-City group. The Continental group includes the railway properties at Columbus, Ohio, and in Lincoln, Neb. Both of these are very recent purchases. Only within the last few weeks has the Lincoln deal been approved by the State Railway Commission. It contemplates the merging of the Lincoln Gas & Electric Company and the Lincoln Traction Company. Holders of the preferred stock of the Lincoln Traction Company were offered 50 cents on the dollar in cash or 60 cents on the dollar in Continental Gas & Electric preferred for their holdings. The basis on which the common stock was acquired has not been made public. At

one time this common commanded a price of \$80 a share, but before the purchase by the Continental was made it was offered in small lots at \$5 a share. For 5 years no dividends were paid on the preferred stock, but the accumulated dividends were liquidated some time ago by their payment in additional preferred. Dividends were then resumed, but the last payment was made in 1923.

The headquarters of the Tri-City Railway & Light Company are at Davenport, Iowa. This company through its subsidiaries operates all of the public utilities in Davenport, Muscatine and Iowa City, Iowa; Rich Island, Moline, East Moline and contiguous territory in Illinois.

Public Directors Named for New York Railways

The New York Transit Commission has nominated Samuel L. Martin and George B. Gibbons as public directors of the reorganized New York Railways, New York City. The naming of public directors on the reorganization of existing companies is in pursuance of the policy of the commission carried out in the cases of the Interborough Rapid Transit Company and the Brooklyn-Manhattan Transit Corporation.

Mr. Martin is a native of Virginia. After some business experiences, he was secretary to George McAneny when he was president of the Borough of Manhattan. Later Mr. Martin was executive secretary to Mayor Mitchel. During the war he was connected with the work of the War Trade Board in Washington and Japan. Since that time he has been in the insurance business. Lately he has been vice-president of the United States Merchants & Ship-ers Insurance Company.

Mr. Gibbons is the head of the municipal bond investment house of George B. Gibbons & Company, New York. He was born in Detroit, Mich., but has been a resident of New York for more than a quarter of a century. He was an officer in the New York National Guard for many years and a captain in the 104th Field Artillery of the 27th Division, in France, during the war.

Good Showing Made at Schenectady

A marked improvement in the financial operation of the Schenectady Railway, Schenectady, N. Y., for the quarter ended Dec. 31, 1924, over the corresponding period of 1923, is shown in the report filed with the public service commission. The net corporate income increased more than \$200,000.

REPORT OF SCHENECTADY RAILWAY FOR DEC. 31 QUARTER

	1923	1924
Operating revenues....	\$383,862	\$422,633
Operating expenses....	527,216	321,738
Net revenue	*\$144,354	\$100,895
Taxes assignable to railroad operation	26,475	25,004
Operating income	*\$170,829	\$75,891
Non-operating income.	605	495
Gross income	*\$170,225	\$76,386
Fixed charges	45,061	54,320
Net corporate income.	*\$215,285	\$22,065
*Loss.		

Traffic Continues to Decline

Expenses of Washington Company Decreased—Money Used Liberally for Reconstruction

For the year ended Dec. 31, 1924, the balance of income of the Washington Railway & Electric Company, Washington, D. C., credited to profit and loss was \$256,749. To this was added miscellaneous items making the total credited to profit and loss during the year \$258,036. In 1923 the total was \$287,906.

These figures were all contained in President Ham's report presented to the stockholders at the annual meeting on Jan. 17, 1925. During the year the company carried 77,786,675 revenue passengers and 23,613,607 transfer passengers, a total of 101,400,282. This represented a decrease of 3,731,932 revenue passengers compared with the

CONDENSED STATEMENT OF WASHINGTON RAILWAY & ELECTRIC COMPANY, 1924

Gross earnings from operation..	\$4,759,243
Miscellaneous income (including dividends from Potomac Electric Power Company)	858,802
Gross income	\$5,618,046
Operating expenses (including depreciation), taxes and miscellaneous charges	3,820,621
Interest on funded and unfunded debt	790,675
Payment of dividend on 5 per cent preferred stock	425,000
Payment of dividend on common stock (5 per cent).....	325,000
	\$5,361,297
Balance of income for year 1924, credited to profit and loss	256,748
Miscellaneous items credited to profit and loss	1,287
Total credited to profit and loss during the year	\$258,036

preceding year. Passenger travel has been falling off steadily from the peak, which was reached in the spring of 1920. In 1919 91,488,735 revenue passengers were carried, the greatest number in any single year in the history of the company. The result for 1924 represents a decrease of 13,702,060. This has been due principally to the reduction in governmental activity releasing many employees, the increased use of the private automobile and competitive bus lines.

While operating revenues of the company have fallen off \$271,534 as compared with the preceding year, reductions in operating expenses totaled \$241,028. Although every effort was made to operate the company economically, yet with the large decrease in revenue passengers and the present fare of 8 cents cash or six tokens for 40 cents, it was impossible for the railway to earn a reasonable return on the value of its property even as fixed by the Public Utilities Commission.

Although the earnings were insufficient, the policy of liberal expenditures for maintenance and reconstruction was continued. On this work, and on general repairs and on the allowances for depreciation, \$966,458 was spent.

During the year recently ended 10 new cars of the pay-within type were

placed in operation. Thirteen of the pay-as-you-enter type were converted into pay-within type cars and eight buses were added to the transportation equipment, making the total number of buses now in operation 23. While the operation of buses has not proved compensatory the company adheres to its policy to establish such bus lines as may be necessary. It has repeatedly expressed its willingness to start such lines for the public convenience, believing that the public is best served by the operation of buses in co-ordination with the railway.

The report referred to the splendid results of the safety campaign which was started several years ago. Although the streets seem very much congested due to the great increase in the number of automobiles, accidents have been greatly reduced and the claims situation materially improved.

The company sold on July 17 \$2,496,000 of its general and refunding mortgage 6 per cent 10-year gold bonds dated Nov. 1, 1923. These bonds were sold to retire \$1,000,000 of 6 per cent 5-year general mortgage bonds which matured Dec. 1, 1923, and to provide additions to plant and equipment up to June 30, 1923. The Washington Railway & Electric Company also obtained authority from the Public Utilities Commission under date of Dec. 11, 1924, to issue and sell \$1,850,000 of its general and refunding mortgage 6 per cent 10-year gold bonds, dated Nov. 1, 1923, for the purpose of retiring a similar amount of Metropolitan Railroad first mortgage 5 per cent bonds which matured Feb. 1, 1925. These bonds have not yet been sold.

The total outstanding bonded debt of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, is now \$31,350,750. This added to the \$15,000,000 of capital stock of the parent company and \$95,350 outstanding capital stock of subsidiary companies makes the total outstanding capitalization at this time \$46,446,100.

The total payroll for 1924 of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, was \$4,281,217, an increase of \$95,496 over that of the preceding year.

The accompanying table shows the condensed statement for the year 1924, subject to revision upon final audit.

Philadelphia's Mistaken Attitude

A recent issue of "Service Talks," published by the Philadelphia Rapid Transit Company, Philadelphia, Pa., reminds the public that under the 1907 agreement the city is to divide equally with the company any earnings above the amount necessary to pay 6 per cent dividends, cumulative, on the \$30,000,000 of stock. The stockholders, however, thus far are \$20,000,000 short of having received the dividends contemplated. "Service Talks" says:

Almost every move the company has made to reduce costs or increase revenue has been mistakenly fought by the city. Since all excess earnings over 6 per cent, cumulative, must be divided fifty-fifty with the city, there would seem to be every reason why the city should, in self-interest, now co-operate with men and management in a supreme effort to make city built transit self-supporting.

Massachusetts Property Nearing Desired Goal

The Worcester Consolidated Street Railway, Worcester, Mass., netted enough income in 1924 to pay a dividend of 5 per cent on its stock, according to President Clark V. Wood. This will result in putting the company into the class of public utilities the bonds of which may be held legally by Massachusetts savings banks. This statute provides that a street railway must pay dividends for five consecutive years before its bonds get into the savings bank class. The Consolidated, after a series of years with no dividends, has paid them now for 2 years. Operating receipts in 1924 were about \$570,000 less than in 1923, but operating expenses in 1924 were reduced about \$450,000 over 1923. In other words, the net revenue in 1924 was about \$120,000 less than in 1923. Labor costs were advanced by wage increases granted by the arbitration board under the agreement which expires in the spring, but the working forces were reduced and one-man cars substituted for two-man cars wherever feasible.

Abandonment in Hudson Opposed.—Opposition of the city of Hudson, N. Y., to the proposed abandonment by the Eastern New York Utilities Corporation of its local tracks in Hudson east of Seventh Street was registered at a hearing on the company's petition before the Public Service Commission on Feb. 10. James A. Connell, assistant treasurer and auditor of the company, submitted compilations of figures showing the decrease in the number of passengers and revenue from the local line in recent years.

Revenue Statement Submitted.—The first report of earnings, as required by the Wisconsin Railroad Commission when it ordered an increase in rates on the lines of the Madison Railways, Madison, Wis., was submitted by that company recently. Total revenue passengers for January, 1925, aggregated 616,956, while the gross passenger revenue was \$39,779, the report reveals. The report further shows that the average revenue passengers for January during the 4-year period 1921 to 1924 aggregated 679,608. The average passenger revenues during the same month in the same 4-year period totaled \$39,647.

Municipal Line Shows Slight Profit.—Officials in charge of the Greenfield & Montague Street Railway, Greenfield, Mass., report the 5 months of operation in their charge, August to January, show receipts over expenditures to be \$1,135. Of this money 85 per cent has been returned to the towns in the so-called transportation area, giving \$668 to Greenfield and \$295 to Montague. The surplus of \$170 is kept in the treasury. The total income for the 5 months was \$31,496 and the expenses \$29,371. A reserve of \$500 is carried for contingencies, \$1,300 for depreciation and \$800 for operation. Operation under this general scheme was described at length in the *ELECTRIC RAILWAY JOURNAL* for Jan. 10, page 59, in which same issue the matter was discussed editorially.

Authorizes Discontinuance of Division.—The Public Service Commission recently granted the petition of the Olean, Bradford & Salamanca Railway, Olean, N. Y., for permission to discontinue the operation of its Little Valley division, remove its tracks and dispose of its right-of-way. The evidence showed that the line was operated at a loss of \$6,933 during the year 1923, taking no account of depreciation, and that the revenues had been steadily declining for the past 6 years. The railway is preparing to acquire and operate a bus between Olean and Little Valley. The commission's order requires that the railroad restore the pavement in Rock City Street, Little Valley, and the state highway to as good condition as the adjoining portions.

Order of Foreclosure Entered.—An order of foreclosure against the Joplin & Pittsburg Railway, Pittsburg, Kan., was issued by the United States District Court at Kansas City, Mo., Jan. 31. The order was requested by the holders of the first mortgage bonds.

Mr. Insull Resigns a Directorship.—Samuel Insull has withdrawn from the board of the Chicago City & Connecting Railways Collateral Trust, Chicago, Ill. No reason was announced, but Mr. Insull is said to have written to B. E. Sunny, chairman of the board, indicating a lack of sympathy with the policies of Leonard A. Busby, president of the City Railway properties, in connection with the negotiations to sell the Surface Lines to the city. The board at its annual meeting did not attempt to fill Mr. Insull's place.

Temporary Receivers Appointed.—Hamilton Disston, Jr., and Henry J. Rebman were recently appointed temporary receivers for the Frankford, Tacony & Holmesburg Street Railway, Philadelphia, Pa., by Judge Horace Stern of the Common Pleas Court. The action was taken on motion of Roberts & Montgomery, solicitors for the Tacony Trust Company, trustee. The decree is effective until March 2, at which time there will be a hearing on the question of appointing receivers permanently.

Toronto Railway Liquidating.—The Canadian *Financial Post* says that in order to push ahead the winding up of the Toronto Railway, Toronto, Ont., the liquidator is calling for tenders for the purchase of the remaining properties now in the hands of the company. These have been referred to as the wreckage or debris of the old concern, but there are some really valuable properties, and several of them are expected to add materially to the treasury of the company. The amount shareholders are likely to get over and above the \$110 already distributed will depend in a good measure on the successful sale of the properties still held. It will be recalled that the Toronto Railway is in process of liquidation following purchase of the property some time ago by the city.

Will Issue \$2,116,000 in Bonds.—Stockholders of the Worcester Consolidated Street Railway, Worcester, Mass., have voted to issue, subject to the approval of the Public Utilities Commission of Massachusetts, \$2,116,000 of

first and refunding mortgage bonds due Aug. 1, 1930, which have been held in the treasury of the company unused. The new bonds will bear 6½ per cent coupons. Application has been made to the public utilities department for authority to sell the bonds. The details involving the proposed issue were given in a recent issue of the *ELECTRIC RAILWAY JOURNAL*.

Back Dividends All Paid.—The Louisville Railway, Louisville, Ky., has declared a dividend of 5 per cent on the preferred stock, payable on Feb. 15. The payment of this dividend will clear up all accumulations on the issue.

Another Power Property Purchased.—The Illinois Power & Light Corporation has purchased through the Omaha & Lincoln Railway & Light Company, a subsidiary, all the physical properties and good will of the Ashland Light, Power & Mill Company, Ashland, Neb. The property comprises a hydro-electric plant, a dam and water power rights, a central steam plant and a widespread network of transmission lines. The price paid for the property was not made public. Approximately \$50,000 will be spent immediately on additional transmission lines and revision of the physical property.

December Shows Gain.—In revenue receipts and number of passengers, the Seattle Municipal Railway showed for December, 1924, a gain over a similar period of the previous year. In spite of the heavy expenses due to the snow-storm of the month, the carlines showed a net profit of \$9,686. The revenues in December, 1924, totaled \$552,505 compared with \$524,575 in December, 1923. The number of passengers was 6,693,601 compared with 6,476,848.

Eastern Massachusetts Doing Well.—The Eastern Massachusetts Street Railway, Boston, Mass., reports to the Department of Public Utilities for the quarter ended Dec. 31, 1924, net income after dividends and all charges of \$223,025, against \$3,637 in same period of 1923. Net for the year was \$77,797, against a loss of \$81,318 in 1924.

Want to Sell Property.—Hugh Goodfellow, Warren Olney and W. I. Brobeck, as trustees of the San Francisco-Oakland Terminal Railways and Key System Transit Company, jointly have applied to the California Railroad Commission for permission to sell to the Southern Pacific Company the property formerly belonging to the San Francisco-Oakland Terminal Railways for the sum of \$120,000. This property is the portion of the California Railways lying south of East 14th Street in the city of Oakland, consisting of seven parcels and including all railroad tracks and appurtenances, rights-of-ways and franchises. The Key System Transit Company shall retain possession of trolley equipment and shall have the privilege of operating over the same.

Made Receiver of Long Island Electric.—Gen. Lincoln C. Andrews was appointed receiver of the Long Island Electric Railway, New York, N. Y., by Justice Faber in the Queens Supreme Court on Feb. 6. The application was made by the Long Island Railroad Company.

Personal Items

C. L. Kurtz, Resigned

Following Change in Control, Head of Utility at Columbus, Ohio, Retires—Property Rehabilitated Under His Régime

When Charles L. Kurtz stepped down as president of the Columbus Railway, Power & Light Company, Columbus, Ohio, at the directors' meeting on Jan. 27 he ended a period in his career which will go down in railway history as one of the outstanding examples of generalship in the field of public utilities.

In January, 1919, when Mr. Kurtz assumed that office, the company was without credit, its bond interest was in default, dividends on stock had been suspended, back wages, ordered to be paid the employees during the war, presented another obstacle, and a suit had been instituted by Augusta Slaymaker, a stockholder, for receivership, an accounting and a judgment against the company. In addition pink slips had been issued by the company to passengers who paid a 5-cent cash fare, redeemable for 1½ cents each if the company won the Slaymaker case, which it did.

During the period that the company was under the direction of Mr. Kurtz more than \$13,000,000 was spent for construction and rehabilitation. The daily average of cars in service at the beginning of the 1919-1925 period was 115 to 120. Now it is 320. One and a quarter million dollars was spent in building underground conduits through the center of the city. Within a month a new concrete and steel garage, covering nearly a city block, will be completed to house between 80 and 90 automobiles and trucks. During the latter part of his incumbency Mr. Kurtz and his board of directors closed a deal for a new office building, the first home ever owned by any railway in Columbus since the industry started in 1854. This structure, practically new, 185 ft. deep and 95 ft. wide, is located in the business section of Columbus. Moreover, a new power plant is under construction that will have an ultimate capacity of 150,000 kw.

These are some of the outstanding achievements of the company during the presidency of Mr. Kurtz. All of them were accomplished through his influence, skillfulness, level-headedness, perseverance, and last, but not least, hard work.

The first thing Mr. Kurtz did when he assumed charge in Columbus in 1919 was to institute a program of the most rigid economy. Waste was eliminated. At the same time he worked to build up the morale and restore co-operation as the touchstone of success.

Two years later, through the efforts of Mr. Kurtz, the company received permission from the Ohio Utilities Commission to issue additional A and B preferred stock, enough to equal the amount of dividends accrued on the original amount of A and B stock, thus

wiping out dividends then in arrears by giving stockholders stock equal to the amount of dividend due them. Since then all dividends have been paid regularly.

About this time Mr. Kurtz won his fight before the City Council for an increase in fare. For many years Columbus citizens had been buying eight tickets for 25 cents. The new rate called for five tickets for 25 cents, a 6-cent cash fare, with a universal transfer free of charge. Furthermore, Mr. Kurtz succeeded in placing a \$3,000,000 loan to pay floating debts. This loan has since been wiped out entirely.

It has often been said the quotations for a company's securities are about the best criterion of the general regard in which it is held. A few quotations will show what was done dur-



C. L. Kurtz

ing the 6 years Mr. Kurtz was in office. In 1919 the common stock was quoted at \$8. a share. Today it is \$115 a share. In 1919 A preferred was 42, now about 95. Series B was 23, now 87. In 1919 4 per cent bonds sold from 40 to 42. At the beginning of 1925 they were quoted at 80. Five per cent bonds jumped from 55 in 1919 to 96 in 1925.

The man who did all these things—or was directly or indirectly responsible for their accomplishment—brought to his task with the Columbus company a wealth of business experience. He quit school in the grammar grades, but the grasp that he showed of the problems before him secured for him at the age of 13 a loan of \$5,500 without collateral security. Since then he has been afoot on life's highway. His experiences have indicated to him that there is nothing quite so pleasing as to live under one's own hat. For some years he represented his home of Athens in the General Assembly of Ohio, and was the youngest member, at the age of 25, the age limit for such public office. Then he felt the call of public life and spent about 25 years as chairman of the Republican state executive committee, member of the National

comm'ttee, state inspector of oils and private secretary to Governor Foraker, to mention only a few of his activities.

Twenty-seven years ago Mr. Kurtz forsook politics for business. During this period he has been engaged as chief executive of various corporations—the Columbus Public Service Company, a coal company, an asphalt paving company, a paving block company which controlled the output of 15 producing companies, and has latterly been president of the Scioto Stone Company, the Keever Starch Manufacturing Company, the Guanajuato Reduction & Mines Company (a large operation in Mexico which has been producing gold and silver for 20 years).

Mr. Kurtz is at present devoting his time to other projects in which he is interested. He is 70 years old, still very active and energetic and attributes his good health to hard and constant work.

Changes Made in International Personnel at Buffalo

B. J. Yungbluth has been appointed vice-president in charge of operation of the International Railway, Buffalo, succeeding R. Harland Horton, who has gone to Philadelphia. Mr. Yungbluth goes to Buffalo from Philadelphia, where he had been associated with the Philadelphia Rapid Transit Company since 1920. His first connection with the Philadelphia traction system was as a member of the coordinating committee. A year later he was made supervisor of purchasing and supplies. He held this position for 2 years and was promoted to assistant vice-president in charge of finance and accounts. His last position in Philadelphia was assistant vice-president of traffic.

Mr. Yungbluth started his railway career with the Duluth South Shore Railroad, where he rose to the position of storekeeper of the Hancock, Mich., stores. He was connected with that company for 7 years. Later he became storekeeper for the New York Central Lines at Lima, Ohio, and remained there 4 years. In 1909 he became associated with the Pittsburgh Railways as general storekeeper and remained on that property until 1920, when he resigned to accept the position with Mitten Management.

Leslie Spraggon has been appointed superintendent of equipment of the International Railway, to succeed George Kuhn, who has been made superintendent of shops of the company. Mr. Spraggon was at one time inspector of rolling stock with the Connecticut Company. He resigned that position in 1920 to go to the Boston office of the Westinghouse Electric & Manufacturing Company.

G. W. Barker, for more than 25 years associated with the traffic and transportation departments of the International Railway, has been appointed operating manager of the International Bus Corporation, a subsidiary operating the bus lines in Delaware Avenue, Delevan Avenue and Bailey Avenue. Mr. Barker has served as superintendent of the Main Street and Hertel Avenue stations of the International Railway.

Robert Colwell, heretofore superintendent of the Edmonton Radial Railway, Edmonton, Alta., has been appointed manager of the Railway Utility, Winnipeg Electric Company, Suburban Transit Company and Winnipeg, Selkirk & Lake Winnipeg Railway, at Winnipeg, Man. This is a new position created as a result of a reorganization of the operating staffs. Mr. Colwell was born in Simcoe County, Ont., Nov. 5, 1876. He entered transportation service on Jan. 1, 1900, with the Winnipeg Electric Railway.

H. Cowan, heretofore night foreman of the shops of the Niagara, St. Catharines & Toronto Railway at St. Catharines, Ont., has been appointed general foreman of the Canadian National Electric Railways, Toronto Suburban District, shops at Lambton and Weston. He will make his headquarters at the Lambton shops.

Obituary

Robert N. Wallis

Robert N. Wallis, treasurer of the Fitchburg & Leominster Street Railway for a number of years, and prominent in banking, welfare, social and business organizations, died recently at his home in Fitchburg, Mass. Following his graduation from the Massachusetts Institute of Technology, and after a brief period spent in financial journalism in Boston and a year with a business house in Philadelphia, Mr. Wallis returned to Fitchburg to succeed his father as treasurer of the Fitchburg & Leominster Street Railway.

This office was considered a difficult seat in the councils of most any transportation company in those years, but Mr. Wallis's financial ability was soon recognized and his interest extended into the general field of operations. It was said of him that his devotion to the company was no greater during its days of prosperity than it was in its leaner years, and that this devotion was not restricted in the least by his desire that the public should always have the best service which the company could give. He had been trustee of the Worcester North Savings Institution since 1914 and clerk of the corporation since 1899, as well as a director in other trust companies.

Mr. Wallis was president of the American Street and Interurban Railway Accountants' Association in 1908. His activities in behalf of the association were conspicuous.

Although he was overwhelmed with the busy affairs of the railway company, he gave his untiring efforts to the building up of the relief association of the railway. He was its treasurer for many years.

Daniel W. McFetridge, formerly purchasing agent for the Lehigh Valley Transit Company, Allentown, Pa., died at his home in that city on Jan. 31. For the last few years he had been purchasing agent for the Lehigh Portland Cement Company.

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

Official Tells of Twin City Activity in Car Building

Details of the arrangement under which the Twin City Rapid Transit Company is building cars for other cities were recently made public in a statement issued by Horace Lowry, president of the company.

Mr. Lowry explained that the Twin City lines have very large modern shop facilities which have not been fully utilized in recent years on account of conditions brought about by the war. When the Light-Weight Noiseless Street Car Company received an order to build 50 cars for the Chicago Surface Lines an arrangement was made with the Transit Supply Company, a subsidiary of the Twin City Rapid Transit Company, to have this work done in the Twin City shops, on a cost plus basis.

It was pointed out by Mr. Lowry that the stockholders of the Twin City Rapid Transit Company are protected against loss from this car-building activity and at the same time the Twin City shops are being kept busy. He said that the Transit Supply Company is protected in its arrangement with the Light-Weight Noiseless Street Car Company. Whether or not the car company makes a profit is of no interest to the Transit Supply Company, as the latter is protected and assured a profit by the nature of its contract.

This arrangement was considered highly desirable and profitable by Mr. Lowry. He claimed that the shops and personnel of the Transit Supply Company are inferior to none, and said that the company plans to continue building cars under this arrangement as long as this can be done without interfering with regular street car service in the twin cities. Any profits made from this construction work will go to the operating companies and will thereby be used to reduce the cost of car service.

Resolution Adopted to Investigate General Electric

The United States Senate by vote of fifty-five to twenty-five on February 9 adopted the Norris resolution providing for an investigation of the General Electric Company by the Federal Trade Commission. The majority included virtually all the Democratic Senators and the radical Republicans.

Senator Watson of Indiana, representing, it is believed, the administration viewpoint, attempted to amend the Norris proposal by precluding the investigation of stockholders or other security holders of the company.

That there has been large-scale propaganda in an effort to discredit municipal ownership of public utilities is contended by Senator Norris. It is

believed that many of those who voted for the Norris resolution think it is unnecessary and is an effort to boost public ownership, but at the same time they had no information as to the conduct of the company and did not feel justified in voting against the proposal.

It is expected by certain well-informed observers in Washington, however, that the investigation will prove to be a great disappointment to those who conceived it.

Interborough Rail Order to Bethlehem, Not Krupp

Much attention was attracted by the statement made recently that the Interborough Rapid Transit Company, New York, was negotiating with Krupps in Germany for 6,000 tons of rails. The company did so negotiate, but the order has been placed at home with the Bethlehem Company for the full amount of the tonnage in rails weighing 100 lb. to the yard.

Interest lies in the fact that the order remained at home. It can be said that while American steel rail business has fallen off in neutral markets, and we may expect to see a good deal of generalizing from a few facts as to the trend of things in the international steel trade, thus far it does not appear that foreign steel will figure in any large way in this market. We consumed about 26,000,000 tons of domestic finished steel products last year, and it would take nearly 100,000 tons on top of the total imports of 1924 to bring our consumption of foreign steel up to 1 per cent of the domestic output.

The *Iron Age* said recently that low prices have always been a factor in the shifting of iron and steel trade across national borders, but such low prices have been sporadic and occasional. Proximity, service, quality, mutual interest, and a half dozen other important considerations make it certain that American railroads are likely to rely upon the American manufacturers to meet their demands.

Metal, Coal and Material Prices

Metals—New York		Feb. 10, 1925
Copper, electrolytic, cents per lb.	.....	14.85
Copper wire base, cents per lb.	.....	17.00
Lead, cents per lb.	.....	9.70
Zinc, cents per lb.	.....	7.77
Tin, Straits, cents per lb.	.....	57.625
Bituminous Coal f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	.....	\$4.45
Somerset mine run, Boston, net tons	.....	2.125
Pittsburgh mine run, Pittsburgh, net tons	.....	1.95
Franklin, Ill., screenings, Chicago, net tons	.....	1.625
Central, Ill., screenings, Chicago, net tons	.....	1.575
Kansas screenings, Kansas City, net tons	.....	2.50
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	.....	\$7.25
Weatherproof wire base, N. Y., cents per lb.	.....	20.00
Cement, Chicago net price, without bags	.....	2.20
Lined oil (5-lb. lots), N. Y., per gal.	.....	\$1.16
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots	.....	0.1297
Turpentine (bbl. lots), N. Y., per gal.	.....	0.945

Rolling Stock

The British Columbia Electric Railway, Vancouver, B. C., has ordered from the Canadian Car & Foundry Company, Montreal, twelve single-end cars arranged to be operated in trains during peak-load periods on Vancouver city lines. Their general type will be very similar to the trains which have proved successful in Montreal, but the cars will be somewhat larger, and the trailer will have complete four-motor equipment. The car bodies will be of all-steel construction, with girder side frames, similar to the Toronto Transportation Commission's cars. The electrical equipment will be unique, and will, it is said, be the first of its kind to be used in Canada for street car propulsion. The motors will have a rating of 55 hp. at 500 volts, to give ample margin for operation at the high schedule speeds required in Vancouver, over heavy grades. The control system will be multiple-unit, with automatic electrically operated camshaft controller operated by master controller on platform. The camshaft will be motor-driven, giving positive sequence of control steps, with current-limiting relay to give automatic acceleration. The master controller will have only three steps, starting, series and parallel, and in case the current-limiting relay operates too soon to start the car on a grade, the controller may be advanced by an advance lever till the car is in motion, when the automatic feature will come into play again. This control is similar to that installed in the Montreal Harbor Commission's new electric locomotives. The pneumatic door control will be interlocked with the master controller, so as to prevent application of power if all doors are not closed. The cars will be finished outside in enamel, red with cream trim, and the interior trim will be mahogany finished birch. The trailer differs from the motor car in that the length of the front platform is 7 ft. and the seating capacity is 55. The trailer car has no rear platform. The detailed specifications of the motor car follow:

Seating capacity	50
Bolster centers, length	25 ft. 0 in.
Length over all	48 ft. 8 in.
Truck wheelbase	5 ft. 10 in.
Width over all	8 ft. 4 in.
Height, rail to trolley base	11 ft. 4 1/2 in.
Headlining	Panelyte
Air brakes	Westinghouse SME-D, 10 x 12 in.
Axles	A.E.R.A. standard, 4 1/2 in.
Bumpers	Rico anti-climbers, 7-in.
Car signal system	Faraday
Side bearings	Canadian Car & Foundry Company self-oiling roller
Control	Multiple-unit
Couplers	Tomlinson, Form 10 electric, with drum cutout switch
Destination signs	Hunter
Door-operating mechanism	National Pneumatic
Fenders	HB Ifeguards
Headlights	Golden Glow
Journal boxes	3 1/2 x 7 in.
Motors	English Electric Company, outside hung, 55 hp.
Seats	Rattan upholstered
Trolley retrievers	Earl, 4-A, long drum
Trolley base	U. S. No. 11
Trucks	Canadian Car & Foundry Company
Wheels	30 in., rolled steel

Interstate Consolidated Street Railway, Attleboro, Mass., which has just passed to the control of Hemphill & Wells, New York, will be equipped by the new owners with five double-truck

one-man cars and three single-truck one-man cars. Orders for these cars have been placed with the Wason Manufacturing Company at Springfield, Mass. The Interstate was formerly operated with cars that were leased.

Newport Electric Corporation, Newport, R. I., ordered during January of the Fageol Motors Company, Oakland, Cal., four buses of the street-car type.

Seattle Municipal Railway, Seattle, Wash., may possibly be in the market for new buses for equipping feeder lines, if the suggestions recently laid before the City Council are approved.

Macon Railway & Light Company, Macon, Ga., has reconstructed 13 of its cars into one-man cars. The remaining 28 will be converted into the one-man variety as rapidly as possible.

Pacific Northwest Traction Company, Everett, Wash., ordered during January of the Fageol Motors Company, Oakland, Cal., two six-cylinder chassis.

Track and Line

San Francisco, Cal.—The Board of Supervisors approved the measure for the improvement of Judah Street from 31st to 41st Street. Instructions were immediately issued to begin construction of the improvement. When completed, the project will allow the passage of a municipal car line from the ocean to the proposed Mission tunnel when the route for that has been finally decided upon. An appropriation of \$500,000 for the street car line is already available, but has been awaiting the Judah Street improvement.

San Diego Electric Railway, San Diego, Cal., completed recently the Tide Street three-tier grade separation crossing, or Santa Fé overhead crossing, at a cost of \$290,000. It has taken almost 5 months to construct the new viaduct, which is 2,000 feet in length. The object of the improvement was to eliminate the combination hazard that formerly existed at this spot.

Los Angeles Railway, Los Angeles, Cal., is laying new tracks on Fifth Street between Flower and Grand, for which a franchise was recently awarded by the city. Girder rail of 116-lb. weight is being used.

Seattle Municipal Railway, Seattle, Wash., may extend its Montlake and Eastlake Street car systems to the University of Washington, if the agitation started by the people of the district affected results in action. D. W. Henderson, superintendent, was asked to report on the proposition.

Shops and Buildings

Detroit United Railway, Detroit, Mich., suffered damages of \$10,000 recently by a fire at its Ann Arbor carhouse. The office was partially destroyed, but the records were saved.

Long Island Railroad, New York City, N. Y., has the structural steel in place for the new addition to its Morris Park shops. When completed this will provide six overhauling tracks for electric car equipments and complete overhead traveling cranes and material-handling facilities.

Trade Notes

Joseph Dixon Crucible Company, Jersey City, N. J., which manufactures graphite products, pencils, lubricants, crucibles and paint, announces the removal of its Boston office from 49 Federal Street to 80 Federal Street, the new Chamber of Commerce Building.

Differential Steel Car Company, Findlay, Ohio, is acting jointly with the International Steel Tie Company, Cleveland, and is sending H. F. Hastings as a representative through Central and South America and several European countries, particularly Spain, Holland, Belgium and England and later Australia, to visit both the electric traction interests and the steam railroads in these countries. Mr. Hastings, A.M.I.C.E., was formerly representative of a big British manufacturing interest in Spain. He has already covered Cuba, several of the Central American countries and South America and is now en route for Spain.

Illinois Central Railroad has placed an order with the Ohio Brass Company for Tomlinson automatic air and electric couplers to equip 260 cars.

Scott Valve Manufacturing Company, Detroit, Mich., has appointed Russell F. Kleinman, Land Title Building, Philadelphia, as its sales representative. Mr. Kleinman will handle the complete line of Scott bronze and iron body valves in eastern Pennsylvania, southern New Jersey, Maryland, Delaware and the District of Columbia. The Charles H. Tinker Company, 201 Devonshire Street, Boston, Mass., has been appointed the New England representative for the Scott complete line of bronze and iron body valves.

International Oxygen Company, Newark, N. J., re-elected its officers at the annual meeting of the stockholders on Jan. 20. John Heller was added as secretary. The newly elected board declared a dividend of 6 per cent on all the outstanding stock of the company, payable semi-annually.

Blodgett Engineering & Tool Company, Detroit, Mich., has added Roy Gill to its sales organization. Mr. Gill is well known throughout the machine tool field in the United States and will work directly out of the Blodgett factory as a special sales and service representative.

New Advertising Literature

Herman H. Sticht & Company, New York, N. Y., has issued bulletin No. 135, an 8-page pamphlet describing the several models of its Standco "2 in 1" megohmmers. The pamphlet has several illustrations and diagrams.

Georgia Railway & Power Company, Atlanta, Ga., has issued a supplement to its "Snap Shots," dealing with its record of the Ohmer system of fare accounting for December, 1924.

Wagner Electric Corporation, St. Louis, Mo., has issued bulletin No. 141, on Wagner repulsion-induction motors, BA type and bulletin 142 on the Wagner split-phase induction motors, RB type.

Jack Frost doesn't bother Motorman Bill



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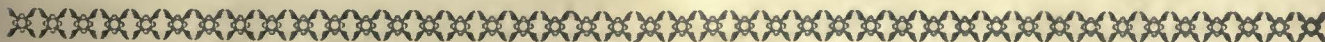
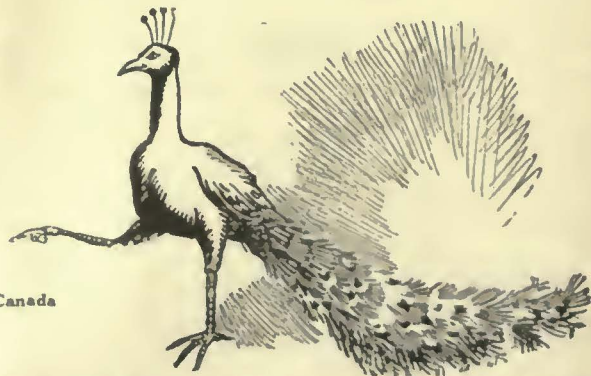
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Electric Railways operating Yellow Coaches for auxiliary and supplementary service enjoy far more than the advantages of efficient equipment. They have at their disposal the daily experience, methods, and practices of three of America's most successful motor coach operating systems; Fifth Avenue Coach Co., New York; Chicago Motor Coach Co., and the People's Motorbus Co., St. Louis.



These organizations now operate 914 Coaches over 189 miles of streets and boulevards, covering nearly 25,000,000 coach miles annually. Accurate audited records are maintained covering each coach and every mile it runs. The priceless knowledge gained through these records is available to all Electric Railways operating Yellow Motor Coaches.



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Innumerable refinements found exclusively in Yellow Coach design are the result of applying to manufacture, the lessons learned in actual operation.

It is not sufficient that a motor coach merely be strong. Trucks adapted to bus service, fail to satisfy the public demand because the layman recognizes that the design does not meet passenger requirements. An elaborate body, sometimes provided, is not the answer. Even a properly designed chassis alone does not suffice. The two must be co-ordinated properly into a single unit, such as is found in the Yellow Coach.



No other company is more thoroughly equipped to build specialized, revenue-producing vehicles.

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EXPERIENCED OPERATORS



Pierce-Arrow Motor Coaches bring *new* profits to electric railways

There are territories within your field of operation where the traffic would not warrant the necessarily heavy investment in trackage and other equipment.

Pierce-Arrow Motor Coaches, however, will secure this business for you *at a decidedly good profit*. The investment will be only a fraction of the amount required for electric equipment. Many railways have proved this fact beyond doubt.

The traveling public insists on three main points—speed, comfort and safety. The six-cylinder 100 horsepower engine carries the Pierce-Arrow Motor Coach along at speeds from 45 to 50 miles per hour without any undue tax on the power reserve. The roomy, luxurious, beautifully appointed body is comparable in comfort to a parlor car. The powerful brakes, the low-hung chassis, the solidly built body and the wide tread are all assurances of safety. The coach handles with the ease and flexibility of a high-powered touring car because it is built solely for passenger transportation and is not merely a converted truck.

Our engineers will be glad to demonstrate these modern coaches to railway representatives and to discuss their profit-earning ability.

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

Standard **\$4600**
Chassis

Terms if desired

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

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SIX-CYLINDER
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Both city
and interurban cars
of the Northern Texas
Traction Company
are MILLERIZED

1924's "star" road points the trend

Practical test in Fort Worth has proved Miller Shoe advantages equally as valuable on city lines as on interurbans.

City service with constant starting and stopping, sharp curves, switches, crossings and intersections needs wire-hugging, smooth-running, 3-in. contact Miller Trolley Shoes. To say nothing of less wire wear, greater mileage, and silent operation—all

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Miller Trolley Shoe Co., Boston-21, Mass.

MILLER TROLLEY SHOES

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A Pole Selling Policy That May Fit Your *Buying* Needs

WHEN Weyerhaeuser enlarged its pole service it wasn't the intention to scoop up orders as fast as stocks accumulated. That is not the way Weyerhaeuser does business.

The Weyerhaeuser policy has always been to take good care of a group of permanent customers, to ascertain their needs and to meet their requirements as they arise.

Weyerhaeuser men do not claim to make all the good poles. However, this organization does maintain a high standard in the selection of pole timber which results in uniformly good poles. Timber not meeting this standard goes to the saw mill where it is cut into material for which it is suited.

Weyerhaeuser poles formerly sold through jobbers are now being marketed direct to users as announced a short time ago in this publication. A clientele of permanent customers is being built up. Quite a few pole users say our policies and service are just what they have been looking for. Perhaps you will feel as they do. The next time you are in the market for treated or untreated poles or piling give this specialized service a tryout. Prices by mail or wire.

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Weyerhaeuser Idaho Red Cedar Poles in the lines of the Beloit Water, Gas and Electric Company, Beloit, Wisconsin



Weyerhaeuser Idaho Red Cedar Poles

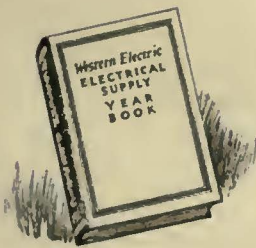


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ahead!



*Western Electric
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Just say the word when we can be of help.

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On the job at Newark Bay. By means of this simple slump test, any competent inspector can easily control the quantity of mixing water and, therefore, the strength of the resulting Concrete.



The new, four-track Central Railroad of New Jersey Bridge over Newark Bay will be located 100 feet north of the present structure. The new track level will be 30 feet higher than the old.

New structure is to be 7500 feet long with Concrete Piers weighing 1500 tons each.



Quality Control in the Field

Central Railroad of New Jersey engineers believe in putting the laboratory to work right on the job.

In the Concrete construction, shown above, they are regularly applying approved methods of field control to keep the quality of the Concrete uniform and particularly to maintain desired strength.

Strengths are verified at regular intervals by testing field cylinders.

Proportions of fine and coarse aggregates are accurately determined by fineness modulus.

Slump tests are being made daily to control consistency.

This is only one of many jobs where the most modern field methods of control are directly helping to assure better Concrete with greatest economy.

* * *

The work on the Newark Bay Bridge is being done under the direction of A. E. Owen, Chief Engineer, J. J. Yates, Bridge Engineer, and H. E. Van Ness, Construction Engineer, Central Railroad of New Jersey.

Let us tell you more about the practical advantages of field methods of quality control. Write the nearest office listed below for your free copy of "Concrete Data for Engineers and Architects."

PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

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Reduces Maintenance Costs

The cost of a trolley or power line is measurable in terms of permanence and maintenance. The nearer your first cost comes to final cost the more economical the line. Truscon Steel Poles, through unusual durability, indestructible character and the economy of less poles per mile, decrease first cost and insure lowest maintenance. Truscon Poles never need reinforcement or replacement. Their copper bearing steel construction combined with truss formation gives them extreme strength and lends permanence to the line. First cost is surprisingly low, maintenance is negligible.

Write today for complete information.

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STEEL POLES



INTERIOR of Brooklyn Edison Powerhouse. Truscon Steel Windows installed. These windows conform to every architectural and structural demand for Powerhouses. Truscon Engineers are specialists in day-lighting and control of natural ventilation for Powerhouses.

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*Below freezing, but Concrete
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EVEN in coldest weather, concrete made with Atlas Lumnite Cement can be safely poured without the use of artificial accelerators and expensive protective measures.

Lumnite Cement concrete *protects itself against frost*. Not only does it harden in a few hours to a point in its curing beyond danger of freezing—but through the chemical action of this rapid hardening Lumnite produces very considerable heat within its own mass. Lumnite is not “quick setting,” but allows ample time for mixing and pouring.

Atlas Lumnite Cement is a hydraulic building cement that makes concrete stronger in twenty-four hours than the usual twenty-eight-day concrete—through its principal ingredient, Bauxite, a high-grade aluminum ore.

Whenever you must have speed with safety and economy, use Lumnite.

Write for the Atlas Lumnite Cement book containing detailed accounts and photographs of Lumnite's remarkable successes, and the long list of users, including railways, state highway commissions, and electric, telephone, steel and oil companies. All but two of the State Highway Departments east of the Mississippi have already used Lumnite.

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and **APPEARANCE**
is appreciated

There You will find

"NATIONAL"
Electric Line
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generally used in the
built-up districts

because:

being a known quantity in respect to strength and ductility they offer maximum protection both to the company and the public;

because:

they do not detract from the appearance of the finest street; they present a neat appearance and are unobtrusive in the most beautiful surroundings;

because:

they economize space, which is always desirable and often quite necessary;

because:

experience of street railways with their overhead construction points to less interruption, lower up-keep, greater reliability and longer life for these poles.

Bulletin No. 14—"NATIONAL" Tubular Steel Poles—will be sent upon request; ask for it.

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

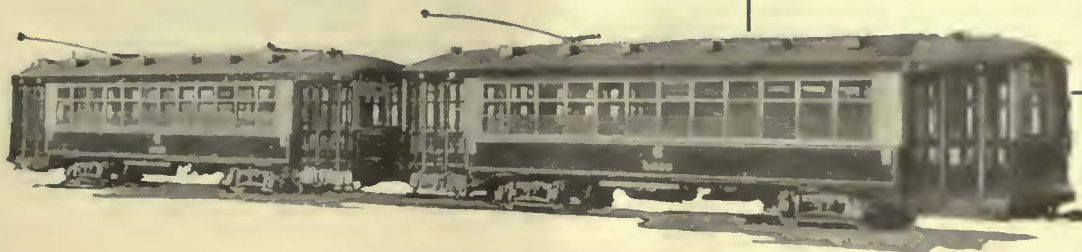
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50 of these cars

Now being constructed for Chicago Surface Lines. Designed for One-man, Two-man or Two-car train units under the design and specifications of the Chicago Surface Lines.



Two-car train unit for Chicago Surface Lines

10 LIGHT WEIGHT NOISELESS CARS

now being constructed for Duluth, Minn., Stillwater, Minn., and Grand Rapids, Mich.

LIGHT WEIGHT NOISELESS ONE-MAN TWO-MAN CAR

22,000 to 24,000 Pounds Complete, Length 36 ft., Seats 43

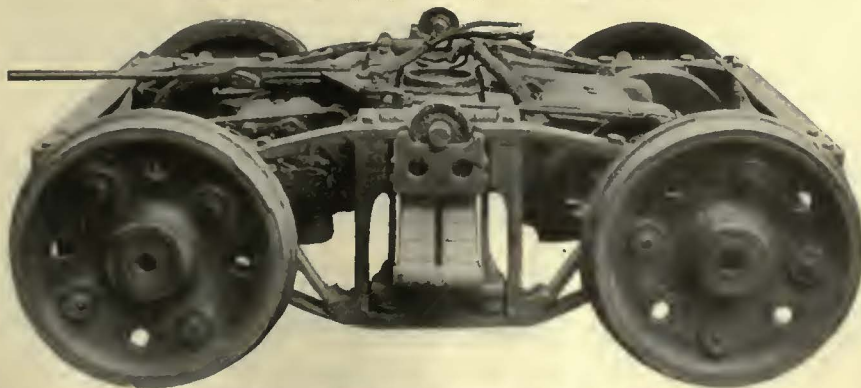
10% faster schedule speed, 40% saving in power compared with standard weight car

Light Weight Car on Smith Light Weight Noiseless Trucks equipped with Hyatt Roller Bearings and Concentric Clasp Axle Drum Brakes provides Faster Acceleration, Faster and More Coasting, Faster and More Comfortable Braking, resulting in Faster Schedules, with greatly reduced Power Consumption and Less Automobile Interference.

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26,000 to 28,000 Pounds Complete, Length 46 ft., Seats 48

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SMITH LIGHT WEIGHT NOISELESS NO. 12 TRUCK
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Manufacturers of Electric Street Cars

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“One-Wear” Mileage Without Maintenance

One unbroken life of service, uninterrupted by visits to the machine shop.

A longer life, without periodical doctoring on the lathe.

Treads and flanges of toughened heat-treated steel that go the limit without re-turning.

These characteristics of Davis “One-Wear” Steel Wheels are causing scores of roads, both steam and electric, to use them. In Davis Wheels, these roads have found more miles per dollar when the final reckoning is made.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
“ONE-WEAR”
STEEL WHEELS

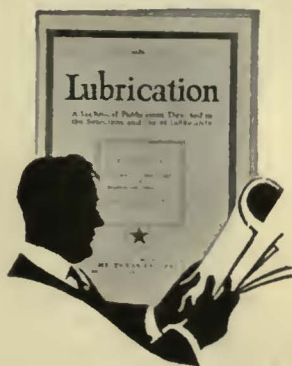
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(More than one man in the Electric Street Railway Field will say that this month.)

More than one man will get a real money-saving idea from The Texas Company's magazine "LUBRICATION," the latest issue of which is devoted "exclusively to the Electric Street Railway Field."

The January issue of "LUBRICATION" contains fresh, original ideas on such subjects as:

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Our engineers will welcome an opportunity to work with yours, in applying these high-duty, high-precision bearings to your equipment with a view to realizing in highest degree the advantages and economies which follow the adoption of anti-friction bearings of proved dependability.

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**For the
Heavy Loads
and
Hard Service
of Electric
Railway Duty**





Station CCH broadcasting
up-to-the minute Car Heater news

Please stand-by for a message from Station CCH on the latest developments in electric car heating equipment.

What's new in electric car heaters?

IN ADDITION to the popular line of standard cross-seat, truss-plank and panel type heaters, the Consolidated Car Heating Company now offers several novel and effective specialties.

First there is the new and exceptionally light-weight cross-seat heater. It has a flat top, the casing being formed in the approximate shape of a half cylinder. This style heater will occupy the minimum amount of space under seats, and be most inconspicuous. Its casing

is absolutely impregnable from the outside as there is no opening for the accidental or intentional insertion of foreign objects.

Next there is the Electric Blast or Hot Air Heater constituting a combined Heating and Ventilating System in which the incoming air can all be taken from the outside, or partly from the outside, or completely recirculated from the inside of the car. Heat is automatically cut off if the motor stops, and the unit can be used either with or without thermostatic control.

HEATERS



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

The *International* Tie of Uniform Quality



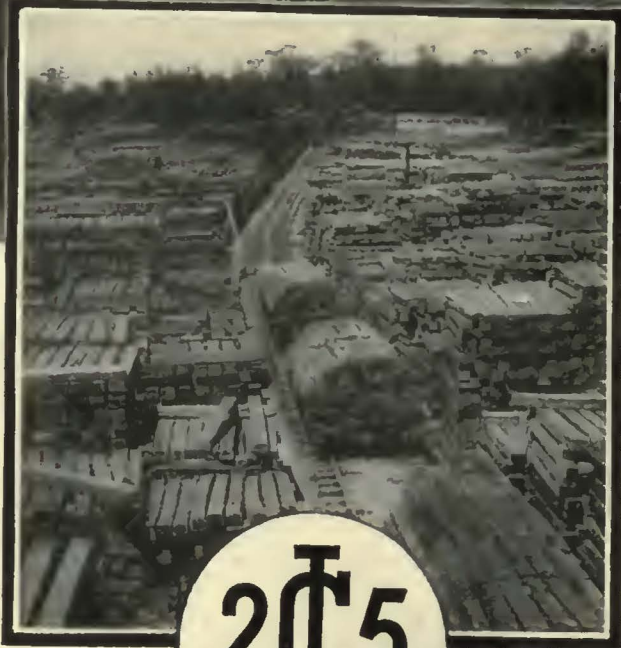
Every *International* Tie
is a
Standard Specification Tie

THERE is a vast difference between the mere purchase of ties and really investing in Tie Service—when you specify *International* you get both—because every *International* Tie is a sound, well seasoned, thoroughly treated, standard specification tie.

To substantiate our willingness to assume full responsibility for our ties—every *International* Tie is permanently marked with the *International* Dating Nail. This identification is particularly important to the tie consumer because the real value of high grade timber and effective penetration of *International* Treatment can only be realized after many years.

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Just specify the timber, the grade and the treatment desired—we will ship the ties exactly as you specify them.



2  5

*The Stamp of Quality
The International Dating Nail*

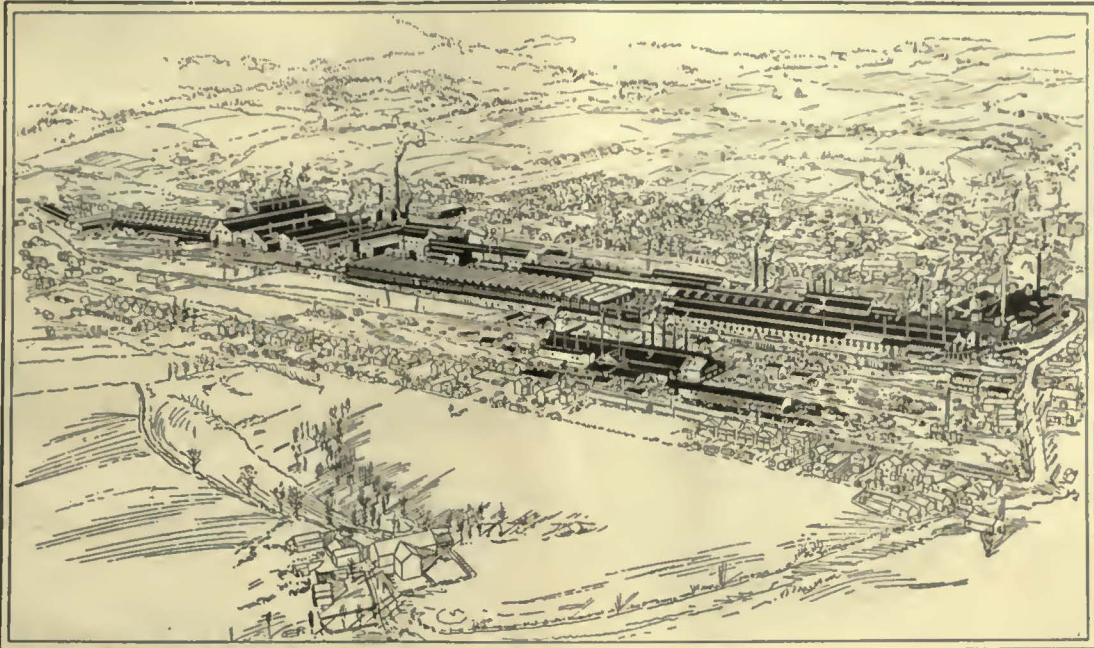
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 —not only to sell but to serve, assisting those who buy to
 choose as well as use their purchases—this is the
 privilege if not the practice of all modern
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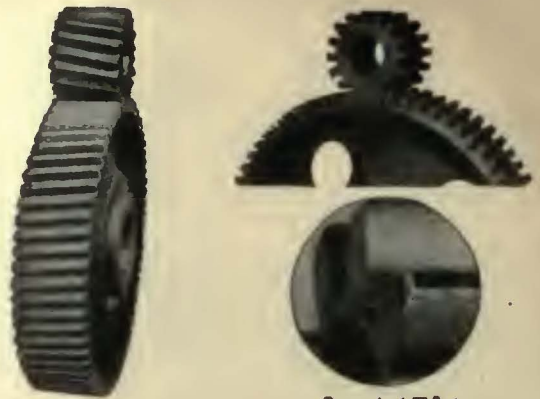
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EVERY GEAR REGISTERED

*There isn't a bit of noise
in a
Nuttall Gear*

Nuttall Helical Gears are the most silent, easiest-operating, longest wearing and most economical gears made for traction service.

That's the whole story except that more and more of the leading traction companies are making Nuttall Gears standard equipment.

There are Nuttall Gears for every type of traction car, from the one-man safety to the large interurban express.

Examine a set of Nuttall Gears—see how the teeth are cut with rounded edges to facilitate easy installation and to prevent chipping and cutting—note also that there is no undercut at the tooth root where the greatest strength is required—Both of these minor details add materially to the life of the gears. After you see and study these gears in operation you will wonder why you haven't adopted Nuttall Helical Gears long ago.

Get our gear book, it will tell you the whole story.

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

THE Metal and Thermit Corporation, New York, N. Y., has questioned the accuracy of the following statement which appeared in the advertisement of the Alumino-Thermit Corporation, Roselle Park, N. J. in the September 27, 1924 issue of ELECTRIC RAILWAY JOURNAL:

"Do you realize that over half the alumino-thermic welds installed on American roads this year, have been made by the FERALITE PROCESS?"

THE Metal and Thermit Corporation offered to submit its records of sales and deliveries to an audit by a public accountant to be selected by the management of ELECTRIC RAILWAY JOURNAL,

provided that the Alumino-Thermit Corporation would do the same. The results were to be held in strict confidence by the management of ELECTRIC RAILWAY JOURNAL and used only to determine the veracity of the statement in question. The Metal and Thermit Corporation has given access to its records to Ernst and Ernst, the auditor selected. The Alumino-Thermit Corporation has been unwilling to submit to such an audit.

ELECTRIC RAILWAY JOURNAL, in accordance with its policy of fairness to both its readers and its advertisers, chooses this manner of disowning any responsibility for the statement as it appeared.

ELECTRIC RAILWAY JOURNAL
NEW YORK, N. Y.

Approaching the Ideal in Track Construction

Concrete for the track foundation!

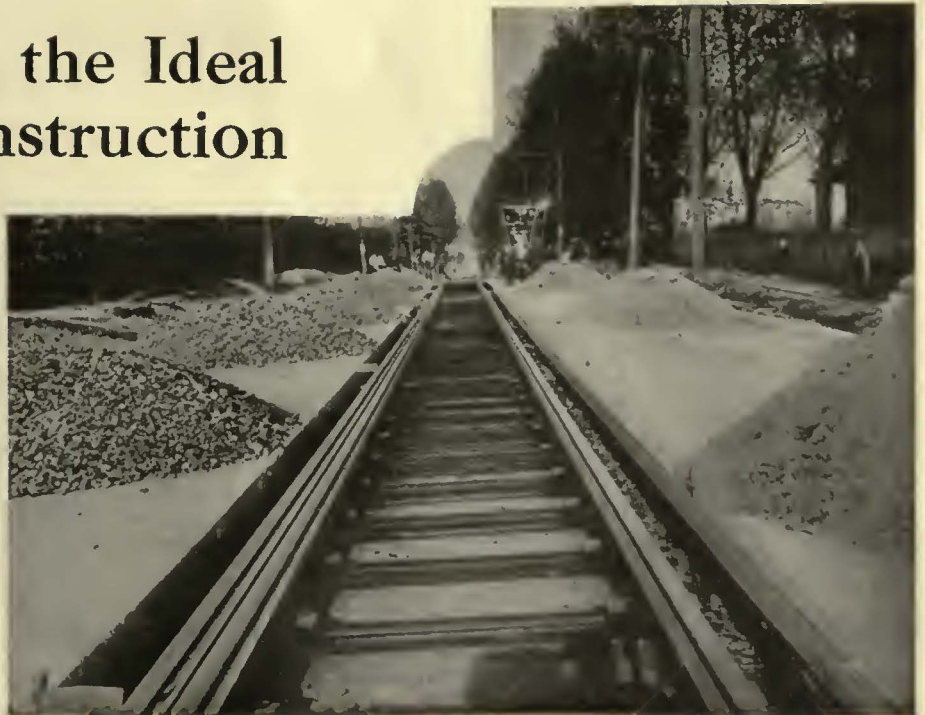
Dayton Resilient Ties embedded in it!

That's approaching the ideal in track construction!

The maximum service from the concrete is secured by the shock absorbing feature of this tie. The shocks of traffic are not permitted to reach the concrete and disintegrate it. Neither is the strength of the concrete paving over the tie weakened by undue displacement as with the wood tie. Uniform thickness is maintained.

The Dayton
Mechanical Tie Co.

707 Commercial Building
DAYTON, OHIO



DAYTON *Resilient* TIE

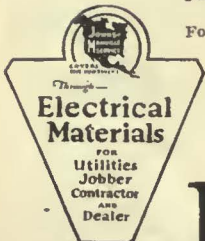
Ebony Asbestos Wood



*Installation
by the Bureau
of Power and
Light, Los Angeles,
Calif.*

THE greatest possible electrical and mechanical safety goes with the attractive appearance of this Ebony Asbestos Wood combined Switch and Bench board, of the Bureau of Power and Light, Los Angeles, California. Ebony Asbestos Wood surpasses all other switch-board materials in dielectric strength and resistance to shock. It is easy to cut and drill.

JOHNS-MANVILLE, Inc., 292 Madison Ave., N.Y.C.
Branches in 62 Large Cities
For Canada: Canadian Johns-Manville Co., Ltd., Toronto



JOHNS- MANVILLE



Kharab

Among certain Persian tribes, kharab is the way the man gets treated by his bevy of wives when he gets careless with his affections.

They simply string him up by the heels and the resulting din sounds like the slapping of misapplied carbon brushes on a pitted commutator—

—proving that there's always a punishment for the man who flirts with strange females or strange brushes.

Let a man who has been using Morganite try some of those flossy brushes—

—and he'll have all the excitement he wants and he'll pay dearly for it if he doesn't get back to Morganite quickly.

This isn't TELLING you anything—it's simply REMINDING you.

Morganite Brush Co., Inc.

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

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One Man Safety Cars

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Weight
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Steel Seat*

*No higher in price than others
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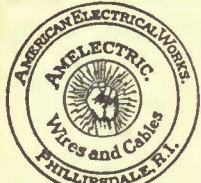
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DAMAGES paid for one car step accident may cost you more than a complete equipment of permanently non-slipping "SAFKAR" Car Steps for every car on your system. They're lighter in weight than other steps, too — a big saving in dead load. And maintenance costs upon them are negligible.

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THE "WIRE LOCK" / THE CHAMFERED JOINT

COMBINE

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

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**Black and Yellow
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**Irr-O-Slot Insulation Flexible Varnished Tubing
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Sales Representatives in the Principal Cities

We are prepared

to handle any high grade proposition where
**VARNISHED CAMBRIC
Wires and Cables**
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When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

THE OKONITE CO., Passaic, N. J.
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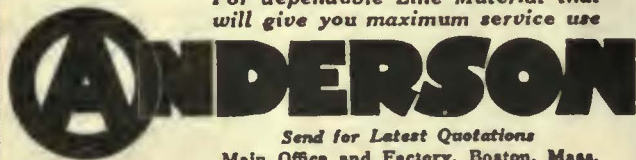


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*For dependable Line Material that
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*Send for Latest Quotations
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ELECTRICAL WIRES and CABLES**
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Railway Feeder Pins

A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.

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Special Track Work of every description

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SPECIALISTS

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Best for Longer Service

Other products for the electrical field includes axles, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

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BETHLEHEM

'CARNEGIE'
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WHEELS
AXLES
RAILS
CROSS TIES

Carnegie Steel Company
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High-Grade Track Work

SWITCHES—MATES—PROGS—CROSSINGS
COMPLETE LAYOUTS
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Electrically Welded Joints

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Makers of Steam Superheaters
since 1898 and of Chain Grate
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Adapted to all
types of rails
and paving



Proven by service
to economically
prevent seepage
and disintegration
of street railway
paving.

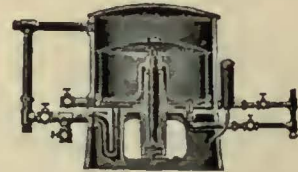
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RACE & McCOMAS STS., BALTIMORE, MD.

Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

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Dept. D.

Play for safety—

plus resiliency—
plus long life

By specifying

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FORT PITT SPRING &
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U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.

West Newton, Mass.

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MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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New and independent process. No inserts needed.
Up-to-date and economical.

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reduce fuel costs by making
use of waste exhaust gases
to preheat the boiler feed.
Patented construction proven
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SUPERHEATERS

improve engine, turbine and
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given amount of steam to do
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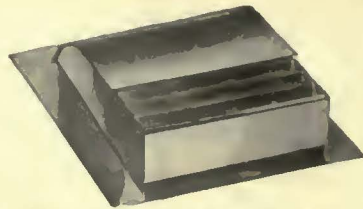
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Stuffy Cars Empty Fare Boxes

Many people simply will not ride in poorly ventilated cars. Why not encourage them to ride by making the cars comfortable? N-L Ventilators make it possible to keep them amply warm yet perfectly ventilated. They change all the air in the car many times an hour. They are weatherproof, dustproof, draftproof, silent—and good looking.

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Coin Counting and Sorting Machines. Change Carriers

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RAMAPO AUTOMATIC RETURN SWITCH STANDS FOR PASSING SIDINGS

TEE RAIL SPECIAL WORK

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Bemis Pins are absolutely smooth and true to diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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100 New Users in the Last Nine Months KASS SAFETY TREADS

HIGH in efficiency and lasting qualities
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Brass Hardware For Cars and Buses
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1 TON or 1000

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GRIFFIN F. C. S. WHEELS

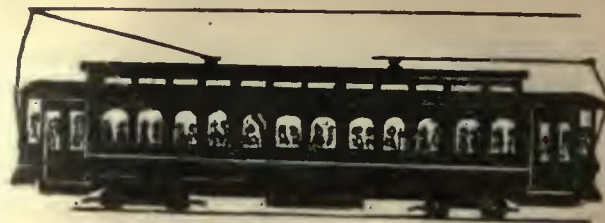
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THE RUSH HOUR

holds no terrors for you or your passengers if your rolling stock keeps rolling...

AJAX BULL BEARING ALLOY

will keep bearings and passengers cool.
Stays on the job for a long time.



The Ajax Metal Company

ESTABLISHED 1880
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New York Chicago Boston Cleveland



Type R-11
Double Register

International Registers

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

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



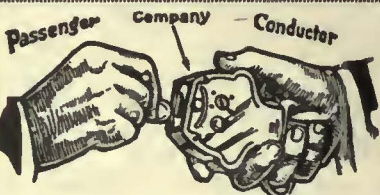
Adjustable

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

Flexible

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

JOHNSON FARE BOX COMPANY
Ravenwood, Chicago, Ill.



Direct Automatic Registration By the Passengers

Rooke Automatic
Register Co.
Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
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THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

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Hex Numbers in care of any of our offices count 10 words additional in undisplayed ads.
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ELECTRICAL engineer with good technical training and about eight years' experience in electric light, power and railway public utility work. Location, large city in Brazil. In applying please give full particulars regarding self and experience, stating also salary desired and when available. P-778, Electric Railway Journal, 10th Ave. at 36th St., New York.

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SPECIAL track work draftsmen wanted, preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

ACCOUNTING executive, railway, electric and gas utilities, now employed, seeks change; can produce results. PW-780, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

KERN, energetic operating official with successful record and excellent references, now employed, for personal reasons desires change; has had over 20 years' practical experience in steam city and interurban operation, filling all the positions in the successive steps from platform to general superintendent; correspondence invited. PW-783, Electric Railway Journal, 10th Ave. at 36th St., New York.

MASTER mechanic having had twenty years' practical experience on small road in New England desires similar position. Unquestionable references and ability assured. PW-776, Electric Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT or chief of secret service department, now employed, desires change; thoroughly experienced in all branches; can produce results; best of references. PW-782, Electric Railway Journal, 10th Ave. at 36th St., New York.

SALESMAN WANTED

Side Line
Salesman who is already calling on, or in touch with street railways in the eastern part of the United States to take on a new article for sale, paying a good commission for which there is a great demand, and very little competition. SV-784, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

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Competent, experienced, at present with one of the largest properties in the country, desires new connection.
PW-785, Electric Railway Journal
10th Ave. at 36th St., New York City

WANTED USED PORTABLE SUB-STATION

Will buy or rent one used portable sub-station, 500 to 1000 kw.-600-v.D.C. output, complete with control equipment, car and accessories. Rotary converter preferred. Also transformers for use with above, to be used with 4000 or 23000-60-cy. primaries.

Bidders to submit proposal to

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Department of Street Railways, St. Jean and Shoemaker Aves., Detroit, Michigan

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TRANSIT EQUIPMENT COMPANY
Cars—Motors
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FOR SALE

20—Birney Safety Cars. Brill built. Seating 32.

8—Steel Interurbans, 48 ft. loog. Seating 52.

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

Relaying Rails NEW RAILS—ACCESSORIES

Buy Guaranteed
Relaying Rails
and Save 30%
to 50%

1 Ton or 1000

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JERSEY CITY - PHILADELPHIA - HAMILTON O.

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Orders for Oak, Car Stock,
Cross Ties, Switch Ties, Timber

Have four mills in operation. A good stand of timber. Grades guaranteed. Prices right. Let's get equalized.

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For Immediate Delivery

1—48-in. Niles Car Wheel Boring Machine without derrick, otherwise complete; good condition.

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Terre Haute, Indiana

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the equipment or machinery that you are not using.

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

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION
IS HELPING OTHERS

—LET IT HELP YOU ALSO

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
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Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch
Stands**
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- Automatic Safety Switch
Stands**
Ramapo Ajax Corp.
- Axles**
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Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Standard Steel Wks.
Westinghouse E. & M. Co.
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Ajax Metal Co.
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More-Jones Brass & Metal
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Westinghouse E. & M. Co.
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Side**
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- Bells and Gongs**
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Norma-Hoffman Bearings
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National Tube Co.
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Hubbard & Co.
Ohio Brass Co.
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Johns-Manville Inc.
National Brake Co.
Westinghouse Tr. Br. Co.
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Jeandron, W. J.
Le Carbone Co.
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Westinghouse E. & M. Co.
- Brushes, Graphite**
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N. Y. Transportation Co.
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Black Varnish**
Irvington Varnish & Ins.
Co.
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St. Louis Car Co.
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Elec. Service Supplies Co.
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Transit Equipment Co.
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or Copper**
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J. M.
More-Jones Brass & Metal
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Steel**
American Steel Foundries
Bemis Car Truck Co.
Standard Steel Works
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Brass**
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Trolley**
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- Circuit-Breakers**
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General Electric Co.
Westinghouse E. & M. Co.
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Wires and Cables**
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Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
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- Coin Wrappers**
Cleveland Fare Box Co.
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Westinghouse E. & M. Co.
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General Electric Co.
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General Electric Co.
Westinghouse E. & M. Co.
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Splicing)**
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Western Electric Co.
Westinghouse Tr. Br. Co.
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Westinghouse E. & M. Co.
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Elec. Service Supplies Co.
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The
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Ramapo Ajax Corp.
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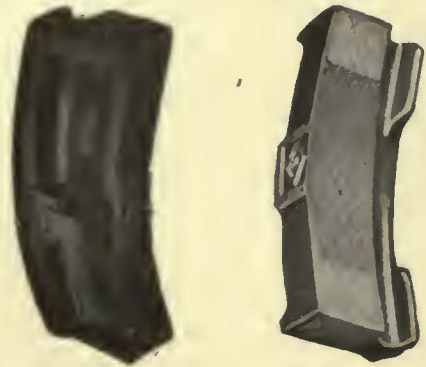
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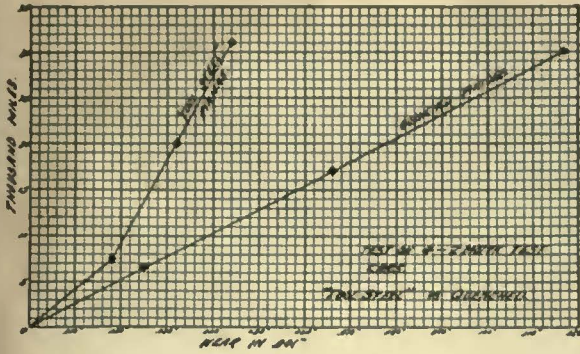


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St. Louis Car Co.
- Track, Special Work
Buda Company
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- Transformers
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Step
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- Thornton Trolley Wheel Co.
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Trolley)
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Westinghouse E. & M. Co.
- Turbines, Water
Allis-Chalmers Mfg. Co.
- Turnstiles
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.
- Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers & Silks
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.
- Welded Rail Joints
Alumino-Thermic Corp.
Ohio Brass Co.
- Welders, Portable Electric
Ohio Brass Co.
- Welding Processes and
Apparatus
Alumino-Thermic Corp.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wheel Guards (See Fenders
and Wheel Guards)
- Wheel Presses (See Machine
Tools)
- Wheels, Car, Cast Iron
Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co.
- Wheels, Car, Steel & Steel
Tire
American Steel Foundries
Standard Steel Wks.
- 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.
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Western Electric Co.
Westinghouse E. & M. Co.
Std. Underground Cable Co.



This chart shows the relative wear on test cars equipped with "Tool Steel" vs. Bunched pinions.

The maker of the bunched pinions claimed they were "as good as Tool Steel." Four pinions of each make were tested and measured for wear with micrometers.

The above chart shows the result.

Tool Steel Quality

The Tool Steel Gear and Pinion Co.
CINCINNATI, O.



"Differential Two-Cor Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

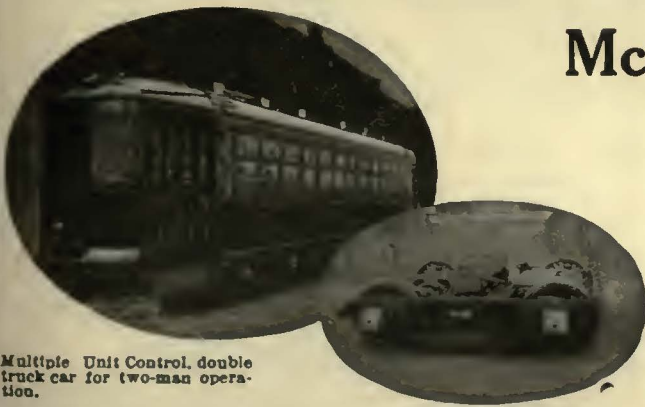
- | | |
|--------------------------------|--------------------|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |
| Concrete Materials to the Job | |
| Excavated Material to the Dump | |

For Economy

- THE CLARK CONCRETE BREAKER
- THE DIFFERENTIAL BOTTOM DUMP CAR
- THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.



Multiple Unit Control, double truck car for two-man operation.

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Manufacturing Company

General Offices

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Street Cars, Trucks Snow Sweepers

Waterproofed Trolley Cord



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

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SILVER LAKE

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

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts



MORE-JONES "TIGER" BRONZE AXLE & ARMATURE BEARINGS

Strong - tough - durable
anti-frictional
economical

MORE-JONES BRASS & METAL CO

ST. LOUIS

MISSOURI

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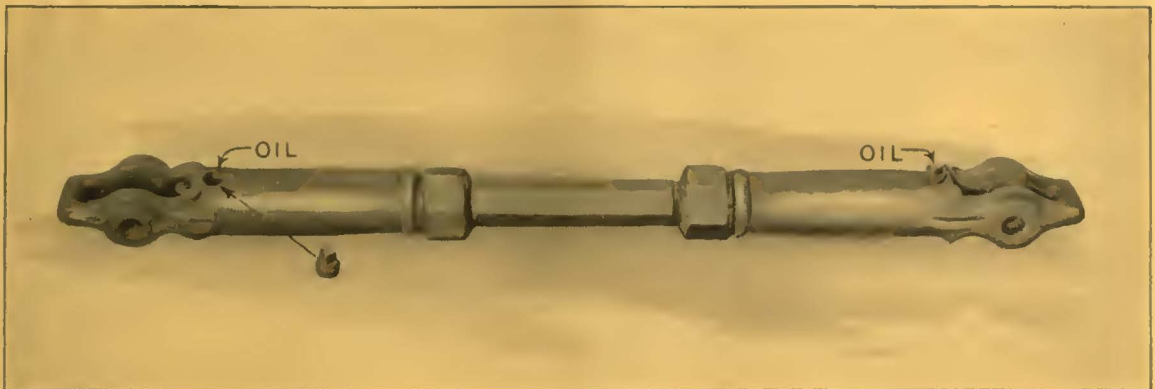
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 all grades of poles; also any butt-treating specifications
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 Minneapolis, Minn.



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 SIDE
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 Oliver Bldg.
 Pittsburg, Pa.



Lubricated Brake Rod Castings



Easy Adjustment

Master Mechanics will readily recognize the advantages of this new type Brill Brake Rod Casting. With the lever end closed the threaded brake rod is protected from dirt, water and snow, and being lubricated is safeguarded against the ravages of rust. Instead of difficulty due to the brake rod rusting tight, an experience familiar to many

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Brake Rods with this closed type casting can readily be installed in place of those having the open end type.

Jam nuts and spring washers are unnecessary when used in conjunction with Brill Automatic Slack Adjusters.

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 ST. LOUIS, MO. — CLEVELAND, OHIO. — SPRINGFIELD, MASS.





Terminal improvement under way in Chicago

THE Illinois Central has added its name to the list of railroad electrifications—to the list of high-voltage direct-current electrifications using 1500 volts.

Thirty seven route-miles of heavy-traffic suburban line out of Chicago will begin electrical operation next year.

For the initial installation of 120 two-car equipments General Electric will supply 100 per cent of the multiple-unit control equipment and 100 per cent of the compressors and governors, as well as half of the motors.

GENERAL ELECTRIC

GENERAL ELECTRIC CO., SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES