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ELECTRIC RAILWAY JOURNAL

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ELECTRIC RAILWAY JOURNAL

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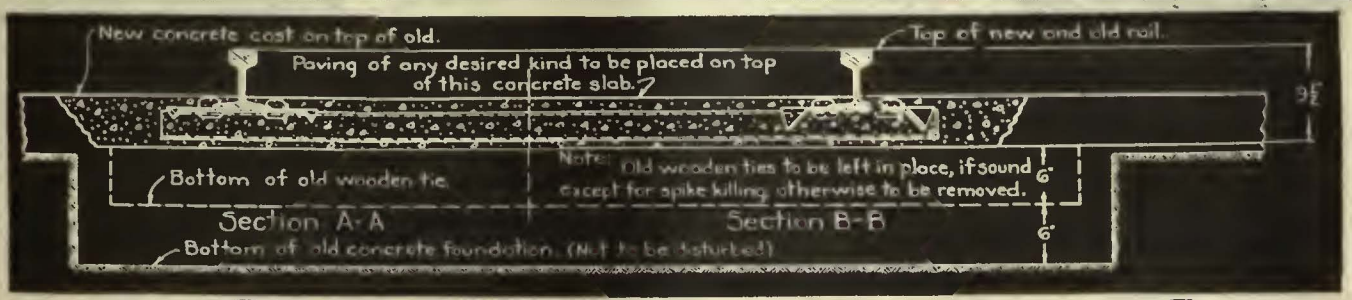


In 1921 and 1922 Twin Ties Saved 29,496 Lineal Feet of Old Concrete Track Base

WHERE worn out track which has a concrete base under wood ties is to be rebuilt, Steel Twin Ties fit every case with a saving in first cost which has been as high as $26,928 per mile.

The conditions vary, of course, as to rail heights and clearances. For instance, in the case shown in the drawing, a clearance of 3½ inches was available; while in the job shown in the photograph the clearance was only 1¼ inches.

Before considering the removal of old concrete base let us prepare a suggestion and estimate for rehabilitation with Steel Twin Ties.

THE INTERNATIONAL STEEL TIE CO.
Cleveland, Ohio

Steel Twin Tie Track

The Copper to Steel Weld in UNA Bonding

The copper to steel weld in UNA Bonding is based on a well-established law of metallurgy. That is, when molten copper from which oxygen has been excluded is maintained in contact with clean steel until the latter is raised to the melting point of copper, an extremely strong, ductile weld results.

All of these fundamental principles are embodied in UNA Bonding in ways that make the welding simple and readily learned. For the heat, an electric arc is used. In order to retain the molten copper against the steel rail the bond is placed in a mold which surrounds the bond heads. Then UNA Metal (copper alloy) is melted into the mold and combined with the bond strands forming a permanent union of the strands to the head. Just as soon as enough UNA Metal has been added to fill the mold the bond head is completely welded to the rail—an operation requiring about 30 seconds for a 4/0 bond. Due to the action of UNA Metal it automatically cleans the rail of oxide and scale, leaving clean steel to which the copper welds. It is therefore unnecessary to grind the rails. UNA Metal also eliminates the gases formed during welding which leaves the finished bond head a solid homogeneous structure as shown by the above photo-micrograph. Actual tests have shown that the weld of copper to steel with UNA Metal is so strong that 25,000 to 32,000 lbs. steady force is required to shear a bond head from the rail—and then the shear takes place through the bond head leaving the weld of copper to steel intact.

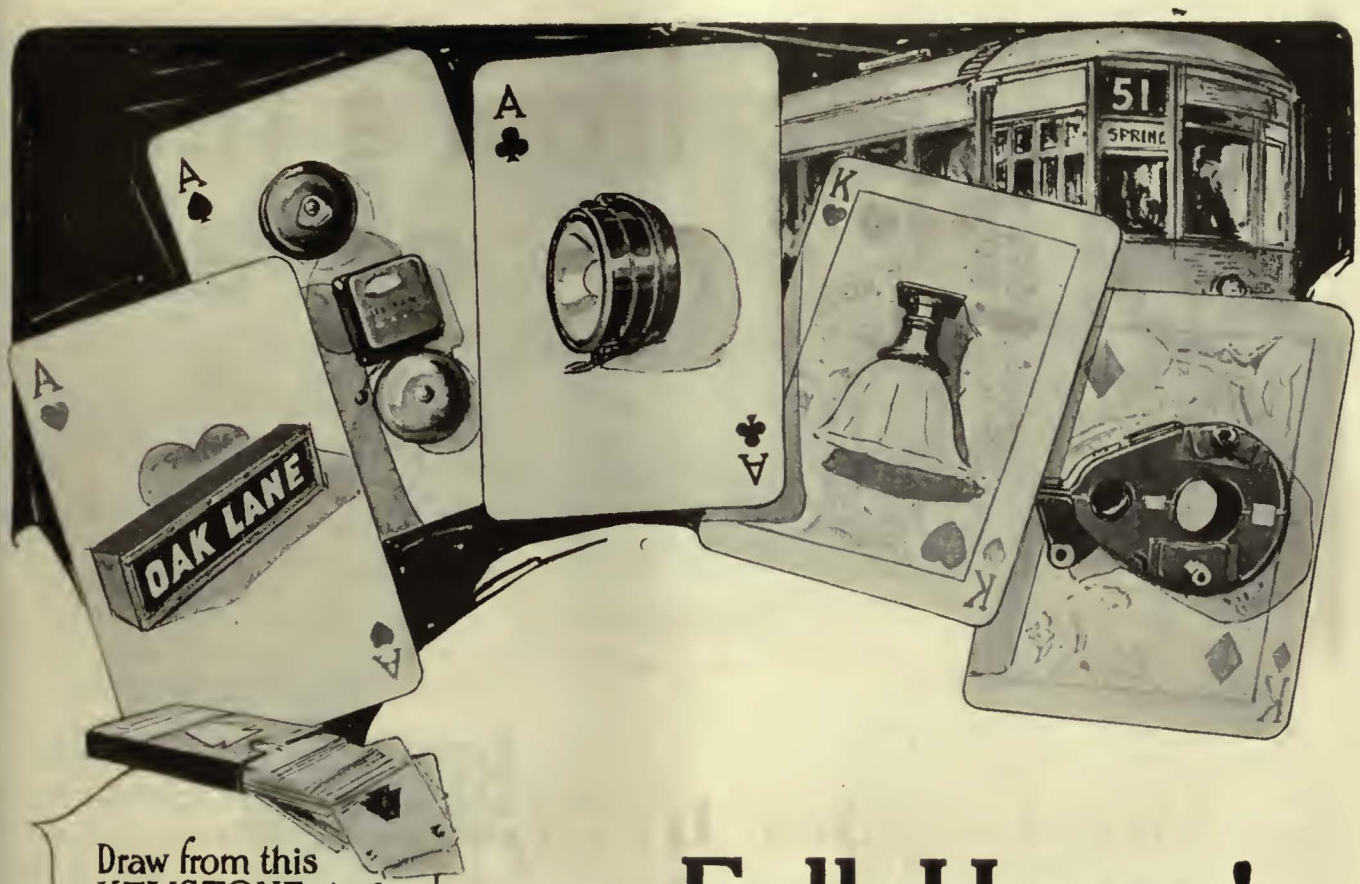
UNA Bonding is a most logical method of bonding because the all-copper bonds are welded direct to the steel rails. This provides a path of copper from rail to rail which makes the electrical conductivity a maximum. The actual welding of copper to steel with UNA Metal is simple and the operator has the advantage of being able to judge the weld he is making as he fills the mold.

These are some of the features which have made UNA Bonds approved by so many electric railways.

UNA Rail Bonds of standard capacities are available in both laminated and cable types. Let us send you a sample for your particular rail joint.

Rail Welding & Bonding Company

Cleveland, Ohio



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Steel Gear Cases
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Lighting Fixtures
Golden Glow Headlights
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International Fare Registers
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Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels

Full House!

Cars that win are like cards that win.

Cars *fully* fitted out with Keystone equipment bring home the money from increased passenger traffic. Their greater attractiveness, better service and increased reliability are revenue builders.

Look over the Keystone deck at the left and pick your own winners.

Comprehensive up-to-the-minute data sheets on any or all of these items will be sent gladly on request.

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A straight line

is the shortest distance between two points. The installation of Galena Oils leads immediately to better operating conditions, through increased lubricating efficiency.

A checking-up of hot journals, hot armature bearings and hot axle bearings per 100,000 car-miles will determine the degree of improvement to your own satisfaction — a reliable comparison that will tell the story truthfully.

The reduction in expenses through the improved performance in these items alone will convince you of the actual economy of Galena lubrication, without even considering the better service it brings.

A complete line

of Galena lubricants covers every requirement of Electric Railway car or power house equipment. Each product is built specially to suit the type of equipment used.

Galena Oils are not ordinary refinery lubricants. They are made from selected stocks by our own special processes. Over a half century of experience in practical railway lubrication has contributed to their development.

Hundreds of electric properties are now using Galena Lubrication Service. Their uniformly efficient performance in mileage and low upkeep costs is conclusive evidence of its economic value.

Lubricating Efficiency

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities

Philadelphia's Record Breaking Car Order

This week there are being delivered the first of the 576 new cars recently ordered by the Philadelphia Rapid Transit Company.

In specifying the materials and equipment for this largest single order ever placed, unusual care was taken to choose wisely throughout.

The following advertising pages of this special insert show some of the equipment

Chosen on merit
for Philadelphia's latest record breaking car order

Alphaduct Co.; Anglo-American Varnish Co.; J. G. Brill Co.; Carnegie Steel Co.; Central Equipment Co.; Consolidated Car Heating Co.; Differential Steel Car Co.; Economy Electric Devices Co.; Electric Service Supplies Co.; General Electric Co.; John Lucas & Co.; National Brake Co.; National Pneumatic Co.; National Railway Appliance Co.; Ohio Brass Co.; Pantasote Co.; Safety Car Devices Co.; Star Brass Works; Tool Steel Gear & Pinion Co.; Turnstile Car Corp.; Universal Safety Tread Co.

576 Cars in one lot

In building Philadelphia's new cars, the "largest single order on record for electric railway rolling stock," the Brill Company feels that it has an important part in the great progressive movement now prevalent throughout the electric railway industry. It is significant that this unusally large order for cars, expressing Philadelphia's confidence in the future of the industry, should be placed when electric railways in general are showing activity in the purchase of new equipment.

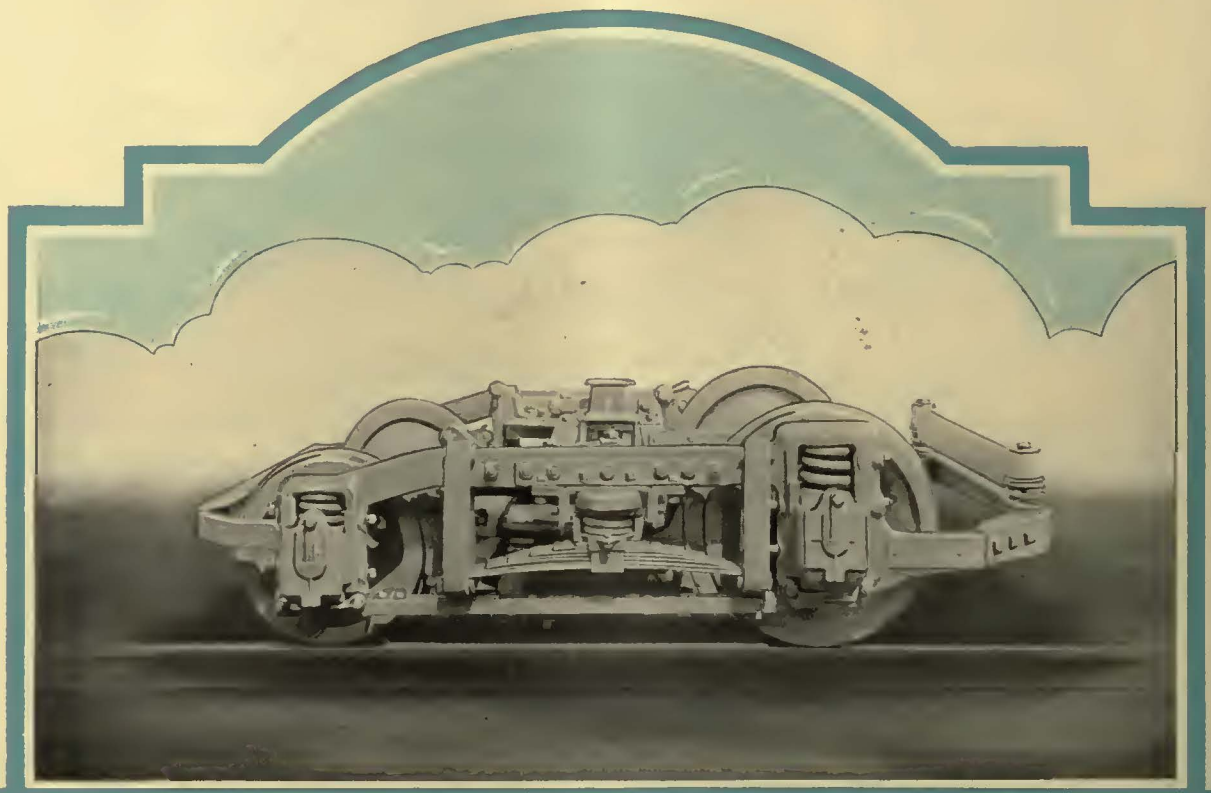
All passenger cars are mounted on Brill 39-E-2 Single-Motor Trucks.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

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

385 Single-End Passenger Cars
135 Double-End Passenger Cars
24 Shear Type Snow Plows
10 Double-Truck Snow Sweepers
6 Drop Side Work Cars
8 Side Dump Motor Cars
5 Side Dump Trail Cars
1 Surface Crane Car
1 Elev. and Subway Crane Car
1 Double-Truck Line Car

Total 576



Brill Equipment
Specified

In addition to the car bodies and trucks, Philadelphia's "largest single order on record for electric railway rolling stock" specifies many Brill Specialties, the most important of which are listed on the opposite page.

The use of Brill 39-E Single-Motor Trucks can only be attributed to the satisfaction they have evidently given, as more trucks of this type are already in service in Philadelphia than in any other city in the world.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

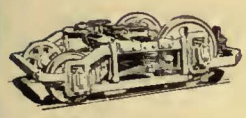
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

Brill Non-Reversible Seats

Standard equipment for single-end cars. Wall and aisle arms and plates, and pedestals are of pressed steel. Durability and simplicity of construction are characteristic of Brill Non-Reversible Seats.

Brill "Winner" Seats

Standard equipment for double-end cars. Double seat levers perfectly equalize reversing action of seat back, and with the comfortable pitch of cushions and backs are responsible for the popularity of Brill "Winner" Seats.

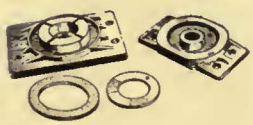


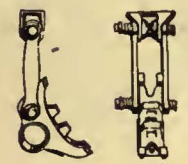
Brill 39-E2 Trucks

Standard equipment for all the passenger cars. Solid-forged Sideframes, Bolster Guide and Graduated Spring System are embodied in this single-motor type truck.

Brill Oil-Retaining Center Bearings

Standard equipment for all Brill pivotal trucks. As its name implies, it obtains constant lubrication, affording smooth and steady riding and lessening friction and rail wear at curves.



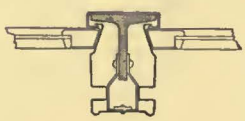


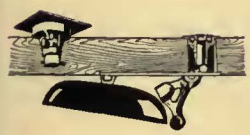
Brill "Half-ball" Brake Hangers

Standard equipment for all Brill single and double-trucks. Keeping brake shoes in proper alignment, thereby reducing maintenance, is but one of its principal functions.

Brill "Renitent" Posts

Embodied in construction of passenger cars, spring brass post casing holds sash under compression, keeping out water, air, and dust. Sash removable and interchangeable without aid of tools.



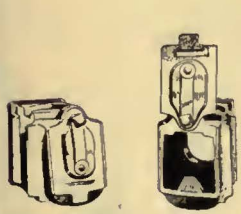


Brill "Dedenda" Gongs

Standard equipment for all types of cars. Gives a sharp, clear and unmistakable tone. One-half turn of pedestal will lock gong to prevent ringing on rear platform.

Brill Truck Springs

Manufactured in special department of high carbon, low phosphorus open-hearth steel, according to chemical specifications of American Society Testing Materials.



Brill Journal Boxes

All Brill Journal Boxes are carefully machined to give a tight fit for the pressed steel lid and a smooth close fit for the pedestals.

BRILL

CHOSEN ON MERIT FOR PHILADELPHIA'S

"ALPHADUCT"

Resists to a degree beyond that of any other flexible conduit the action of grease, oil, and moisture, and gives most complete protection to the insulation on the wire within it.

Minimum weight for adequate protection—
Twenty-one-year service record to back it—
Used by many prominent electric railways

Alphaduct offers the highest degree of protection under severest service conditions. Neither grease, oil nor moisture can penetrate the heavily glued duck inner lining. It can be cut lengthwise or crosswise and leave a clean, closed edge without ravellings or separations. See the picture and note how it's made. It will neither shrink nor stretch.

Made in 12 sizes from 7/32 to 2-1/4 inch diameters. Write to the factory for samples and data.

CONSTRUCTION:
Inner lining of Canvas. Glue sized and SOAP-STONED.

Water-proof Coating.

Hard Fibre Cord.

All interstices filled with special waterproof compound.

Outer Jacket.

Fire resisting Outer Coating.

FINISHED CONDUIT.

Examined and labeled under the direction of the Underwriters Laboratories.

ALPHADUCT COMPANY

136 Cator Ave.
Jersey City, New Jersey

CHOSEN ON MERIT FOR PHILADELPHIA'S

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

Details of Philadelphia Order for 576 Cars

On Jan. 22 the board of directors of the Philadelphia Rapid Transit Company authorized the lease and purchase by car trust agreement of 576 new cars of which 520 will be passenger cars. A brief note in regard to the order, which is said to be the largest single order for trolley cars placed in this country, was made in the issue of the ELECTRIC RAILWAY JOURNAL for March 3, page 408. Details regarding the equipment are now available and eighty-

MANUFACTURERS OF EQUIPMENT, TOGETHER WITH TYPE FURNISHED

Air brakes	G.E. Co.
Armature bearings	Plain
Axles	Carnegie Steel Co.'s heat treated
Bumpers	Six-inch Channel reinforced
Car signal system	Brill's standard and push button contact bases—Faraday Type-E
Car trimmings	...Malleable and bronze statuary finish
Center and side bearings	Brill's standard
Conduits and junction boxes	Galvanized
Control	G.E. 2-K-68 with ratchet attachment
Couplers	Drawbar pockets
Curtain fixtures	Curtain Supply Co.'s No. 88
Curtain material	Double face pantasote
Destination signs	Hunter
Door operating mechanism	...National Pneumatic Co.
Wheelguards	H. B. Life Guard
Gears and pinions	...Tool Steel Gear & Pinion Co.
Hand brakes	...Peacock staffless
Heater equipment	...Consolidated Car Heating Co.'s
Headlights	Crouse Hinds semi-enclosure lens
Journal bearings	Plain
	...Plain cast-iron
	...M.

1040
"Tool Steel" gears + pinions
go on this new equipment.

A quality specification.

CHOSEN ON MERIT FOR PHILADELPHIA'S

Light
Strong
Sanitary
Comfortable
Economical

when they have to stand—

Philadelphia riders will have

something more than loose dangling grimy leather straps. Mitten management, recognizing that peak loads require some standees, equipped all these new passenger cars with

BUFFALO LIGHT METAL HANDLES

Twenty thousand all at once is a big order. Only the confidence and satisfaction engendered by previous experience with Buffalo Light Metal Handles could have induced the Philadelphia Rapid Transit Company to come back for another quota of this magnitude.

Central Equipment Company
Exclusive Manufacturers
Englewood Avenue, Buffalo, N. Y.

Representatives:
National Railway Appliance Co., New York
Graysoo Railway Supply, St. Louis Hageman-Castle Corp., Chicago

LATEST RECORD-BREAKING CAR ORDER

2640 ECONOMY METERS in Philadelphia

EARLY this year the Philadelphia Rapid Transit system placed an order for Economy Meters, with car inspection dials, to completely equip the forth coming new P.R.T. Cars.

Philadelphia began equipping with Economy meters in 1919. Subsequently they ordered 310 meters to completely equip the Callowhill division.

After 18 months power-saving and car inspection service with 310 cars the P.R.T. ordered Economy Meters to completely equip all its street cars.

This system now has 2640 Economy Meters in service.

METER The Energy—that's what you want to save

ECONOMY ELECTRIC DEVICES COMPANY
1592 Old Colony Building, Chicago, Ill.

Domestic Representatives:

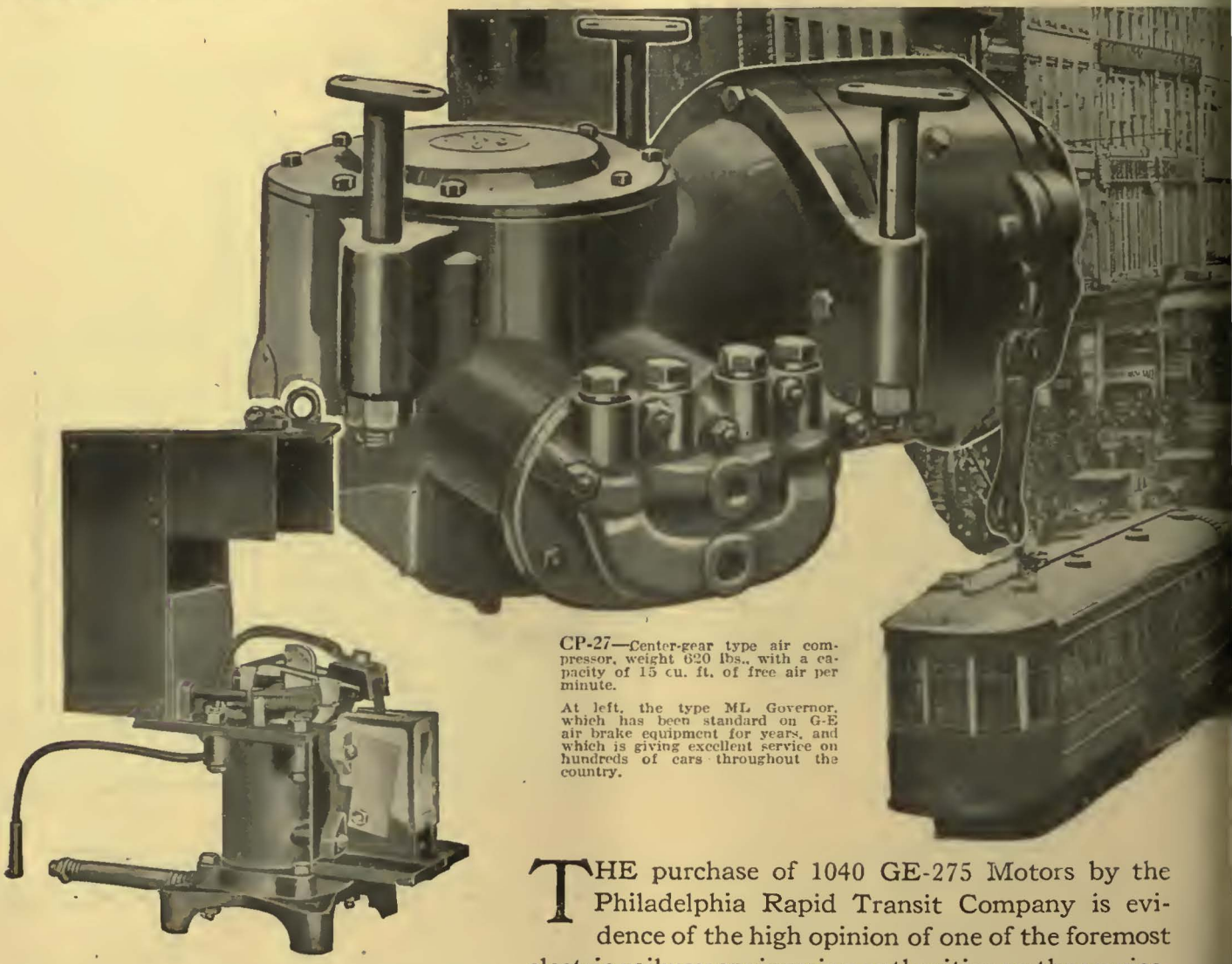
National Railway Appliance Co., New York
L.A. Nott, San Francisco
Burton R. Stare Co., Seattle
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
Detroit Railway Supply Co., Detroit

Foreign Representatives:

Appareils Electriques et Scientifiques, Rue Royal, 166, Brussels, Belgium
Ashida Engineering Co., Daini Sagisucho, Oasaka, Japan
Carrick Wedderspoon & Co., 94a Hereford St., Christchurch, New Zealand
Alfred Collyer, 183 George St., Toronto, Canada. 83 Craig St., Montreal
Albert Delamare, Director, 15 Allee Andrea 15, Bonely, Seine, France
Edison Swan Electric Co., Ponders End, Middlesex, England
Griffin Engineering Co., 94 Main St., Johannesburg, South Africa
Compania Nacional de Electricidad, Barcelona, Spain. Madrid, Spain.
H. I. Skilton, 519 National Bank Bldg. Havana, Cuba
Technisch Bureau, Hellendoorn, Javastraat 25, The Hague, Holland
Franki Warburton, Ltd., 380 Bourke St., Melbourne. 307 Kent St., Sydney

PRT

CHOSEN ON MERIT FOR PHILADELPHIA'S



CP-27—Center-gear type air compressor, weight 620 lbs., with a capacity of 15 cu. ft. of free air per minute.

At left, the type ML Governor, which has been standard on G-E air brake equipment for years, and which is giving excellent service on hundreds of cars throughout the country.

THE purchase of 1040 GE-275 Motors by the Philadelphia Rapid Transit Company is evidence of the high opinion of one of the foremost electric railway engineering authorities on the serviceability of this motor.

Similarly, the selection of the CP-27 Compressor for 520 new cars emphasizes the excellent operating record of more than 2500 CP-27 Compressors in use on the Philadelphia Rapid Transit System. In fact, low maintenance costs for the CP center-gear type Air Compressor have resulted in recent repeat orders for nearly 1000 equipments from other roads all over the country.

No consideration other than merit could justify such confidence in car equipment as is manifested in the placing of this large order with the General Electric Company. Turn to the back cover of this issue of Electric Railway Journal for a further expression of confidence in the GE-275 Motor, CP Compressors and K Control.

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

GENERAL

New York, Saturday, June 30, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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

Volume 61
Number 26

Re-Equipping to Save Money

RECENTLY a story appeared in this paper which gave the engineering, operating and economic considerations involved in the decision to scrap the fifteen-year old a.c. cars of the Indianapolis & Cincinnati Traction Company and re-equip the property with modern d.c. motored cars and automatic substations. This was all in preparation for extending the line 75 miles on through to Cincinnati. But if this extension should never be made, the change to modern equipment will result in a saving in operating expenses equal to 14 per cent return on the additional investment on the basis that no more business is done than in 1922. The re-equipment of the present property is therefore a good paying proposition even without the further advantages that will accrue to the road, such as the ability to give much more reliable service in new, attractive, better riding cars, which will bring more patronage.

Of course few railways have the opportunity to make so radical a change as was made on the I. & C. from a.c. to d.c. operation, in a case where the a.c. installation was a misfit, but there is nevertheless a sufficient inducement to make careful consideration of re-equipment important. To replace d.c. motors and cars twenty years old, and more, with modern cars of lighter weight and with more efficient motors will produce savings estimated to run from 8 to 12 per cent on the additional investment. In city service, if the saving resulting from more car-miles per car-hour is included, this will run the return up to 15 to 20 per cent. Adding to these savings the merchandising value of new cars makes re-equipment quite worth while.

Making Secure the Investment in the I. & C.

THE Indianapolis & Cincinnati Traction Company was one of those interurban lines whose continued financial success was a matter of doubt. It operates out of one good terminal city into farming communities, and hence must depend almost entirely on local patronage, as it does not run to any other commercial center. In view of the increasing use of the private automobile and the competition of motor buses, this local travel has diminished so that it has recently been scarcely adequate to support the railway even to the extent of paying operating expenses and fixed charges.

The re-equipment of the present property alone would enable the railway to carry on somewhat longer, but would not make its financial position secure. The completion of the plan of the company, however, to go forward promptly with the extension of the line to connect Indianapolis with Cincinnati, will place the property in an altogether more favorable position as to earning capacity per mile of line. That will add to the present limited local business the commercial travel that is attracted readily to frequent, high-speed, comfortable transportation between two important cities. Such transportation, if the cities are 50 to 100 miles apart, is in no serious danger from automobile and bus competition.

Thus it may be said that it is much more than an ambition with Charles L. Henry, president, to push through to completion the original idea behind the incorporation as indicated by the company name.

Under-Insurance Is a Common Fault

MUCH has been published on the method of determining valuations of railway physical property for rate-making purposes, but little on the method and need of making valuations of this same kind of property for fire insurance purposes. Nevertheless, neglect of this matter will nearly always result in serious consequences, if the property is of much value and should happen to be destroyed by fire.

The value of a building for fire insurance purposes is not the same usually as that at which it is carried in the balance sheet as an asset. It may also be quite different from the value at which it is held in a rate case or for taxation purposes. But it can be very definitely defined. It is the sum at which in each year the building can be replaced or another building as good for the purpose may be erected. This means, of course, that its value for fire insurance purposes varies from year to year with fluctuations in the cost of building construction.

Conservative railway financial managements often take pride in the large amounts which they charge off yearly for depreciation of their physical property. For the stockholder this policy has many points of merit when this policy is applied to the balance sheet, but the experience of the last few years shows that it may be and probably is absolutely wrong if applied to the amounts at which this same property is insured. Thus if a carhouse was built ten years ago for $200,000, its cost of replacement today might be double that sum, while if a system of charging off 3 per cent a year on the original cost for depreciation was followed it would be represented in the balance sheet at only $140,000. Here is a difference of $260,000 which the company would lose if the building was destroyed by fire. Obviously the same principle applies to other parts of the equipment.

It is somewhat strange that on a great many properties the work of handling fire insurance seems to be conducted on a different basis than are other parts of the business. For these, the advice of experts within or without the organization is sought. But the business of caring for the fire insurance is often turned over to a clerk, and the policies are taken out through a

local agent for no other reason than that he happens to be a friend of one of the officials of the company. This is all right if he earns his premiums, but to do so he ought to make sure that the company's risks are fully covered and that it is taking advantage of all practicable opportunities to reduce its rates by the introduction of fire preventive measures.

Utility insurance is quite a special study in many respects, which points to the value of placing insurance matters in the hands of some one like a general agent who is particularly equipped and experienced in this class of work. When dependence is placed solely in the average local agent, the railway company may easily be subject to great losses or to unnecessary high rates through lack of competent advice in securing adequate protection and in pursuing ways and means to reduce the risk and the cost.

Would Use Even a Tragic Accident for Political Capital

MAKING political capital of a tragic accident would seem to be about the lowest form of human enterprise. Yet that is about what New York's Mayor did on the occasion of the disaster on the Brooklyn-Manhattan elevated line in the heart of Brooklyn last Monday when two cars fell off the structure, killing eight and injuring eighty. After a cursory glance at the splintered timbers where the cars left the structure, he promptly announced that rotten guard timbers were responsible for the accident. By contrast, engineers and other experts long trained in the science of construction and railroad operation have withheld their judgment pending the disclosures of thorough investigation.

The Mayor declared he would write the Governor demanding the removal of the Transit Commission, his favorite victim of attack, as this condition existed with its knowledge and consent. He indicated also that the accident would probably never have occurred if his traction program had not been killed at the recent legislative session. Fortunately, all of the local newspapers have severely criticised his attitude.

So far as can be ascertained to date, it appears that whatever the condition of the guard timbers was, they performed their function, as the truck which was derailed was kept on the structure. If the sudden lurch of the car body, resulting from the truck suddenly turning crosswise of the track, was responsible for breaking the king-bolt and throwing the body off the track, then no structure short of a high wall would have saved the cars from falling to the street. The traction company is co-operating in a thorough study of the causes, for, naturally, it is most vitally interested in bringing out any facts that can be used in devising ways to prevent a recurrence of an accident which will probably cost the railway a million dollars or more.

Principles of Utility Regulation Are Restated in Illinois Case

IN A CLEAR-CUT decision in the case of the West Suburban Transportation Company, appellant, vs. the Chicago & West Towns Railway Company, appellee, the Supreme Court of Illinois has defined the purposes of a public utilities commission and has declared its willingness to intervene in cases where these purposes are not carried out. Of course, there is nothing absolutely new in principle in what the court says in this case. The whole idea of public utility regulation in this country is built around the theory that a utility whose rates and service are regulated will be protected against competition to the extent that a new company will not be permitted to supply a similar service in the same territory unless that service is a matter of convenience and necessity to the public. Neither is it entirely without precedent that the courts should intervene even in matters of judgment on the part of the commission as to what condition of affairs is meant by convenience and necessity.

It is in defining these terms that the Illinois Supreme Court decision, just rendered, is particularly clear. "Whether the public convenience and necessity require the establishment of a new transportation facility," it says, "is not determined by the number of individuals who may ask for it." Even a considerable number of people, the court goes on to point out, might be convenienced by the new transportation enterprise, but this does not mean that it would be either a convenience or a necessity to the great body of the public. In fact, the court intimates if the amount of traffic taken by the competing bus line should so affect the existing trolley company that it would have to reduce its service or increase its fare, the interest of the public as a whole would be jeopardized.

It is well that these principles of public utility regulations should be restated by the court every so often. While fundamental in their soundness, it should be remembered that utility regulation is not so very old in this country, and that its principles may be lost sight of by, or perhaps are unknown to, each new crop of politicians. It is for this reason that their restatement by a body like the Supreme Court of Illinois is refreshing.

Good Maintenance Important in Improving Public Relations

AT THE recent convention of the National Electric Light Association much time was devoted to the discussion of how to better public relations. Several speakers referred to the importance of service as the fundamental on which good relations can be built, and the need for providing the best of service at all times. Of course, it is not possible for the customer to see the maintenance departments at work, except in some few instances; but they are always behind the scenes, and much of the success of the utility depends on the character of work done by these essential departments.

Much emphasis has been laid on methods of reducing the costs of maintenance, due to the straits in which the railways have been for the past several years. Unfortunately in some cases the costs have been reduced to the point where service has suffered. A few equipment men have overlooked the seriousness of failures during the rush hour. While sometimes it does not mean a great loss in revenue, other cases can be cited where failures have caused regular riders to seek other means of transportation or to walk, either for the one day, or, if breakdowns are too frequent, to get away from the use of the railway's service permanently.

The best is usually the cheapest, and if attention is paid to keeping all parts of the property maintained in the best manner, the total net revenue at the end of the year is likely to be greater, even though more money actually has been spent in its upkeep. Penny-wise methods usually turn out to be pound-foolish, and their use should be discouraged, even though the immediate cost may make a small saving look tempting.

New Philadelphia Cars Will Have Many Modern Devices

Sample Single-End Car of Which 385 Will Be Built for Philadelphia Rapid Transit Company

Single-End Type Is Designed for Either Two-Man or One-Man Operation—All of the New Cars Are to Be Equipped with Safety Devices—The Cost of the New Rolling Stock Will Be $6,500,000

THE outstanding feature of the 520 passenger cars recently purchased by the Philadelphia Rapid Transit Company will be the completeness of the auxiliary equipment. Practically all of the latest devices for use on electric railway cars have been embodied in the design. This large purchase includes 385 single-end cars such as shown in the accompanying illustration of car No. 8000, similar in type to the modified near-side cars now in service, and 135 double-end cars which are a modification of the so-called "Hog Island" type. Car No. 5201, also pictured, is an example of this design. These two sample cars are the only units which have yet been completed.

On the single-end car, sliding center doors and a double step in the well inside the car body will replace the folding door with a single step in the well and a folding step outside, used on the earlier type. It is expected that a reduction in the number of accidents will result from keeping these doors within the lines of the car instead of opening outward where they can be smashed by a passing vehicle. This feature is of particular importance in Philadelphia because of the narrowness of the streets. Moreover, it is hoped by the company to speed up the unloading process by having a larger well inside the car, where more people can assemble in readiness to alight.

All of the cars are to be equipped with standard safety car devices. National pneumatic door interlocking devices will be used as an additional safeguard, with a signal light in front of the motorman to indicate to him when all the doors have been closed. When the 8000-type car is used for two-man operation, passengers will enter at the front and leave by the center door, as in the older cars. Under these circumstances the center doors will be controlled by the conductor stationed on the right-hand side of the aisle immediately in front of the well. This control is similar to that now used on the other cars of the Philadelphia Rapid Transit Company. The pneumatic door engines have their valves mechanically operated by the conductor through a system of rods and bell cranks.

When the car is used for one-man operation, passengers may enter and leave by the front doors, or they may enter at the front and leave by the center door, in which case the center door is opened and closed from the motorman's position. These operations are all controlled by the engineer's valve handle, as in the standard

135 Double-End Cars of the Type Shown at the Right Are on Order. Note New Location of Destination Signs In This View and In End View of Single-End Car Shown at Left

The Top Step Is Shortened Because of the Turnstile

Standard Seating Arrangement for Single-End Cars

safety car practice. In order that door operation may be suited to the use to which the car is put, a selector valve has been placed in front of the motorman immediately below the engineer valve. The position of the selector valve handle determines whether both doors at the front are opened or whether one door at the front and those at the center are opened by the door-opening movement of the engineer's valve.

Consideration is now being given to the question of locating a turnstile of the Syracuse type at the center exit of the car. This device will be used when the car is operated by one man as a front entrance and center exit car or vice versa. For experiment the turnstile in the sample car has been placed just in the rear of the well. In case the car is to be used in two-man service with a conductor, one of the three turnstile arms may be dropped, so as to leave the exit passage free. The position of the turnstile near the well at the center of the car, as shown in the accompanying illustration, is such that it introduced an element of danger in that it distracted the attention of passengers from the step, so that they might fall as they left the car. In order to eliminate this danger, the floor has been mitred to cut off the corner of the well near the turnstile so that a passenger can pass entirely by it before it is necessary to take a step down. Universal safety treads will be used on the steps.

Great flexibility of operation is possible with the car so designed. It is adapted to any kind of service. However, the normal operation will be with two men on heavy city runs, or with one man for lighter traffic as a front-entrance, center-exit car. The cars will always be used as single units and never coupled into trains.

The seating capacity of the new single-end car will be fifty-three, which is greater by two than that of the present cars. The general seating arrangement will be the same as in the present cars, and the increase will be effected by moving back the rear bulkhead. Although this will decrease the capacity of the curved seat at the rear of the car, nevertheless it will make possible the installation of two additional cross-seats. The Brill "Cleveland" type of seat will be used. This is of wooden slat construction, which the Philadelphia Rapid Transit Company believes to be the most economical and sanitary type of seat.

Artificial lighting will be accomplished by two rows of small unshaded electric bulbs. These are arranged in line with and between the hand straps, approximately over the center line of the cross-seats.

The straps themselves are to be the Buffalo handholds. The grip is of white enameled metal and is suspended from the car roof by a chain. Around the chain is a piece of thick rubber tubing which gives a certain amount of stiffening and prevents the strap

A Selector Valve Is Located Below the Engineer's Valve

New Seating Arrangement in Double-End Car

flopping around when the car is in motion. The car signal system will be the Faraday type-E with contact bases. The interior metal trim of the car is to be bronze statuary finish, while the wood work is cherry. The Lucas system is used for interior and exterior finish. The roof will be the arch type with Agasote headlining finished with white Anglo-American enamel. Double-faced Pantasote will be the curtain material.

Hunter signs will be used. In this respect the new single-end car shows a slight variation from previous designs. The name of the destination point will be shown in the center front window instead of being immediately below the large route number in the right-hand window. The route number, however, will remain in the present location.

The new car will have on each side one more window than the old car. Window posts will be of the Brill "Renitent" type, which holds the sash under compression, yet permits its easy removal. The sash is held firmly in place when raised to any desired height. The latter feature is considered by the company to be of great importance, as many accidents have occurred in the past on account of windows dropping upon the arms of seated passengers. This type of window is not a novelty in Philadelphia, having been used on some of the more recent cars. The upper portion of the sash in every second window is to be hinged at the bottom and may be dropped inward slightly in order to afford ventilation, although roof ventilators also will be used. The latter are of the Garland C-1 Jr. type. The car will be heated electrically by Consolidated car heaters.

Although the framework of the new 8000 car is composed of standard-sized members, nevertheless a slight reduction in weight has been effected, the total being only 34,000 lb., as compared with 37,000 lb. for the present car. The over-all length of the car is 45 ft. 6 in., and the over-all width 8 ft. 6 in. The height from rail to trolley base is 11 ft. ½ in. Steel framing is employed throughout, and the sides are of sheet steel, being straight instead of paneled as on the near-side cars. The floor is of wood, the aisle being reinforced with hardwood strips, and at the front end has a slight ramp so that any moisture which accumulates will run down onto the front platform. This in turn is sloped slightly toward the door, thus insuring the motorman a dry place on which to stand.

General Electric K-68 control will be used on the new cars. By means of a ratchet attachment a line switch beneath the car opens with any reverse movement of the controller. Economy meters also will be installed, as this is standard Philadelphia Rapid Transit practice. The air-brake equipment is made by the General Electric Company, while the hand brake is of the Peacock staffless type. Carnegie steel wheels and axles are to be used, the drivers having a diameter of 28 in. and the trailers 22 in. Each car will be equipped with two General Electric No. 275-A outside hung motors, and Tool Steel gears and pinions. Trucks will be Brill No. 39 E-2, having helical and elliptical springs. The cars will be equipped with Kalamazoo trolley wheels and harps, O-B trolley catchers and Imperial headlights.

THE DOUBLE-END CARS

As already stated, the new double-end cars of the 5200 type differ only slightly from the previous design of double-end car, first introduced by the United States Shipping Board during the war period for service to the Hog Island shipyard. The new cars, however, will have this important difference, that one-half of the seats are to be transverse instead of all being longitudinal. There will be altogether ten cross-seats in this car, arranged in two groups of five each, one on the front left-hand side and the other on the rear right-hand side, with a longitudinal seat opposite each group.

On Present Cars the Center Door and Step Open Outward

Another difference from previous types of double-end cars is that the 5200-type car will be equipped with only two motors instead of four. This can be done because it is not intended that the car shall haul a dead trailer, as has been the practice in the past with some of these cars. The motors themselves and most of the other equipment on the car are the same as already described for the single-end car.

Safety car devices and pneumatic door control will be installed on the double-end cars. A selector valve similar to that on the single-end car will be used on the 5200 type, although the door operation will naturally be different on a double-end car. The 5200 type will be slightly

heavier than the 8000 type, having a total weight of 35,000 lb., somewhat less than the present double-end cars.

There will be a marked difference in appearance between the new double-end cars and the single-end cars. In accordance with standard practice in Philadelphia, the double-end cars are to be painted orange in color in contrast to the green of the single-end cars. This is done in order that the public may know at a glance whether an approaching car is of the front-entrance, center-exit type or of the rear-entrance and front-exit type.

Shortly after the completion of sample cars of the new types at the Brill works, where all of the cars are being built, a committee composed of employees of the Philadelphia Rapid Transit Company, Chairman Mitten and President Dunbar made an inspection. A close examination was made of the car and all its working parts by both the employer and employee committeemen, in order that those who operate the cars and those who maintain the cars in the shop should have an opportunity to make suggestions.

Pneumatic control plays a large part in the operation of the new cars. This feature, however, is not without complications inasmuch as the moisture of the Philadelphia climate is such as to cause frequent freeze-ups of the air pipes in winter. There have been included in the design, therefore, enough cooling coils that the moisture in the air may be condensed harmlessly rather than collect at joints in the pipe and freeze up with disastrous results.

The magnitude of the order may be judged from the total cost, which will be $6,500,000. Many automatic and labor-saving devices have been included in the design, and it is felt by the company that the new cars represent a distinct improvement over any others now in service in Philadelphia.

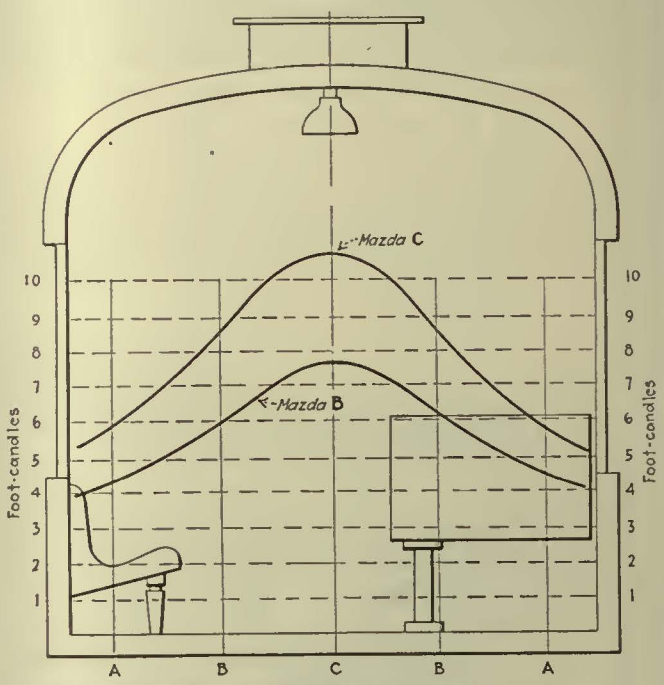
Future Development of Car Lighting

Standards Are Steadily Rising to Follow Industrial and Commercial Practice—The Gas-Filled Incandescent Lamp Is Being Studied

THE passage of laws in several states requiring that the injurious glare from unshaded electric lights shall be eliminated in industrial plants may foreshadow a similar demand for shaded lamps in railway cars. When such a time comes there will have to be a radical change from the customary lighting practice of the present day. The many small unshaded 25-watt lamps will probably have to be eliminated and a smaller number of large lamps with modern reflectors used in their place.

The experience of railway engineers indicates that the 94-watt Mazda B lamps used five in series with center lighting on many cars average close to 2,000 hours in service, and if voltage variations are not excessive they may even continue to burn for a longer time before failure of the filament. However, these lamps are subject to an unavoidable depreciation in candle-power as the tungsten filament evaporates, and they may frequently be expected to fall to 80 per cent or even less of their initial candle-power before final burnout. Economically it would be well, the manufacturers point out, to remove and scrap all excessively old lamps that have fallen to less than 80 per cent initial candle-power, a condition which may be expected to occur at the end of about 1,500 hours continuous burning.

Tests recently made under service conditions show that the center-deck lighting system with 94-watt lamps was giving only about 60 per cent to 70 per cent of the illumination possible with new lamps of the same rating, and inasmuch as the average illumination with new lamps was about four foot-candles, it can easily be seen why a number of car interiors appeared gloomy. The natural supposition would be, in view of the above facts, that either a larger bulb should be used with the 94-watt lamp, so that the deposit of evaporated tungsten on the inside would be kept sufficiently low to allow good light transmission, or that a higher wattage lamp should be installed initially to provide for this depreciation. In fact, for that very reason, the 150-watt Mazda B

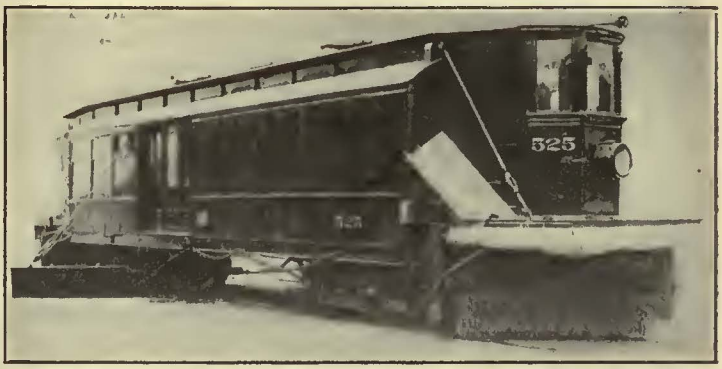


Comparative Intensity of Illumination Directly Under Lamps

lamp does call for a larger size bulb. Such a larger bulb in the vacuum lamp would necessitate changes in reflectors, and does not on that account seem to be the most reasonable solution.

A number of car-lighting tests have recently been made with the object of substituting the gas-filled, or Mazda C, lamp of 75 or 100-watt size for the 94-watt type B lamp. These tests showed that directly under the fixture the C lamp gave nearly 50 per cent more light than the Mazda B, as indicated on the accompanying chart. Midway between fixtures the superiority was not so marked, being only about 20 per cent. Unfortunately, when used five in series on 550 to 600-volt circuits, the failure of a lamp filament in a bulb filled with a mixture of argon and nitrogen usually causes a bad arc, which, backed up by the entire line voltage, may result in the destruction of the lamp base and socket. Car-lighting engineers hope for the satisfactory outcome of research now being carried on to supply a gas-filled lamp suitable for series operations, but the results so far secured have not provided such a lamp and the problem is worthy of considerable thought on the part of railway engineers and lamp manufacturers.

Another alternative which is receiving serious attention is that of reflectors set into the deck of the car. This might be an excellent solution of the car-lighting



Left—Type of Old Car Similar to That Used for Double-Truck Sweeper. Right—Double-Truck Sweeper with Snow Wing as Reconstructed

problem. A slightly higher installation cost would be balanced by a lower maintenance and breakage cost and would afford better eye protection to passengers. Bare lamps within a few feet of the faces of standing passengers, now very common, are a menace to optical comfort and safety. The all-frosted or diffusing bulb lamps, especially for side deck lighting, may grow in favor as an intermediate step in curing the glare evil.

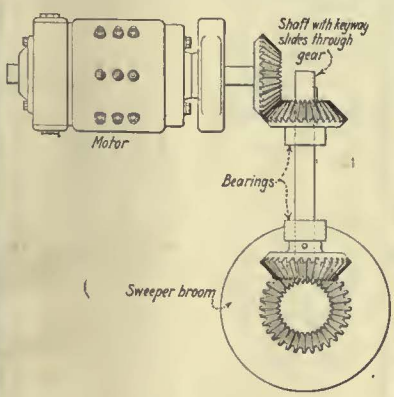
Chainless Sweeper Has Many Advantages

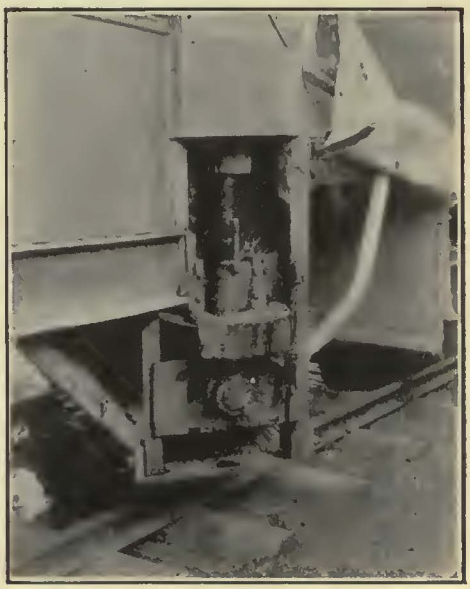
Through Use of Bevel-Gear Drives for the Rotary Brooms, Sprockets and Chains Are Done Away With—A Sliding Shaft Permits Vertical Movement

A DOUBLE-TRUCK, chainless sweeper has been built from an old passenger car by the Lehigh Valley Transit Company, Allentown, Pa. Accompanying illustrations show this sweeper as constructed, also an old car of the same type as that used in its construction. The mechanism used for driving the brooms and for raising and lowering them is particularly interesting. The sweeper has brooms at either end and these are driven through bevel gears at top and bottom of a vertical shaft so that no chains or sprockets are used. This type of construction was resorted to in order to get away from the continual annoyance caused by the failure of chains while the sweepers were in service.

At the outside ends the brooms have bearings which are installed in crossheads with guides providing for vertical movement. The crosshead guides are 2-in. x 5-in. steel castings. These are braced securely to the car-body framing, which is reinforced by steel I-beams. Front pipe braces of 2-in. pipe are also provided. The bevel gear on the broom shaft is located just inside one of the pedestals, and a corresponding bevel gear is installed on a vertical shaft immediately above this. The bearings for this vertical shaft also slide in the pedestal, so that the raising and lowering of the brooms causes the vertical shaft to raise and lower at the same time. The bevel gearing at the top end of this vertical driving shaft has bearings fixed to the car body, so that in raising and lowering the broom the vertical shaft with its keyway slides through the top bevel gear. The motor for driving the broom is connected directly to the top bevel gearing, and an individual motor is provided for driving each broom. The various steel castings required for the crosshead guides and the bevel gears themselves were made in the steel foundry of the railway company.

The mechanism used for raising and lowering the brooms consists of a chain attachment to each end of the broom shaft. This passes over a sheave on the car body directly above the broom shaft and thence to additional sheaves located on a shaft just at the end of the car body. This latter shaft has a sheave attachment in the center and is connected through a chain and rod to a brake cylinder, so that by admitting air to this cylinder the various sheaves are rotated and the brooms raised. They are lowered by their own weight. The





Top—Diagram of Geared Drive for Sweeper Brooms

Left—Motor Drive on Inside of Sweeper for Brooms

Right—Crosshead and Guide, Together with Geared Drive

rods connected to the brake cylinder have holes with side guides so that pins can be inserted after the height is adjusted as desired, and thus the brooms can be held in any desired location.

The sweeper drums as well as the brooms outside of the cane are made much larger in diameter than other sweepers used by the railway. The wooden drum for holding the cane is 20 in. in diameter and the diameter outside the cane is 42 in. As a result of the use of these large diameters long life is obtained from the sweeper cane. During the past winter this sweeper was used during seven severe snowstorms and in about as many light storms. The same cane was used throughout the season without the necessity of replacement, while other sweepers which performed the same service required new cane after every storm, due to the breaking of the cane on account of the small diameter of the drums.

The car is also equipped with side snow wings for cleaning the area adjacent to tracks. One of the accompanying illustrations shows a side wing in position. The raising and lowering of the wing is accomplished by block and rope operated through an opening in the side of the sweeper. Chain attachments are provided for holding it in position and taking the strain of snow removal. These are fastened to the steel side sills. As may be seen by comparing the construction of the sweeper with that of the old car from which it was made, the end cab and mechanism for supporting the broom were added at the end. The center portion is used for carrying tools and for mounting the motors, brake cylinders and resistors necessary in operation. The operation of the brooms and their raising and lowering are controlled from the cab at either end. All wiring is carried overhead, inside the car, so as to keep it dry and thus minimize the danger of short circuiting. The resistors which are mounted inside the sweeper help to keep it heated.

Checking Headway Records in Racine

VARIOUS methods have been described in past issues of this paper of checking Nachod headway records to determine the extent which cars are ahead or behind schedule. A very simple plan for doing this very necessary work has been developed in Racine, Wis., where the city cars are operated by the Milwaukee Electric Railway & Light Company. There are four headway recorders in Racine and their records are checked daily.

A triangular box has been constructed, about 30 in. long, to hold a glass plate of this length and 8 in. wide, or the width of the recorder sheet. A master chart, or one showing the correct spacing of the cars, is laid down on this glass plate and held flat at the edges by brass strips under which it can slide. The headway record is then laid on top of this master chart, and by means of light from a lamp in the box the differences between the times when the cars should pass the time point and their actual times of passing can readily be checked.

At the bottom of the box is a ruler held by three levers so that it can be raised or lowered on the glass plate yet always remain parallel with the bottom of the box. This simplifies somewhat the work of following through the lines on the record and consequently of checking the figures.

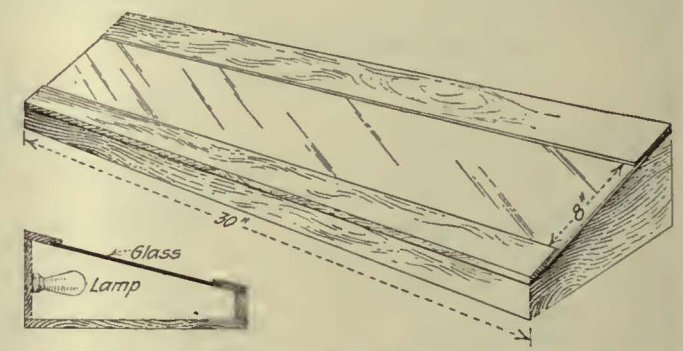
The company keeps a record of all differences between the schedule times and the actual times at which cars pass the time points, as well as the causes for all delays. This record is kept in the form illustrated, which is for January, 1923. A record is also kept of all interruptions to the operation of the recorders, as well as the cause and the total number of minutes delay occasioned thereby. Headway recorders have been found useful not only for checking car headways but also, when set at points on city lines just beyond short route terminals, to determine whether there has been any short routing of long-route cars.

MONTHLY REPORT OF CARS OFF SCHEDULE, RACINE CITY DIVISION, M. E. R. & L. CO., FOR JANUARY, 1923

Compiled from Records of Four Nachod Headway Recorders

Total scheduled car passes	37,286
Total car passes checked	32,621
Per cent checked	87.4
Total early — two minutes or more	89
Per cent early	0.27
Total late — five minutes or more	266
Per cent late	0.82
Total off schedule	355
Per cent off schedule	1.09

			Number	Minutes
Cars ahead of time			89	178
Cars late			266	1,551
Causes of delay:				
Heavy travel	82	450		
Weather conditions	16	97		
Accidents	7	47		
Other cars	37	226		
Total general traffic conditions			142	820
Track	5	31		
Power	34	209		
Rolling stock	20	120		
Transportation				
Total operating failures			59	360
Vehicles on track	3	20		
Bridges	20	120		
Steam railways	27	151		
Total foreign causes			50	291
Late from previous trip			15	80
			266	1,551



Box for Checking Headway Records in Racine

Preventing Grade-Crossing Accidents

IN A RECENT published interview Commissioner Thomas J. Campbell of the Public Service Commission of Oregon suggests that every automobile driver be required to pass a federal test concerning rules of the road, and that every vehicle should be required to come to a full stop before crossing any railroad at grade. The commissioner's suggestions are given weight by a recent check on motorists approaching two obscured grade crossings in the outskirts of Portland. Of 200 drivers observed, fifty-six looked both ways on approaching the crossing, thirty-three looked in one direction only, one hundred and ten gave no indication that they realized that they were crossing a railroad, and one came to a full stop before crossing; this one, however, being a regular stage vehicle, was required by law to stop.

Financial Aspects in New Orleans Report

Actual Return Being Earned Under Present Operation Is 5.58 per Cent —Decreased Expenses and Increased Earnings Must Be Realized if Allowed 7.5 per Cent Return Is Earned—Estimated Savings Possible Amount to $2,400 a Day—This, Together with Increased Earnings Expected as Result of Rerouting and Better Service, Will Make Possible Full Return, Including a Reduction in Fare, by the End of 1924—Plans Can Be Carried Out with $500,000 New Capital Annually

THE seventh and last section of the report by John A. Beeler for the Department of Public Utilities of New Orleans on the local street car system deals with the financial results that have obtained under the present plan of operation and what may be expected if the recommendations made are put into effect. The past operation of the company is indicated by a condensed statement of earnings and expenses for fifteen years back as shown in Table I. The rates of fare applying during the period for which these figures are compiled were as follows:

5 cents prior to Oct. 10, 1918.
6 cents, Oct. 10, 1918, to Oct. 23, 1920.
8 cents, Oct. 23, 1920, to Sept. 28, 1922.
7 cents, Sept. 28, 1922, to the present time.

The revenue and expenses by years per car-mile and per car-hour are shown in Table II. It will be seen from this table that the expense per car-mile was 39.6 cents in 1922, or nearly three times what it was in the pre-war days. The length of the car ride has not been shortened; if anything, the average rider travels farther. In 1912 the total expense of operating a car for one hour was $1.29; last year it was $3.57. A car now in twenty-two minutes rolls up as much expense as it did in an hour ten years ago.

It is explained that the percentages of expense required by the various operating accounts have not fluctuated greatly. A renewals and replacement account was not provided until 1910 and then only inadequately. Last year $740,000 was charged to this account. This was on a basis of about 3 per cent of the rate base. It was equivalent to 9 per cent of the revenue. The report states that so much remains to be done to put the property in efficient operating condition that this amount may be increased temporarily. Eventually, however, this rate should be more than ample.

The rate base was recently fixed at $25,000,000 and the rate of return agreed upon at 7.5 per cent. To provide for new equipment and other additions the rate base has since then been considerably increased. At the time the report was written, the figures showing the average rate base allocated to the railway department of the company for the year were not available. It is shown that the gross income of $1,707,699 earned in 1922, which includes $51,708 of miscellaneous income, was sufficient to pay 7.5 per cent on a value of but $22,769,000, whereas it is known that the rate base with the new equipment on order is not far from $27,000,000. Assuming it at the latter amount, the rate of return equals 6.32 per cent. The amount lacking to cover the allowed return is $317,301.

During the year 1922 the fare was at the rate of 8 cents until Sept. 28, when the 7-cent rate became effective. The last quarter of the year was wholly on the 7-cent fare basis, and therefore the earnings from operation for this quarter reflect more nearly 1923 conditions. On this basis a gross corporate income of $1,506,057 is indicated, which is insufficient by $518,943 to pay 7.5 per cent on a $27,000,000 rate base. The actual rate earned equals but 5.58 per cent. To pay it in full would require $2,025,000, which is equivalent to 26.3 per cent of the combined operating revenue and miscellaneous income of the railway. The total operating deductions require 80.4 per cent. Reduction of these facts to a simple businesslike statement shows that for each 100 cents received, 106.7 cents are required to meet the outgo.

With the installation of the new plan, two factors of importance will be brought into action. Operation, being more efficient, will effect important savings, and the system, covering increased and well-populated territory, will serve more patrons. The first factor reduces expenses, the other increases revenues. Of the track changes, betterments and improvements outlined in earlier sections of the report, certain ones are properly chargeable to capital account and others to expense. New cars, except when they replace old equipment, should go to capital. Virtually all of the trackwork proposed must go to expense as it does not represent an increase in trackage. It represents the cost of replacing the tracks where they will better serve the city. The cost of the proposed betterments is summarized as follows:

Track changes, including extensions	$1,698,960
Canal street construction	304,000
Loading platforms	25,000
Rebuilding and modernizing 150 small cars	270,000
Other items, including civic improvements	200,000
Total	$2,497,960

These expenditures must of necessity come from the renewals and replacement account. The accruals to this fund on the present basis, 3 per cent of the rate base amount to $800,000 annually. However, the full amount will not be available for the items covered in this plan, as renewals and replacements must be made on other parts of the plant. These expenditures can be provided for out of this account by spreading them over a period of years.

If spread over ten years, annual installments of $250,000 each could be taken from the renewals and replacement reserve to cover the foregoing. At the present rate of accrual, less than one-third annually would be necessary to defray these installments. The interest on the funds advanced to make these betterments would, however, be an additional charge against future earnings. At 7.5 per cent this would average about $93,700 annually for ten years. Another way, and one that would save the interest charge, would be to "pay as you go" by using one-third of the renewals and replacement reserve, augmenting it by any available surplus earned until the expense of the charges is wiped out.

Under the proposed plan, the new capital expenditures

TABLE I—NEW ORLEANS PUBLIC SERVICE, INC., RAILWAY DEPARTMENT—OPERATI

	1908 Dollars	1909 Dollars	1910 Dollars	1911 Dollars	1912 Dollars	1913 Dollars	1914 Dollars	1915 Dollars	1916 Dollar
Total revenue from transportation	3,900,834.85	3,959,126.83	4,046,313.00	4,158,779.97	4,274,059.57	4,379,919.85	4,374,064.63	4,167,752.55	4,393,367.
Other street railway revenue	12,103.29	12,017.39	23,465.96	21,092.68	20,967.70	21,232.11	24,442.33	30,482.29	29,409.
Total operating revenue	3,912,938.14	3,971,144.22	4,069,778.96	4,179,872.65	4,295,027.27	4,401,151.96	4,398,506.96	4,198,234.84	4,422,777.
Operating expenses:									
Maintenance of way and structures	265,291.85	265,894.42	281,485.42	310,425.42	336,655.93	322,294.18	297,959.38	276,148.10	294,263.
Maintenance of equipment	447,494.75	397,828.74	384,810.16	322,354.20	335,880.16	366,182.46	324,213.69	323,742.20	341,957.
Traffic expenses	43,875.94	53,446.86	55,146.45	54,527.97	42,786.03	38,272.51	9,207.55	16,909.51	21,370.
Conducting transportation	1,317,610.13	1,278,997.08	1,299,480.29	1,389,757.85	1,420,747.09	1,459,985.43	1,466,101.56	1,473,424.40	1,496,431.
General	273,242.86	276,507.34	279,577.55	316,382.82	260,865.52	252,419.12	243,937.89	252,186.98	283,341.
Total operating expenses	2,347,515.53	2,272,674.44	2,300,499.87	2,393,448.26	2,396,934.73	2,439,153.70	2,341,420.07	2,342,411.19	2,437,364.
Net operating revenue	1,565,422.61	1,698,469.78	1,769,279.09	1,786,424.39	1,898,092.54	1,961,998.26	2,057,086.89	1,855,823.65	1,985,412.
Taxes	332,923.00	329,861.83	344,487.33	361,346.68	373,875.74	478,009.10	498,140.50	493,652.48	484,157.
Net	1,232,499.61	1,368,607.95	1,424,791.76	1,425,077.71	1,524,216.80	1,483,989.16	1,558,946.39	1,362,171.17	1,501,255.
Renewals and replacements reserve	.....	.....	112,000.00	85,296.98	53,982.19	103,732.46	147,123.50	123,269.21	173,022.
Net operating income	1,232,499.61	1,368,607.95	1,312,791.76	1,339,780.73	1,470,234.61	1,380,256.70	1,411,822.89	1,238,901.96	1,328,232.
Deductions per cent of revenue	68.5	65.5	67.7	67.9	65.8	68.6	67.9	70.4	70.0
Net income per cent of revenue	31.5	34.5	32.3	32.1	34.2	31.4	32.1	29.6	30.0

for the next few years should not be large. The most important single item will probably be the trailer equipment. An average addition of $500,000 per annum should be ample to care for the railways' new capital requirements for the next three years.

Were it possible to install the proposed plan overnight, the annual operating expenses would be reduced $853,817. This is equivalent to 11.17 per cent of $7,742,436, the present rate of operating revenue. The savings expected with the installation of the plan are summarized as follows:

Track maintenance—3.25 miles less track to maintain at $4,000 per mile	$13,000
Maintenance saving on Canal Street track rearrangement	35,000
Switchmen released by electric switches	5,840
Energy conservation—$108.50 daily by use of energy saving devices	39,602
Use of light-weight trailers	93,000
Remodeling 150 small cars into safety cars for one-man operation	273,385
Routing changes save 563 car-hours daily at $2 each	410,990
Total saving	$870,817
Deduct cost of street collectors	17,000
Total net saving	$853,817

As to the time required to make effective the proposed plan of operation, the report comments that if the work is pushed with vigor all of the important track changes, betterments and extensions should be completed or nearly completed by the end of 1923. The remodeling of the cars should proceed immediately, line by line being equipped as fast as practicable. The end of 1924 should see the system working completely under the new plan.

The most important factors affecting revenues are the growth in population, which has recently averaged 7,039 annually, and the extent of the facilities available. The population served will probably be very close to 450,000 in 1925. The present effective main line mileage is 171. Replacing 34 miles of the present ineffective mileage where it becomes effective by better serving the community brings the total up to 205 miles. This should be completed and in operation by the forepart of 1924. That year will receive at least a partial benefit, and the year 1925 should have the full benefit, resulting from the operation of the then wholly rounded out system. With adequate service the riding habit should improve. At least the pre-war average should be maintained.

The estimated revenue for the future, as shown in Table III, is on the basis of 1.6 revenue passengers per capita per mile of effective main line. The savings in operation should be realized, one-third at least during 1923, two-thirds in 1924, and all in 1925. Taxes are estimated at 10 per cent of the gross for each year. Renewals and replacements are based on 3 per cent of the estimated rate base for the year. Miscellaneous income is based on the amount earned during the year 1922. Amortization of interest is averaged over a period of ten years at a rate of 7.5 per cent. Fares are based on the present rate of 7 cents. Under these conditions the results for the years 1924 and 1925 are estimated as in Table III.

The surplus of $408,000 earned over the required

TABLE II—NEW ORLEANS PUBLIC SERVICE, INC., RAILWAY DEPARTMENT—REVENUE AND EXPENSES

CENTS PER CAR-MILE

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Total operating revenue	20.96	21.21	21.41	21.70	21.99	22.21	22.41	21.62	22.19	23.26	27.18	34.33	37.69	47.43	49.55
Maintenance way and structures	1.42	1.42	1.48	1.61	1.72	1.63	1.52	1.42	1.48	1.57	2.00	2.77	3.22	5.21	4.85
Maintenance of equipment	2.40	2.12	2.02	1.67	1.72	1.85	1.65	1.66	1.71	1.96	2.47	4.54	6.44	6.34	6.18
Traffic	0.24	0.29	0.29	0.28	0.22	0.19	0.05	0.09	0.11	0.08	0.02	0.04	0.16	0.02	0.15
Conducting transportation	7.06	6.83	6.84	7.22	7.27	7.37	7.47	7.59	7.51	8.13	11.36	12.85	14.49	16.04	15.11
General	1.46	1.48	1.47	1.64	1.34	1.27	1.24	1.30	1.42	1.64	2.05	1.84	2.60	3.44	4.29
Taxes	1.78	1.76	1.81	1.88	1.91	2.41	2.54	2.54	2.43	2.56	3.46	2.93	3.70	3.93	4.53
R. & R. reserve	....	....	0.59	0.44	0.28	0.52	0.75	0.64	0.87	0.77	0.84	2.05	4.61	3.97	4.46
Total expense	14.36	13.90	14.50	14.74	14.46	15.24	15.22	15.24	15.53	16.71	22.20	27.02	35.22	38.95	39.57
Net operating income	6.60	7.31	6.91	6.96	7.53	6.97	7.19	6.38	6.66	6.55	4.98	7.31	2.47	8.48	9.98

CENTS PER CAR-HOUR

Total operating revenue	187.88	188.45	190.36	194.98	197.10	199.05	200.54	189.94	195.44	207.75	244.78	304.89	331.57	430.41	447.48
Maintenance, way and structures	12.74	12.62	13.17	14.48	15.45	14.58	13.59	12.49	13.00	14.07	18.03	24.57	28.33	47.22	43.83
Maintenance of equipment	21.49	18.88	18.00	15.04	15.41	16.56	14.78	14.65	15.11	17.49	22.19	40.31	56.68	57.56	55.81
Traffic	2.11	2.54	2.58	2.54	1.96	1.73	0.42	0.77	0.94	0.68	0.19	0.37	1.44	0.19	1.38
Conducting transportation	63.26	60.69	60.78	64.83	65.20	66.03	66.84	66.66	66.13	72.61	102.34	114.16	127.42	145.56	136.41
General	13.12	13.12	13.08	14.76	11.97	11.42	11.12	11.41	12.52	14.67	18.44	16.38	22.87	31.21	38.77
Taxes	15.98	15.65	16.11	16.85	17.16	21.62	22.71	22.33	21.39	22.85	31.12	26.01	32.56	35.68	40.85
R. & R. reserve	.....	.....	5.24	3.98	2.48	4.69	6.71	5.58	7.65	6.88	7.59	18.20	40.52	36.00	40.28
Total expense	128.70	123.50	128.96	132.48	129.63	136.63	136.17	133.89	136.74	149.25	199.90	240.00	309.82	353.42	357.33
Net operating income	59.18	64.95	61.40	62.50	67.47	62.42	64.37	56.05	58.70	58.50	44.88	64.89	21.75	76.99	90.15

E AND EXPENSES 1908–1922

7 ars	1918 Dollars	1919 Dollars	1920 Dollars	1921 Dollars	1922 Dollars
9.95	4,962,272 12	6,510,646.24	7,037,744.64	8,813,821 83	8,190,383.28
9.89	28,872.56	28,560.59	32,635.16	32,054.56	29,814.60
9.84	4,991,144.68	6,539,206.83	7,070,379.80	8,845,876.38	8,220,197.88
8.23	367,577.82	526,875.19	604,017.54	970,542.53	805,260.72
7.79	452,547.16	864,461.00	1,208,721.10	1,182,901.21	1,025,208.81
3.29	3,802.32	7,982.63	30,713.32	3,830.15	25,321.71
7.95	2,086,675.08	2,448,597.16	2,717,029.04	2,991,480.21	2,505,820.06
5.50	376,035.65	351,320.30	487,714.18	641,515.37	712,127.39
2.76	3,286,638.03	4,199,236.28	5,048,195.18	5,790,269.47	5,073,738.69
7.08	1,704,506.65	2,339,970.55	2,022,184.62	3,055,606.91	3,146,459.19
4.51	634,541.77	557,889.51	694,257.09	733,253.23	750,468.32
2.57	1,069,964.88	1,782,081.04	1,327,927.53	2,322,353.68	2,395,990.87
8.46	154,658.46	390,400.00	864,000.00	740,000.00	740,000.00
4.11	915,306.42	1,391,681.04	463,927.53	1,582,353.68	1,655,990.87
	81.7	78.7	93.4	82.1	79.9
	18.3	21.3	6.6	17.9	20.1

return on the rate base for the year 1924 is sufficient to reduce the fare 0.3 cent for each of the 133,000,000 revenue passengers. This would indicate, provided no valid claim exists against the surplus on account of past deficiencies or for other causes, that a ticket rate of four for 25 cents could be inaugurated during the latter part of the year, probably about Sept. 1, the cash rate remaining at 7 cents.

The surplus of $1,106,900 shown on the 7-cent fare basis for the year 1925 divided among the 147,000,000 revenue passengers would give an equivalent of 0.8 cent reduction for each one. This would indicate that the four-for-a-quarter ticket rate could be maintained throughout the year.

Or under the pay-as-you-go plan, the report continues, by applying the surplus as shown above and utilizing one-third of the renewals and replacement accruals, it is estimated that the entire cost of the installation of the proposed plan could be met by the latter part of 1925. This would save the interest on the ten-year amortization plan, amounting to some two-thirds of a million dollars, during the seven succeeding years, or would simply mean that the initial fare reduction would be postponed for a period of about thirteen months.

TABLE III—OPERATING STATEMENT FOR NEW ORLEANS ESTIMATED FOR 1924 AND 1925, TO SHOW RESULTS OF BEELER RECOMMENDATIONS

	1924		1925	
Operating revenue		$9,431,400		$10,441,300
Operating deductions:				
Expenses	$5,098,600		$5,256,100	
Renewals and replacements	840,000		755,000	
Taxes	943,100		1,044,100	
Amortization interest	93,700		93,700	
		6,975,400		7,248,900
Net operating income		2,456,000		3,192,400
Miscellaneous income		52,000		52,000
Gross corporate income		2,508,000		3,244,400
Allowed return		*2,100,000		**2,137,500
Surplus		$408,000		$1,106,900
Ratio of operating deductions to operating revenue		0.740		0.695

* 7.5 per cent on $28,000,000
** 7.5 per cent on $28,500,000

In considering the possibility of fare decreases, the report states that the enlarged application of the one-man principle of operation is the factor that seems to offer the greatest opportunity for bringing about a substantial reduction to the car rider. It is evident, however, that no mysterious waving of a managerial wand will bring about an early return of the 5-cent fare. There are other ways of reducing the fare, such as cutting operations generally, reducing maintenance of track and equipment and loading the cars heavily. Such temporary expedients as these have all been tried in New Orleans, and the public is familiar with the results. Few, if any, want to see a return to these conditions.

Warning is given that the inauguration of the new plan will not be an easy task. There will undoubtedly be times when the public will be inconvenienced, temporarily at least. The hearty co-operation of the public, however, should be accorded the management in making these changes. When fully completed, the enlarged and improved service will not only be rendered more efficiently and economically, but will be of such a character as to encourage and develop the future growth and welfare of New Orleans.

The Kind of Traction System Serving Havana, Cuba

Single-Truck Cars Are Necessary Due to Extreme Narrowness of Streets with Resulting Sharp Curves—Climatic Conditions Require Special Features of Design

BY OTTO GOTTSCHALK
Engineer of Railway Equipment Department
Havana Electric Railway, Light & Power Company, Havana, Cuba

THE Havana Electric Railway, Light & Power Company, Havana, Cuba, operates an average of 450 cars carrying 375,000 passengers per day. The cars are mounted on single trucks and are arranged for single-end operation. They have a length of 32 ft. over all and a width of 7 ft. 1 in. at the bottom of the side sills. The sides curve outward, which gives a width of 7 ft. 9 in. at the window rest. The interior height from floor to ceiling is 8 ft. 4 in. and the seating capacity is thirty-six passengers.

New Type Cars of Havana Electric Railway

It is necessary to construct all cars within these dimensions due to the narrow streets in the downtown section, many of which have just sufficient width from sidewalk to sidewalk to permit a car and other vehicles to pass. All curves in this section are of very short radius, the minimum being 27½ ft. Standard 4 ft. 8½ in. gage track is used. There are many points where the fenders overhang the sidewalks and in some cases have to be raised to prevent fouling the buildings when cars pass around the curves. An illustrated article giving some of the difficulties resulting from the narrow streets was published in the ELECTRIC RAILWAY JOURNAL for Aug. 26, 1916.

The geographical layout of the city with its narrow streets makes single-track operation necessary for most routes. Most of the streets have been designated as

one-way streets for traffic, and operation under these conditions is very severe, particularly with reference to wheels and other truck parts. Both running rails are of the grooved type and few derailments take place regardless of the chipped flanges that sometimes deve'op.

One other serious difficulty that we have to contend with is a double overhead trolley system which results in many trolley pole dewirements at crossings and curves, and also requires the constant attention of conductors when passing these points.

Two types of passenger cars are used. One an old design similar to the single-truck cars with monitor roofs manufactured by the J. G. Brill Company about the year of 1900. This design is being replaced, however, in favor of a new design adopted as standard for all future construction.

A detailed study was made of service conditions in Havana, taking into consideration the tropical climate,

Rattan Covered Seats are Used

comfort of the passengers, durability of the material used, weight, first cost and maintenance requirements before the first car of new design was built. We believe that units transporting passengers for short periods of time do not require a fine interior and exterior finish, but should have a neat, cheerful, comfortable and durable finish with a color scheme that is restful to the eyes after looking at objects exposed to the intense rays of the sun usual during the Cuban summer.

Electric cars of necessity carry all types and classes of passengers and are subjected to constant contact with traffic. Rapid deterioration of wood and iron due to climatic conditions in Cuba is much more pronounced than in the United States. Paints must act as a preservative, and the colors selected must withstand the intense rays of the sun. Lap joints of wood, of wood and iron and of iron alone are used so as to prevent moisture from entering these joints during torrential rains.

The new design was made to conform to the old as much as possible, as employees are less confused and more familiar with the work and a reasonable standard is maintained. Duplicate parts were fabricated and the extra parts were used as samples for future construction, as very few of the railway company's employees understand drawings. The monitor roof of the old design was discarded in favor of an Agasote arched roof and ceiling with no other supporting members except 1½-in. x ⅜-in. T irons. Both front and rear vestibules are inclosed, and doors of a folding hand-operated type are used on the front end. There are no doors on the rear, only a Pantasote curtain with a heavy steel roller being used. The space between seats was increased ½ in. from that used with old type cars, the hand brake was shifted to the center of the platform so as to permit passengers to disembark more rapidly and the aisle space was increased to 26 in., the old cars having an aisle of 17 in. Bulkheads and doors have been done away with and a pipe framework substituted.

These changes in the interior of the car body were made possible by removing the window pockets, bulkheads and monitor roof. Windows are arranged to raise instead of to drop into pockets. The truss rod formerly located in the interior of the car has been eliminated, a solid piece of flat iron ½ in. x 6 in. x 22 ft. being installed between the side sill and the truck sill. This is placed edgewise and the two sills are bolted together through the flat iron. By doing this, the underframe is strengthened and there is less possibility of joined members becoming loose due to oscillation.

The side sheathing consists of No. 16-gage black sheet iron with no other trimming on the interior of the car body. We consider this good practice as it is desirable to have a free circulation of air throughout the car body, to dry out any moisture resulting from a rain storm. There is no necessity for preventing the cold air from entering cars in Havana. On the contrary, it is desirable to have a free circulation of air and our only trouble is to keep the water out of the car and from entering the joints or corners.

Car-body frames are constructed of native hardwood which resists dry rot and insects. However, longleaf pine imported from the United States is used for the platform outriggers. All wood is painted with white lead and linseed oil before joining, iron parts are painted with lead and linseed oil, strips of canvas are soaked in white lead and are applied wet between iron and wood and iron and iron when there is a possibility of water entering. This insures watertight joints. All cars are equipped with cross-seats with cane backs and cushions.

The light wiring runs in conduit down the center of the ceiling, which is painted with a gloss white enamel so as to reflect the light rays. The lighting system is arranged in two circuits, each containing seven lamps. During the period of darkness full line voltage is used and 10 per cent voltage during the daylight. The low voltage causes the lamps to burn at a dull red, which keeps the filament in a flexible condition and eliminates breakage due to vibration. This arrangement increases the life of lamps, eliminates waste of current from short-circuited filaments and also reduces the labor for replacing defective lamps.

Cables from the trolley bases pass through the roof and enter the iron stanchions used as aisle spacers and supports for the bulkheads. Two circuit breakers and the light switch are installed at the operating end of the car. Controllers are of a late type, known as K-39-F. They have individual blowout coils and are arranged so that dynamic braking is obtained by moving the reverse handle to the reverse position. Cars can thus be brought to a stop or under control either on a grade or level track in the event that the motorman loosens his hand brake and has no power for reversing. This also gives a quick and efficient stop without damage to the motors when attempting to avoid a collision by reversing. The exteriors of cars are painted chrome yellow and white, the roofs are painted gray, ceilings are covered with a gloss white enamel and the remaining interior finish is olive green. All cars are constructed in the railway's shops of semi-dried out woods. These cars have had an average life of about twelve years, whereas a steel car would have a life here of hardly more than eight years.

Carrying Safety to the Public—VIII*

Women Can Play a Large Part in an Organized Safety Campaign—The Lesson for the Mother Is that Her Greatest Duty Is to Teach Safety to Her Children—The Work Can Be Organized Through the Women's Clubs

By C. W. Price
Vice-President in Charge of Public Safety, Elliot Service Company, New York City.

BECAUSE of the fact that women are the natural conservators of human life; because women are the molding influence in the home; because women are coming more and more to take an active part in civic activities, especially along lines having to do with the general welfare of the community; because men instinctively give women the right to speak out and demand that the home and the family be protected; because of these facts women are destined to play even a more important part than men in the future development of community safety. In every community women are becoming alarmed about the accident situation, realizing as they do that the increasing hazards of the streets are literally stalking up to their very doors and threatening the life of their families. This awakened interest on the part of the women needs only to be properly organized and properly led in order to become possibly the most potent single force in arousing public sentiment and bringing about law enforcement.

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This Mother Is Teaching the Most Important Safety Lesson to Her Children

There never was a more propitious time than the present for enlisting the co-operation of women of all classes in an aggressive campaign to eliminate accidents, especially accidents to children.

Of the 14,000 children killed in the United States in 1922 by accident, more than half were babies five years of age or younger. Of those that were of school age at least 95 per cent were not killed at school, or going to and from school, but were killed in and around the homes, largely because they had not been instructed properly and their play had not been supervised properly. These significant facts throw a flood of light upon the whole problem of safeguarding child life. No material reduction in accidents to children will be possible until the fathers and mothers are thoroughly aroused to the necessity of systematically instructing their children in safety and carefully supervising their play. Women should be made to appreciate that the child of today is born into an environment so radically different from the environment of even twenty years ago that it calls for an entirely new set of habits, a new kind of knowledge and discipline not dreamed of twenty years ago before the advent of the automobile. This applies not only to the children of the poor in the more congested districts of our great cities, but likewise to the children in every community and in every walk of life. So serious has the situation become in most cities of any size that mothers are taking their children by the hand and escorting them to and from school in order to make sure that they return home safe in the evening. So recently has this present traffic situation developed, practically in the last ten years, that people have not awakened to the seriousness of allowing the continued existence of such a menace to human life. From present indications it will be only a year or two when in every community public sentiment will have reached the point where some drastic action will be taken. It behooves public utility executives and others interested in traffic safety to take advantage of this awakened public interest and to guide the efforts along sane and instructive lines which have proved successful in other communities.

A prominent police commissioner made the statement

*Eighth of a series of ten articles.

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Escorting the Children Across a Dangerous Street Saves Lives

that if each mother would thoroughly instill the one simple rule into the minds of her children most of the deaths and serious injuries to them on the street would be eliminated. The rule is this: "When I start to cross the street I look to the left, and when I get to the middle of the street I look to the right." The mother shown in the picture on page 1083 has taken her two children down to the curb and is giving them a practical lesson in this simple rule.

Parents must be made to appreciate the fact that just as health instruction has come to be a vital part of the instruction of children in every well-regulated home, so safety must be given the same important place, and thus children will grow up with habits of caution, just as they now grow up with habits of cleanliness thoroughly instilled into their little minds. When safety is thus given an important place in the home life it not only molds the children, but it also influences the adult members of the family, and thus each of the thousands of homes becomes a center of influence to propagate the safety idea.

The progressive women's clubs of today are more and more taking up in a serious and aggressive way matters having to do with the welfare of the community. It has been found from the experiences in many cities that community safety is a subject that appeals to the members of women's clubs, and is a work which women's clubs are peculiarly equipped to promote. In securing the co-operation of all the women's clubs in a community during the initial stage of organizing a community effort it is well to call together their presidents, and to present to them a comprehensive outline of the purpose and scope of the campaign, specifically indicating what the women can do. Each president should be urged to appoint a special committee on safety in her club, and to give safety an important place in the program of activities for the year. Each club should be asked to arrange for at least one special program on safety at which a speaker from the speakers' bureau would present the subject.

Two lines of activity should be urged upon the women's clubs. First the need of devising ways and means of reaching and influencing the mothers properly to train and supervise their children; second, the women's clubs should give their whole-hearted support to the work of safety instruction in the schools. It has been found that when safety instruction is newly introduced into the curriculum the teachers will be encouraged to do more thorough work if they know they may count on the support of the mothers in the community.

The women's clubs can do much in securing proper publicity for safety, especially for safety of the children. The women can also help in securing the active co-operation of the churches and Sunday schools in promoting the safety idea.

The Washington Safety Council has devised a most successful means of encouraging women's clubs to give safety an active place in their programs and to sustain interest in safety throughout the year. This is done by means of a monthly bulletin, each issue of which is sent to the president of every woman's club, citizens'

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The Baby that Mother Has Forgotten

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"Catching On" Has Caused Many Deaths

association and parent-teachers' association. The bulletin contains a complete analysis of the accident experience in Washington during the previous month, with special emphasis on accidents to children. Four or five stories of the most serious accidents are included. The bulletin also contains interesting new items and suggestions regarding ways and means for promoting safety. Each club president is urged to read this report at the regular monthly meeting. Thus the members are kept informed of the accident situation and are constantly stimulated to action.

Locomotives for New Zealand Electrification

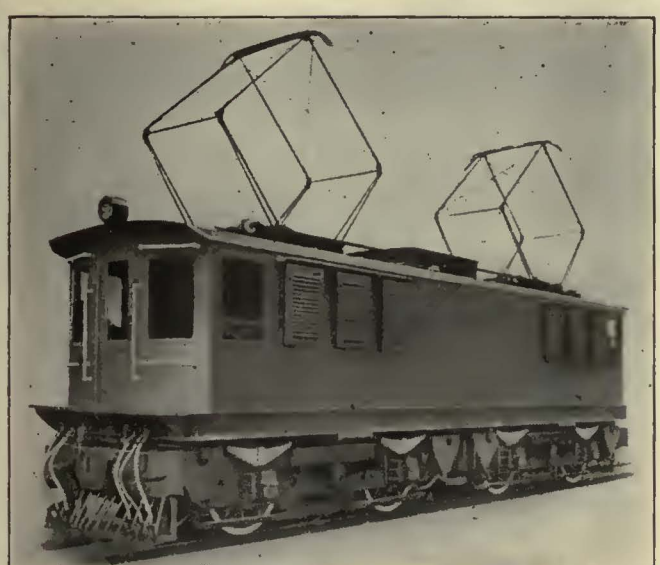
THE Midland Railway, South Island, New Zealand, is electrifying the section through Arthur's Pass on the 1,500-volt d.c. system. Five passenger and freight locomotives, and a battery locomotive for the inspection of the overhead line and repair purposes, are under construction by the English Electric Company, at Preston.

This electrification is through the tunnel under Arthur's Pass which pierces the high range of mountains known as the Southern Alps. The route length now being electrified is 8.4 miles, the total single-track mileage involved being 10.4. The tunnel is 5½ miles long.

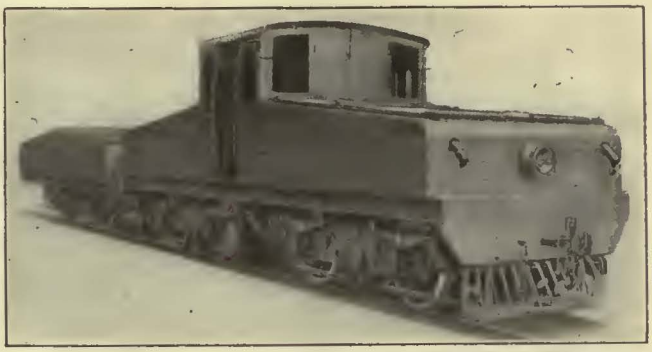
The maximum freight load to be hauled is 280 tons, and the weight of the passenger trains loaded is 128 tons. The service consists of four freight trains and one passenger train each day in each direction, but it is anticipated that this service will be greatly increased in the near future.

The railway is equipped with an overhead contact line, the contact wire being suspended from a double catenary outside the tunnel and a single catenary inside. The messenger wires are of copper and act as feeder cables also.

The locomotives weigh 48 tons and are built for the track gage of 3½ ft. They are 35 ft. 8 in. long over bumpers, and 7 ft. 6 in. wide over all. The truck wheelbase is 8 ft. 9 in. and the wheel diameter 3 ft. 9 in. The four motors have a combined capacity of 680 hp. at the one-hour rating, or 420 hp. continuously. The motors drive the axles through single-reduction spur gearing. They are permanently connected in series pairs. Four types of brake are provided: hand, straight air, automatic air and rheostatic. Provision is made for multiple-unit operation, the control being of the English Electric camshaft type.



Passenger and Freight Locomotive for New Zealand Electrification



Inspection and Repair Battery Locomotive with Battery Tender

A Centralized Store Department

THE purchasing and stores departments of the Detroit Municipal Railway are conducted on a somewhat different basis than on the average electric railway. All purchasing for the railway department, as well as for other city departments, is done through the city department of purchases and supplies, but the railway supply department conducts all follow-up work with the manufacturers of supplies, receives and stores the material, and attends to its distribution among the different departments of the railway.

The main storage yard is at the former track yards of the Detroit United Railway, at Harper and Mount Elliott streets, and this area of 10 acres has been laid out with four distributing tracks, each 800 ft. long. Material is loaded into and out of these yards by steam locomotive cranes, of which the department has two, one of 30 tons capacity and one of 20 tons capacity. The trolley on the four tracks is 40 ft. from the ground so as to be out of the way of the crane booms and is fitted with an over-running contact device and a lead wire which attaches to the street car trolley pole.

A track from the Michigan Central Railroad enters this yard to a ladder track which feeds the four mentioned storage tracks. Plans for a central storehouse are under consideration.

In addition to the duties of storekeeping, the stores department in Detroit also does all the hauling of coal and ashes for the other departments, even including the hauling of ashes for the power department, and rails, paving materials, etc., for the construction gangs of the track department. For this purpose it has six locomotives and fifteen flat cars and will shortly add to this equipment two Differential motor cars and two Differential trail cars. It has its own crews for the operation of these cars, and they work on three shifts to insure twenty-four-hour service. Mounted in the cab of every locomotive is a map of the system so that these cars can go to any point in the minimum time.

An important part of the work of these trains and of the department as a whole is the collection, sorting and sale of scrap. A classification for scrap with eighteen main heads, each having two or more subheads, has been worked out. These classes are based upon a study of the kinds of scrap which can be sold at the best terms direct to the user rather than through a middleman.

The Readers' Forum

Sixty Weeks of Pass Riding

TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY
TERRE HAUTE, IND., June 21, 1923.

To the Editors:

Being now in the sixtieth week of the use of the unlimited ride, weekly pass, and having therefore accumulated some experience, I read with considerable interest the article in your June 2 issue, entitled "Why the Unlimited Pass Was Withdrawn in Youngstown."

Without doubt there were plenty of good and sufficient reasons for the action taken by our good friends in Youngstown, but it seems to me that there were several arguments used in your article which might be taken as general arguments against the use of the pass, not alone in Youngstown, but elsewhere.

As far as we are concerned, we introduced the pass so as to stimulate the riding habit, as we believed that this could be done without increasing the service. In other words, we wished to create more riding during the non-rush hours. Then, too, we sought to make regular riders out of those who had been doing some riding on the cars and some in the jitneys, figuring that if a man paid a dollar in advance for a pass he would become a regular rider. Furthermore, we figured that the pass had a good will value, which, of course, we were not able to calculate. All of our objectives have been realized during the period in which the pass has been used, namely, since May 1, 1922.

With us, the customer has to pay for twenty rides in advance, and therefore our pass sales would naturally be relatively low—at least, considerably lower than where the passenger pays for only thirteen or fifteen rides in advance; and yet it is our experience that many people do buy the pass from the standpoint of pure convenience. For instance, not so very long ago a salesman bought a pass at our office on Saturday morning, and insisted on purchasing it, despite the fact that he was in town for only that day, for, as he said, he expected to do enough riding which, plus the convenience of not having to make change, etc., would justify his buying it.

Under a system of this kind, it needs no argument to show that some people will get an extraordinary use of the cars at a very low rate; but that does not prove that every pass buyer will do the same thing, nor does experience show it to be true. There are exceptional cases, like the boy who is said in Youngstown to have ridden eighty times a day on a pass. If you analyze this statement and figure the time taken for each ride as only five minutes, this boy would be spending 400 minutes either riding on a car or waiting for a car to come along. If, now that the pass has been withdrawn, this same boy rides eighty times a day at regular fare, of course the argument is good; otherwise, it seems to me that it is not.

We are not disturbed in the slightest degree by a few exceptional cases so long as the results which we set out to obtain are realized. If the pass brings in more gross and more net, it stands to reason that it is a good system. If it did not increase the gross, and did not increase the net, the converse would be true. I was especially puzzled by the statement in the article that the street railway commissioner believed the pass to be economically unsound. To me, from the very beginning, the weekly pass has seemed to be, first and last, the most responsive to the economic law of any system of fares that has ever been devised, because it at once furnishes automatically a reduced rate to those who, in the nature of their goings about, have use for the street cars more than twenty times a week. A reduced rate for tickets purchased in quantity may be taken advantage of by the man who is least entitled to a reduced rate, simply because he has the money to invest at the time of purchase, but the system of selling the pass for $1 a week takes care of this.

Having used the pass system on our lines for more than a year, we are able to get a comparison of the workings of the system, this year versus last. This shows that during the first six weeks of the second year of the pass, while the passes sold decreased 1.5 per cent, the actual rides taken on the passes decreased 9.1 per cent. It was our observation that during the first month or two that the pass was in use a good deal of extra riding was done, until perhaps the novelty wore off and the system settled down to a utility basis.

There are other points upon which I might touch, namely, that the pass revenue is the most constant portion of the total revenue, and therefore it may be regarded as a stabilizer; and this is so because it represents income from the heads of families and the generally thrifty class in the community.

However, I did not set out to enter into a lengthy argument on this subject, and while being most ready to admit that there may and must have been many good and sufficient local reasons for discontinuing the pass at Youngstown, still those should not be used as arguments against the efficacy of the pass in general.

E. M. WALKER, General Manager.

Safety Zone with Permanent Posts

A NEW type of safety platform, or more properly speaking safety zone, is being tried in Detroit at the corner of Woodward Avenue and Park Street, or at the southerly side of the Grand Circus. It consists, as shown, of a series of iron posts planted solidly in the pavement, with about 4 ft. of post exposed. The posts

New Type of Safety Area in Detroit

are placed about 8 ft. apart. Altogether there are twelve of these posts parallel to the tracks and one post at right angles at each end, making fourteen altogether, as two-car trains are run on this route. There is a lamppost at each end of the safety zone. The one in

the direction of oncoming traffic, or that shown in the view, is inside the safety area. The light at the other end is just outside the safety zone. The posts are connected by chains except for two openings, as shown in the view.

This type of safety zone has the advantage that it does not interfere with the removal of snow in winter as much as a raised platform. At the same time it is more substantial than the surface type of safety zone, made by removable posts set on heavy iron bases.

This safety platform area was installed by the Police Department of the city of Detroit.

Interborough Augmenting Boiler Equipment

THE Interborough Rapid Transit Company, New York City, is extending its steam-generating equipment at its Fifty-ninth Street station. Four 12,000-sq.ft. Babcock & Wilcox boilers, four Taylor underfeed stokers and four Sturtevant fans for forced and induced draft service are being added.

The boilers, two of which will be in place this summer and two early in 1924, will be designed for 350 lb. pressure, but will operate for the present at 220 lb. gage and an approximate total temperature of 600 deg. F. One boiler will be fitted with a Foster radiant-heat superheater.

The stokers will be of the seven-retort type, thirty-seven tuyères in length, the longest Taylor stokers yet built. The furnaces will be approximately 12 ft. wide by 17 ft. deep. This special design was necessitated by the existing steel structure of the plant. The stokers will be driven by variable-speed motor.

One forced and one induced-draft fan, motor-driven, will be installed for each two boilers. Economizers will not be installed at the present time, but provision will be made for them should operating conditions warrant their installation.

To take care of the change in heat balance brought about by the installation of motor-driven auxiliaries instead of steam as in the present equipment, steam will be bled from a low-pressure stage of the main turbine units.

Association News & Discussions

The Outsider's View of What Sells Transportation*

"Almost Any Concern That Starts Out with the Rendering of Real Service to Its Patrons as an Actual Creed Can Hardly Escape Overwhelming Success"

BY EDWARD HUNGERFORD

A MERCHANT'S show window should be one of his chief trade assets. He will tell you, himself, that it should be of greatest value in helping the merchandising of his wares.

I sometimes wonder how many railroad men ever think of this point. I am not referring specifically to the street railway men in this remark. In fact, I am rather inclined to a belief that in recent years they have given more attention to this phase of their problem than have most of their steam railroad brethren. The passenger trains of the average American railroad—even the so-called de luxe or limited trains—give but little external evidence of a real desire to sell their product. Internally no important progress or achievement in the high-grade American passenger train has come to pass since the creation of the wide vestibule and the observation platform.

Yet it is not even at this that I am inclined to cavil. For the moment it is rather at the outward appearance of the trains.

They have been standardized—standardized to the death, I am inclined to say. The so-called Pullman green has been made the ruling color for the exterior of the passenger trains of nine-tenths of the rail mileage of the United States. That is, it is green at the beginning; after a few months of wear upon the road it becomes a dingy neutral black, sordid and forlorn.

Up to a few years ago some of the roads attempted to relieve this forlorn monotony of their passenger equipment by striping their coaches with fine, bright gold lines. But along came standardization and ordered off the stripings; the American passenger car became as dull and as stupid in appearance as the box car; more so, in fact. Various railroads have sought boldly to place their gay individual trade marks upon the sides of their box cars. But for some reason, utterly inexplicable to me, the sides of the passenger cars have remained sacrosanct. No one has dared to use them for dignified exploitation. Standardization seemingly is a pretty cruel sort of a god.

Now, I have no particular quarrel with standardization. In fact, I have a great deal of real admiration for it. In the mechanical, in the operating, in the financial ends of a railroad it accomplishes marvels. But standardization has no place whatsoever in the exploitation of a railroad—in the delicate business, if you please, of merchandising its transportation.

Will those of you who have been overseas contrast the outward appearance of the American railroad train with that of its British cousin. The passenger train in Great Britain is a thing of beauty and a joy forever. Not only is it bright, gaily striped and immaculate, but in almost every case the coat-of-arms of the operating company is brilliantly emblazoned upon each passenger coach.

A coat-of-arms for a railway company? Well, why not? Not for our American railways—steam or electric—the British type of coat-of-arms, aping monarchial traditions in its composition, but a coat of arms distinctly American; like the swastika of the Santa Fé or the Glacier Park emblem of the Great Northern. Both of these are as American as they could possibly be. Each is thoroughly distinctive. Each registers, without a printed word alongside, the name of the great railroad that it represents.

So far I have talked of the steam railroad, chiefly. Yet everything that has been said of it here and now applies with equal, if not with greater force to the electric line. Recently some of our electric roads have begun to see the light on this thing. A year or more ago, my good friend, T. C. Cherry began painting his Rochester-Syracuse interurbans a bright, gay, beautiful orange—a bit of collegiate fidelity to an alma mater in that, I think—and we

*Address made before New York Electric Railway Association, Bluff Point, N. Y., June 23, 1923.

Rochester folk awoke to the fact that there still was an electric railroad running between our town and the city of the saline marshes. Recently the Interborough in New York city has done Cherry the high honor of copying his color scheme, and some of the older New Yorkers realize once more that their elevated railroad is again in operation.

A small point? Not a bit of it. It is a very large point, and if I were even to attempt to lead you into its ramifications we should have to take a short course in psychology this hot June day—and that is a field into which I have no intention of leading you at this time.

It is a large point because it is a large factor in the successful merchandising of transportation. The Interborough says that it can already see good results from its step in selling enterprise. And I can aver that the Rochester-Syracuse trolley has also made a new impress upon the largest of the communities that it is trying, so faithfully and so honestly, to serve.

The outside world—the potential market, you might wish to put it—of the street railway has no deep-seated or inborn grudge against it. In fact, I often doubt if the sentiment for lowered fares which is so ingeniously engineered against it, has much real response in the heart of the average man. If he is like me he is vastly more concerned in the quality of the service that is to be rendered than in the fine shadings of the price. I am not a rich man. But for a street railroad to be of any service whatsoever to me, it must first begin to serve me.

Railway Loses by Infrequent Service

We have in Rochester, generally speaking, an excellent street railway system. Its cars are clean and modern and, being kept brightly painted, are good show windows of its transportation product. Its men apparently are careful, are courteous and seemingly most efficient. If the road has failed anywhere, it has failed in properly selling itself to the community. Which is an intricate thing into which I shall not enter now. In the rush hours the local system seems to meet its peakloads with a great deal of real efficiency. It is in the non rush-hours that its service is apt to fall to a point where the street railway ceases to be of the largest degree of real service to many folk in our community.

Undoubtedly the records of the company will show that its cars in the non-rush hours are not filled even to their seating capacity. With this there can be no quarrel. And still the statement may be made honestly that the company is not rendering the proper non-rush-hour service. Let me illustrate by personal experience.

My office is three-quarters of a mile from my house—a little less in fact. A double-track trolley line connects them. If I go out to the corner and catch a car—all well and a good. The street railway has my 7 cents and it is welcome to it. It is giving me good value for my money. But if I miss a car, I shall have to wait ten minutes for another. In less than that time I can, and do, walk to my office, and pocket the 7 cents. That 7 cents is lost to the Rochester system for all time.

When I go downtown at lunch the distance is a trifle too long to be walked swiftly and again I ride—when a car is in sight. But if I have just missed one, I again walk, easily beating the following car, and another 7 cents is lost.

My average daily riding, aside from that of the members of my family, comes to six rides; on tickets, about 40 cents. This fall I am going to buy a small closed car. It will not cost me much more to maintain than my carfare expense — particularly when I count in the riding of my family—and I shall no longer have to stand around on street corners waiting on the ten-minute interval. I am buying the car on the advice of several of my neighbors who say that they have been forced, for the same reasons, into the purchase of closed cars for winter use. Potentially they prefer, as I prefer, the street car. It is bright, warm, clean, and there is no risk or responsibility in riding in it. But their time is far too valuable for them to wait upon a ten minute headway.

Here, then, is a street railway, in almost every way highly efficient, failing in one important way to sell itself to the most profitable form of possible patron—the short-haul rider. I do not have to tell you gentlemen that he is the cream of your traffic. Nor do I have to suggest that if you leave him too entirely out of your reckoning you are missing a very good potential source of revenue.

How to Sell Transportation

There are, of course, many ways for a street railway to sell its transportation. One of the most important of these is, in my opinion, the seating arrangement. The average rider, and this is particularly true if he is going any real distance whatsoever, does not like a longitudinal seated car. The cross-bench seat—even if it does detract appreciably from the standing capacity of the vehicle—is the seat that he wants, in nine cases out of ten. Therefore why not aim to give it to him?

Putting the thing the other way around, why fret his soul with awkward or uncomfortable seats, with turnstiles and other similar devices and then expect his undying affection and support? After all, your patron is but human. He likes his motor car, because it seats him the way that he wishes to be seated. How many motor cars do you think that Henry Ford would be making each twenty-four hours if he had them rigged with longitudinal seats? Or if a man had to clamber through a turnstile to get into one of them?

Personally, if they ever put turnstiles on the cars that run by my house, I simply will cease to patronize those cars. I say this without feeling, without prejudice. If the street railway can get along without my patronage or that of my family, why that is its own business—up to a certain point at least. But I do think that the time is not so very far distant when those of us to whom it has failed to sell its transportation will come to sufficient numbers and sufficient volume that we will represent a distinct lack of revenue. It would be well for the railway if it stopped somewhere short of that point.

Enough for the negative side of this thing. Now consider, if you will, the positive side for a final moment. Last October when I had the great pleasure and honor of attending your national meeting in Chicago I also had a great joy in studying out the workings of the interurban trolley between that city and Milwaukee, 85 miles to the north. Gradually there was unfolded to me one of the most interesting transportation stories that has ever come to me. A debilitated, bankrupt, almost hopeless interurban trolley had been fanned back, not merely to life, but to something that dangerously approached being a howling success. Selling its transportation, it had come to a point where it had gained for itself, right under the very noses of two of the best operated and most alert passenger railroads in America, 68 per cent of the local riding between Chicago and Milwaukee.

How was that done?

It is too long a story to be told in detail here. Let me say, however, that it was not done by the installation of cars that were dirty, unkempt, uncomfortably seated or equipped with cumbersome passenger regulatory devices. The equipment of the trains, terminal stations, cars, all the rest of it was planned with a definite view to satisfying the necessities, the comforts, and even the whimsical desires of the passenger. That is what we call rendering service. It is my firm belief, gentlemen, that almost any concern that starts out with the rendering of a real service to its patrons as an actual creed can hardly escape overwhelming success. If its heart is in the right place its bank balance generally finds the same path.

This is the test by which we are today beginning to measure our steam railroads. Long ago we applied it to our retail stores, our newspapers, our hotels, our theaters, to all the business that come into infinitely many contacts with their public. Those that met the test have survived—and survived brilliantly, almost without exception. The street railway cannot claim immunity from such a test. On the contrary, it should be seeking it out, with pride and with dignity. It should be asking itself, all the while:

"Are we meeting, as fully as possible, the service needs of our community? Are we doing all that we possibly can do to give the largest measure of passenger transport to the town or the towns that we serve?"

That is what I mean by selling transportation.

The painting and the cleaning of the cars, the adjustment of fares, the inclusion of clever ride-selling devices such as the ingenious weekly pass, newspaper and poster advertising, the arrangement of the seats, even the abolition of the sin-filled turnstile, are each in its own way, good steps in selling transportation. But the final step, the last measure, the full test of transportation salesmanship is in the hearts and souls of the men who actually conduct the properties. They know—and only they can ever know—whether they are rendering the fullest measure of transportation service to their communities; and so whether they are attaining the highest measure of salesmanship for their peculiar product of transportation.

New Yorkers Gather at Bluff Point

One-Day Meeting Given Over to Business Discussion in the Morning, Golf and Water Sports in the Afternoon, and a Banquet in the Evening—Keeping Employees Happy, Selling Transportation, Publicity and the Bus Were Subjects of Addresses

EMPLOYEE relations, selling transportation, publicity, and the place of the bus were the subjects considered in four addresses before the New York Electric Railway Association at Bluff Point, N. Y., on Saturday, June 23. The meeting was well attended and was presided over by President B. E. Tilton, vice-president New York State Railways, Syracuse lines, who also acted as toastmaster at the evening banquet.

At the morning session particular interest centered in the addresses by James E. Kavanagh, vice-president Metropolitan Life Insurance Company, New York, on "Industrial Relations, Unemployment Compensation, and Old Age Pensions," and by Edward Hungerford, Rochester, N. Y., on "The Outsider's View of Selling Transportation." W. Dwight Burroughs, publicity agent United Railways & Electric Company of Baltimore, entertained the audience and also gave it some thoughts to take home on how to tell the electric railway story to Bill Jones.

A paper by W. B. Potter, engineer, railway engineering department, General Electric Company, on "Co-ordinating Bus and Trackless Trolley Transportation with Electric Railway Service," was read in Mr. Potter's absence by H. L. Andrews. This paper discussed in a general way the relative economy of the different types of vehicles and pointed out the field of each from the economic standpoint.

At the close of the morning session W. H. Collins, Gloversville, N. Y., as chairman, presented the report of the nominating committee, which was unanimously adopted by the association, electing the following officers for the ensuing year:

President, Edwin Duffey, president Cortland County Traction Company, Cortland, N. Y.; first vice-president, Clinton E. Morgan, vice-president and general manager Brooklyn City Railroad; second vice-president, William J. Harvie, vice-president Auburn & Syracuse Electric Railroad, Syracuse; secretary-treasurer, William F. Stanton, Rochester, N. Y.

Keeping Employees Happy

Mr. Kavanagh, in his address, said that in many companies there is no program of "humanics," as compared to the program of mechanics which is usually very thoroughly carried out. He drew upon the experience of his own company, the Metropolitan Life Insurance Company, to show what might be done along this line. His company got into this matter fifteen or twenty years back in scheming out ways looking toward greater stability of employment. It was considered that employees' interests were four-sided—intellectual, social, financial and physical. It was undertaken to do things which would enhance these interests.

In order to insure employees fit physically, the first step is that the company engages only those who are in good health. After an employee is hired, the company considers it its duty to keep him healthy. This is accomplished by maintaining good working conditions, by insisting upon a physical examination at least once a year or oftener if it is thought one is needed, examination of teeth twice a year, provision of a gymnasium with a physical instructor, and various meets and teams which give impetus to the athletic program. Luncheon is also provided free every day to all employees, because it is believed to be a good economy. The company considers that it gets a thank-you every day and that this is better than an increase in salary because that means only one thank-you and then it is forgotten. It is also felt that it is better to supply luncheons than to put this money in the pay envelope as it pays better returns.

In developing the intellectual side of the employee, effort is made to keep his mind busy. He must be given something to occupy his mind aside from his work. If the employer does not do this, some one else will. Consequently the Metropolitan company has devised every kind of class any one can be interested in, including French, stenography, millinery, dressmaking, actuarial studies, art clubs, etc. A large proportion of the employees takes part in some of these courses. The company provides a library of 50,000 volumes, and employees are induced to read by a friendly appeal to their ambitions and a close follow-up by the librarian. Every employee outside of the main office is required to take the company's correspondence courses. These formerly were optional but are now required.

The social or recreational side is taken care of by the employment of certain people whose entire job is to provide fun for the employees. This comprises dancing, picnics, athletic meets, special parties in recognition of long periods of service, etc.

The financial side is developed by getting employees to save money. This is often done by appealing to their sentiments, as they will do things for their families that they will not do for themselves. The company takes pains to let everybody know how much John Doe has made since he came to the Metropolitan. The program in this direction has resulted in a general impression throughout the company that everybody with the Metropolitan gets rich, and Mr. Kavanagh said that this is about 90 per cent true.

The speaker pointed out that the average employee has five worries: What will happen to him or his family if he should (1) get sick, (2) have a bad accident, (3) be out of a job, (4) become aged, (5) die. It should be the employer's interest to remove these worries. The first two and the fifth are taken care of through life, health and accident insurance.

In the matter of old age, there is a large tendency to provide pensions for faithful employees. Many plans are in effect, but many are very unsatisfactory. They carry an implied peonage. Employees feel that they have to work all their life for this one company in order to get pensioned. The young man does not value it because it is too far removed from his immediate need. There is also the skepticism resulting from association of the pension fund with the corporation fund. If the company should fail or if there should be a change in management, or if the corporation merged with another, the continuance of the pension plan is somewhat uncertain. Furthermore, there is an indeterminate and constantly increasing cost which becomes very burdensome as time goes on, as it takes fifty years to get the maximum effect of the average pension plan.

Most of these objections to pension plans are overcome by the more modern pay-as-you-go plan, whereby the company contributes year by year a certain percentage of the payroll to take care of "retirement certificates," which are handed to the employee each year. This plan gives each employee a bond year by year, which is free from all strings and which he can put away against his old age disabilities. Mr. Kavanagh stated that a pension scheme granting reasonable benefits to retiring employees, based on contributions which employees are perfectly willing to pay, can be worked out at a cost to the employer of between 1 and 2 per cent of his current payroll. On this plan the pension does not depend upon the employee reaching the pension status in the employ of one firm. A delivery of the certificates to employees each year rouses the interest of the young man. The cost of the plan within reasonable limits can be determined many years

in advance. It avoids the feeling of paternalism, since the employee has in large measure himself paid the cost of his pension protection.

Mr. Kavanagh also mentioned the possibility of unemployment insurance, which is now getting the attention of some concerns. He said that the Delaware & Hudson Railroad pays $15 a week to an employee upon his discharge for a period of six weeks maximum, or up to the time of his employment on another job. Because they know it may cost the company six weeks pension, or $90, when they fire a man, foremen are more inclined to make a real effort to put the man on another job where he may fit rather than to fire him without consideration.

An interesting side light of the plan is that on this particular railroad it has been found that there is an increase of 20 per cent and a decrease of 10 or 12 per cent representing the maximum fluctuations from normal number of employees. Thus it may be possible to work out a plan whereby the increased amount of work at any time would be taken up by increasing the length of the working day up to ten hours before employing additional men.

DON'T EDUCATE BILL JONES

In pointing out how to tell the electric railway story to Bill Jones, Mr. Burroughs defined who Bill Jones is and what he reads as an average American citizen. He said not to attempt to educate Bill Jones, that he does not like history, but enjoys a story. Mr. Burroughs then went on to show how stories of the railway have been told in Baltimore, largely through the use of still pictures. One picture lecture showed how the growth of the railway had been the growth of the city. In another, when it was desired to talk transfers, the subject matter was directed to "corners" of Baltimore and of various cities. The number of free transfers given at these corners was finally brought up in this story and the height of a stack of transfers issued in one year compared with the height of the highest mountain in the world, the transfer stack being much higher. In making such comparisons, Mr. Burroughs said that it had been the practice to give the rule by which the comparison was made, so that Bill Jones could check for himself the comparison, without taking the company's word.

These picture stories have been presented at various exhibits with an automatic stereopticon machine. People have shown a good deal of interest in them, and have asked to have the pictures brought up to their church, or lodge, etc. This has given the company a great many opportunities to tell its story. A circular was also sent to the clubs, schools, libraries, telling the subjects of these pictures, and a great many calls result from that. Mr. Burroughs' particular admonition was as follows:

"Don't educate. Don't talk high brow. If you talk low brow, the high brow will get it, but if you talk high brow you will lose most of your audience."

After the reading of Mr. Potter's paper on the place of the bus, a question was raised as to the cost of bus operation. Zenas W. Carter of the White Company, said that no two men operating buses have the same costs. The operating conditions vary materially and the costs with them. He considered, however, that it is impossible to give a service beyond a 2-mile haul for a 5 cent fare, and that in general it is necessary to charge 10 cents. Between Youngstown, Ohio, and Warren, Pa., the Pennsylvania-Ohio Electric Company is operating a bus and charging 3 cents a mile and making a large profit. The Youngstown & Suburban Railway is charging 3½ cents a mile for its bus service. Mr. Carter considered that the thing to do was to give good service and charge for it accordingly. Bus service is not comparable to rail transportation, and it is necessary to get more money for it. It is a new type of transportation which the public demands and which it must pay for on a different basis from railway service.

Prince of Wales Becomes President of Institute of Transport

AT THE dinner of the Institute of Transport, held at the Savoy Hotel, London, on May 3, it was announced that H.R.H. the Prince of Wales, K.G., K.T., had agreed to become honorary president of the Institute. In this position he succeeds the Right Honorable Lord Ashfield, chairman of the Board of the London Underground Electric Railways Company.

The president of the Institute, Sir Sam Fay, in making this announcement, said that the Institute was in its infancy and in his opinion must assuredly grow with the heir to the throne as its honorary president.

The Institute of Transport was established on Nov. 3, 1919, and since then a number of important papers on city transit have been presented before it. At its congress, which was to be held at Sheffield, June 13 to 16, a number of such papers were scheduled, with inspection of the Hadfields' special work plant, and a paper on modern track work by Sir Robert A. Hadfield.

C.E.R.A. Summer Meeting

THE program for the summer meeting of the Central Electric Railway Association on July 18, 19, and 20 at the Breakers Hotel, Cedar Point, Ohio, has been arranged as follows:

Wednesday morning, July 18, at 10 o'clock there will be a meeting of the executive committee. The convention will convene at 11 o'clock, when President James P. Barnes will make his address. Reports of committees and of the secretary will consume the remainder of the morning.

Wednesday afternoon at 2 o'clock there will be a paper on "The Interurban Possibilities from Freight Business," by T. H. Stoffel, Westinghouse Electric & Manufacturing Company. Secretary Earlywine states that a great deal of interest will be manifested in this paper, as it is the result of an exhaustive study of the freight situation in the central states. The prevailing handicaps which now exist will be pointed out, presumably with suggestions for future developments.

Thursday morning at 10 o'clock, H. L. Andrews, General Electric Company, will present a paper on "What Manufacturers Have Done for the Electric Railway Industry." There will also be another paper at this session on "Utility Information Work," by John Mellett.

Thursday afternoon, 1:30 o'clock, the Engineering Council will convene with F. R. Coates presiding. In this session devoted to the Engineering Council, addresses by the directors of the four local sections and the reports of three committees will bring before the association all the subjects discussed by the Council prior to Jan. 1, 1923. These subjects will come before the association in the nature of recommendations for standardizing equipment and practices. These recommendations will represent the combined activities of the four sections and mark the beginning of a permanent record of approved methods and practices on engineering subjects as endorsed by the association. Papers will be presented as follows:

"Purpose of the Engineering Council," by R. Moses, Youngstown, Ohio, director Eastern section.

"Support Deserved by the Engineering Council," by A. V. Brown, Sandusky, Ohio, director Northern Section.

"Benefit of the Engineering Council to the Railway Industry," by L. A. Mitchell, Anderson, Ind., director Western section.

"Future of the Engineering Council," by G. A. Stiles, Columbus, Ohio, director Southern section.

Report of the committee on track and roadway, by T. H. David, Indianapolis, Ind.

Report of committee on power supply and transmission, by G. H. Kelsay, Elyria, Ohio.

Report of committee on car equipment, by P. V. C. See, Akron, Ohio.

"Wireless and Its Application for Communication by Electric Railways and Central Stations," by C. A. Boddie, Westinghouse Electric & Manufacturing Company.

"Steel Ties," by William P. Day, president International Steel Tie Company.

Thursday evening at 6:30 o'clock, there will be an informal dinner for association members and invited guests.

Friday morning at 10 o'clock E. F. Wickwire, secretary Ohio Brass Company, will address the convention, on co-operation of manufacturers with the

railways. After discussion of this paper and transaction of further business, the convention will adjourn at noon on July 20.

A special car furnished by the Interstate Public Service Company will leave Indianapolis at 7 a. m. on July 17 and arrive in Sandusky at 5:30 p. m.

The Engineer as a Leader in Transportation

The Ever-Widening Scope of Engineering Is Discussed at the Annual Convention of the Society for the Promotion of Engineering Education

THE story of the railroads of this country is a story of the engineer, according to E. H. Lee, vice-president and chief engineer Chicago & Northern Indiana Railroad, speaking at the annual convention of the Society for the Promotion of Engineering Education. He divided the history of the railroads into three periods: the construction period, the transition period, and the public relations period. Railroad construction was romantic and drew men of brains and ability. With no data and meager tools the engineer built the roads, made bridges and filled in the swamps. At that time the engineer was not considered a real leader in transportation, but only a necessary evil.

As railroad traffic developed during the transition period, the systems had to be improved and freight movement speeded up. Public sentiment was not so favorable to the roads at this time as it had been in the construction period. The chief reason for this change was that the real leader who had done the impossible with the physical problems was not interested or competent to handle the political, financial and human problems which were developing.

In the present or third period the question of public relations and human relations has become paramount in the successful operation of transportation systems. The ideal is to secure the best possible service under conditions which shall be the best possible for all concerned in the operation of railroads. The engineer's work has become increasingly important, not only in design and construction but also in operation. The tendency now is to advance engineers to positions of leadership. He must bring to the problem of the present period, however, the same ability and energy with which he solved the problem of the construction period and later those of the development.

The meeting was opened by an address from Dean Dexter S. Kimball, Cornell, who stated that twenty years ago the idea of a course of training for leadership was startling, but that now this topic was of major interest. Before the development of electrical engineering to its present position of importance, engineers were designers and builders. Technical requirements, however, governed the manufacture of electrical apparatus so greatly that engineers have been forced to enter the shops as managers. The same sort of development has occurred in salesmanship, technical engineers now being in demand to sell scientific equipment. The business world, according to Dean Kimball, now desires and admires the engineering way of doing things so greatly that the engineer will soon reign supreme in designing, operation and management of industry. The military leader of days gone by no longer exists, and his place has been taken by the man with legal training. The leader of the future, however, will be the engineer, because the public has confidence in his methods.

The president of the society, Prof. Charles S. Scott, Yale, told of the encouraging co-operation which had been received. A paper was read by T. H. MacDonald, chief of the Bureau of Public Roads, Washington, D. C., on "The Engineer as a Leader in Public Service." The result of the work of a joint conference committee to determine the place of the engineer in industry was presented by O. S. Lyford of the National Industrial Conference Board. He said the three important questions are: 1. Does industry need more or fewer engineers than are now available? 2. What kind of education should they have? 3. What is the responsibility of the industry in their work? He emphasized the point that the engineer should be a leader, because he has a method of attack and a scientific mind. Industry considered the underlying scientific training of the engineer to be fundamental. A man who has a scientific mind will generally receive the best education from a course of engineering, regardless of the work he intends to pursue.

"The Engineer in Business" was the subject of a talk by W. E. Wickenden. The place of the engineer as a leader in business is not assured, he thought, although the engineer's leadership in industry is certain. The business world, however, is dominated by considerations which are a handicap to engineers.

Program of the International Strassenbahn Verein

THE program for the second annual convention of the Internationale Strassenbahn und Kleinbahn Verein, with headquarters at Vienna, has just been published. It follows:

"One-man Cars," by Mr. Van Putten, Amsterdam Municipal Tramways and Mr. Hultman, Malmö Tramways.

"Track Construction and Track Maintenance," by Mr. Goetz, Leipzig Street Railway.

"Motor Control Systems," by Mr. Pforr, Berlin Street Railway.

"Average Annual Output in Car-Miles of the Train Force, when Working on the Basis of the Eight-Hour Day," by Mr. Mumssen, Hamburg Elevated Railway; Mr. Norregaard, Copenhagen Tramways, and Dr. Patz, Budapest Electric Railway.

"Design of Modern Street Railway Motors, Including Methods of Lubrication," by Mr. Wellner of the Bielitz Electrical Works.

"Anti-Friction Bearings and Lubrication of Bearings and Gears," by Mr. Pforte, Hagen Street Railway, and Doctor Videky, Budapest Institute of Technology.

"Magnetic Brakes," by Mr. Barth, Kristiania Street Railway.

"Fare Systems in Restricted City Areas," by Mr. Winter, Vienna Municipal Railway.

"Recent Improvements in the Zurich Street Railway System," by Mr. Wick, Zurich Municipal Railway.

"Car Couplings," by Mr. Paap, Berlin.

"Standardized Practice in Car Design on Standard and Narrow-Gage Steam Railroads," by Mr. Semke, Berlin.

The date and place of the next convention has not yet been settled. An invitation has been received from Münich to meet in that city during the spring of 1924.

Organization Meeting — A.E.S.C. Sectional Committee on Walkway Surfaces

THE first meeting of the sectional committee on walkway surfaces of the American Engineering Standards Committee was held on June 15 at the Engineering Societies' building in New York City. This committee has been organized under the dual sponsorship of the American Society of Safety Engineers and the American Institute of Architects.

The committee organized by electing the following permanent officers: Chairman, Dr. Lucien W. Chaney, U. S. Department of Labor; vice-chairman, F. W. Joannes, American Institute of Architects, and secretary, H. W. Mowery, American Society of Safety Engineers. An executive committee of seven members, including the three officers, was also elected, and a committee on plan and scope was appointed.

The committee will undertake to promulgate a code covering the appropriate materials for walkway surfaces as applied to walks, floors, stairs, platforms, elevators, car steps, car floors, etc., all with the view of providing adequate specifications to cover the manufacture of such materials. It is believed that accident hazards may be greatly reduced by correct application of the code which will ultimately be formulated, possibly somewhat along the lines of results obtained through the National Safety Code.

That the electric railway industry is much interested in the work of the committee is shown by the fact that the code will be applicable to railway cars, stations and platforms and will specify characteristics for walkway surfaces to include, among other things, resistance to slipping, freedom from

the tripping hazard, durability and insulation for surfaces around electrical apparatus.

The American Electric Railway Association has been requested to name a representative on the committee but the representative has not been appointed as yet. R. C. Cram, Brooklyn, represented the association at the organization meeting.

Returns from a British Electrification

Good Results Shown in the Suburban Service of the London, Brighton & South Coast Railway by the Electric Trains as Compared with Steam

AT A MEETING of the Institute of Transport in London on May 7, 1923, Sir Philip Dawson, M.P., presented an address in which he gave some interesting figures on results with steam and electric traction in suburban service on the London, Brighton & South Coast Railway. Three of the charts presented by Sir Philip are reproduced. As the investigation was primarily to show what benefit might be expected from electrification, the "expenditure" charted indicates only the expenditure affected by the system of traction adopted. Hence, from the net receipts indicated in these charts, the cost of maintenance of track, management, taxes, etc., which are not directly affected by electric as compared with steam operation, should be deducted if the net amounts available for dividends are to be ascertained.

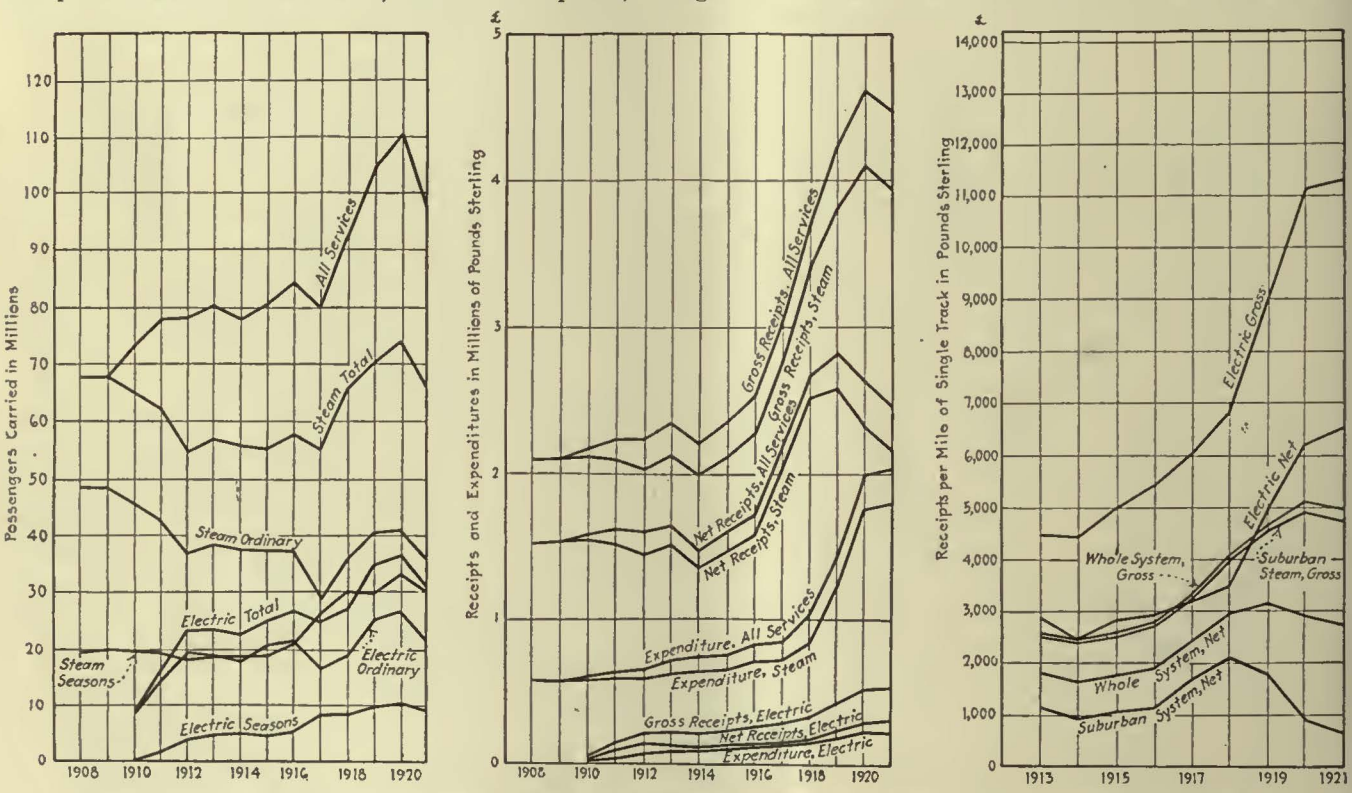
The electric division of the London, Brighton & South Coast Railway gives a suburban service only, and does not, according to the speaker, "represent the most profitable part of the railway system." Considerable suburban service is also given by steam. The average suburban steam train consists of 6.6 cars, accommodating 463 passengers and operating at an average speed of 9.31 m.p.h. The average electric train consists of 4.4 cars, accommodating 308 passengers and operating at an average speed of 21.8 m.p.h.

The first diagram shows that up to 1920 the passengers by electric trains constantly increased, while those by steam trains in 1921 are about the same as in 1909. The second diagram shows that gross and net receipts in the case of steam are decreasing, while the reverse is the case with the electric services. The third diagram shows the remarkable track capacity obtained with electric power, though as a certain number of suburban steam passenger trains operate over electrified sections and this mileage has not been taken into consideration, the suburban steam services show up more advantageously than they should.

In estimating the cost of equipping the entire line with electricity, the speaker said that if electrification would bring an increase of 70 per cent in gross receipts on the suburban line and 35 per cent on the main line, a return of 8½ per cent could be made on the expenditure required to carry out the electrification, and that these estimates of increase in growth were conservative.

In the discussion which followed the presentation of this paper, Sir George Paish, the eminent statistician, declared that the terms used in the paper, "passengers per train-mile" and "passengers per car-mile" were misleading. There were no such units. Passenger mileage can be divided by train-miles or the number of passengers can be divided by number of trains, but number of passengers cannot be divided by train-miles. Sir Philip Dawson in his reply acknowledged the theoretical correctness of the criticism but said that as passenger mileage was a very difficult figure to obtain, the ratio used was employed as a matter of interest, and as between lines where the average length of ride is about the same, was a convenient one.

Sir William Acworth, director of the London Underground Railways and also author of various books on railway economics, suggested that the best way of deciding the "battle of the systems" was to toss a coin and then abide by the result. He said that if that had been done during the dispute between the advocates of the vacuum brake and the air brake in the early days, it would have been a good thing for the British railways. Another instance of the kind was the adoption of various railway gages in India. Sir Philip Dawson, however, pointed out that electrification was not quite the same thing as gages, because if, after a number of years, it was found advisable to alter or modify the electric system it could be done at a comparatively small cost compared with the cost of unifying different gages.

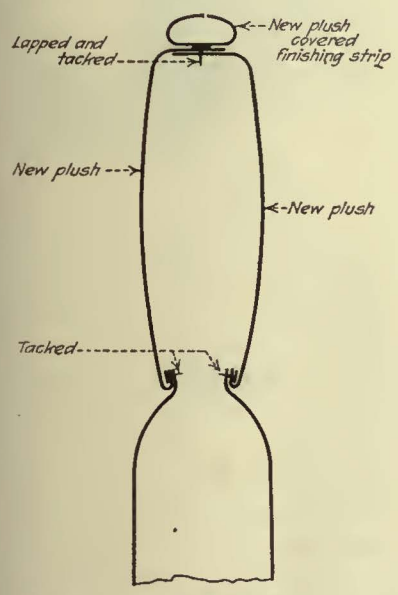


Comparative Results of Steam and Electric Traction on Suburban Lines of the London, Brighton & South Coast Railway

Maintenance of Equipment

Economical Method of Covering Seat Head Rolls

WHERE plush covering is used on car seats, the head rolls at the top of the seat backs become greasy from the hair of passengers and so are very unsightly. This grease is of such a nature that its



Method of Covering Head Rolls of Seat Backs

removal by any of the various commercial cleaners is almost impossible, and about the only satisfactory method is to re-cover the soiled parts. As plush covering is expensive, the replacement with new material is costly unless the material is used economically. The accompanying illustration shows a plan used by the Lehigh Valley Transit Company, Allentown Pa., in which new plush is placed over the old head-roll covering without disturbing it. In starting strips of plush are placed with their face against the lower part of the seat back. The upper edges are then tacked along the depression. The back and front strips are then folded over the heads of the tacks and brought together at the top of the seats so as to overlap. Here they are again tacked, and a finishing strip is nailed over the top. This strip is covered with a plush sleeve.

By this method no tacks or seams are visible. As the head rests are about the only part of the seats to be seen, when a passenger looks down the car the seats finished in this manner present the appearance of being entirely new.

Improved Construction for Cores of Sweeper Brooms

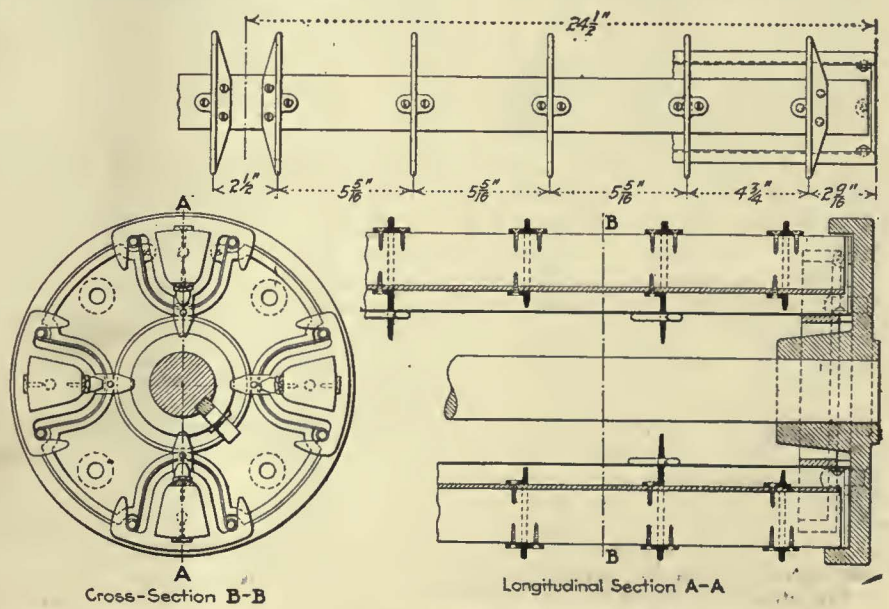
A MACHINE for filling snow sweeper brooms as used in the Harvard shops of the Cleveland Railway was described in the ELECTRIC RAILWAY JOURNAL for July 10, 1920, page 87. Some additional details regarding the construction of the cores of the brooms which are filled with this machine are now available, and the accompanying line drawing illustrates the construction.

The shell in which the rattan is inserted is made of a single piece of sheet steel with cast ends. The sheet-steel core has four U-shaped recesses for receiving the rattan. The cast ends are riveted to the shell by four rivets which come in between the recesses. Maple bars fit into the recesses of the cores for holding the rattan in place. Brass hooks are fastened to the maple strips at intervals of 5⅛ in. These hooks are put in place by slipping them over the ends of the bars before the latter are inserted in the slots. Four of these hooks have projections at the bottom which extend through the shell and are held in place by cotter pins. A method of securing the maple strips is thus provided, so that they cannot separate or fly out centrifugally as the brush revolves.

The end castings have four pockets into which the maple cleats fit. A flange around the end casting prevents endwise and radial movement of cleats. An inner casting is also provided at the center, which is split and hinged at one side. The type of construction permits easy removal of the cleats for filling.

Metering Car Energy Reduces Maintenance Cost

FOR several years the West Penn Railways has had the cars on its Allegheny Valley division equipped with Economy meters for measuring the car energy and checking the performance of the motormen. This has produced a substantial saving in energy consumption. According to Daniel Durie, superintendent, the principal advantage, however, has not been in this saving of energy, but in the reduced maintenance of equipment. The use of the meters makes the motormen careful in their handling of the equipment, and this in turn eliminates many of the causes of motor failure. The brake shoe



Improved Core Construction for Sweeper Brooms

mileage, which was from 3,000 to 4,000 miles without the meters, has been increased to 8,000 miles by their use. This division is quite level, so that the wear on brake shoes should be a minimum.

Installing Additional Side Feeders

WHEN the overhead wires on a double-track line extend for a long distance without any taps connecting with a feeder cable, it is often desirable to connect the two trolley wires electrically at intervals between the feeder taps. Unless this is done one wire may carry a heavy load, while the other carries very little.

The intervals between side feed spans should be short in order to keep the two wires at nearly the same potential. This will also tend to prevent a wire becoming annealed, should it break and become grounded. In that case all of the current must pass through on wire from the nearest feeder tap to the point of grounding. After such an occurrence the wire is so soft as to be quite useless and has to be taken down and a new wire put up. The nearer the side feed spans are to each other the shorter will be the length of wire which is damaged in this way.

Occasionally section insulators may be so close together that there would normally be only one side feed span between them. In such cases it is better to put in at least one more connection between the feeder and the wire or between the two trolley wires, so that if the trolley ear at the side feed span becomes disconnected from the wire the trolley will not be dead.

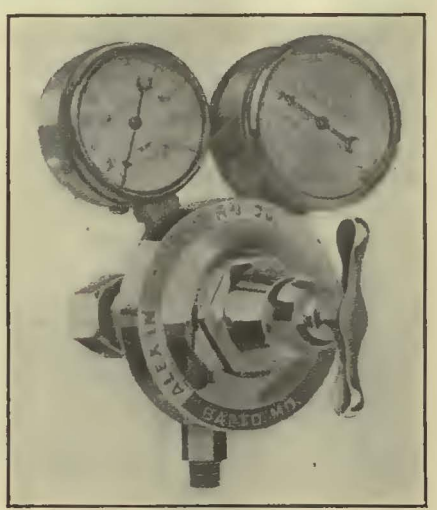
New Equipment Available

Regulator for High Pressure Gases

A NEW regulator for controlling the delivery of acetylene, oxygen, hydrogen and other high-pressure gases is being marketed by the Alexander Milburn Company, Baltimore, Md. It is designed to maintain a constant, predetermined pressure regardless of fluctuations in the initial pressure line and variations in consumption.

The front cap contains an adjusting key, a top spring button and a tension spring. In front the body contains a flexible metal diaphragm. Soldered on and over this diaphragm is screwed a bronze diaphragm plate or spring button to hold the tension spring. Inside this body is a fixed nozzle containing a loose operating pin. Over the nozzle and loosely assembled is the valve sleeve, which has a roll of gas ports drilled through its circumference and carries the valve seat. The seat closes against the nozzle by initial gas pressure on the valve sleeve and pressure of a compensating spring resting in the recessed tank coupling. The loose operating pin inside the nozzle is actuated at one end by the deflection of the diaphragm and at the other by pressure of the valve sleeve.

The regulator closes with instead of against the gas pressure. This



New Gas Flow Regulator

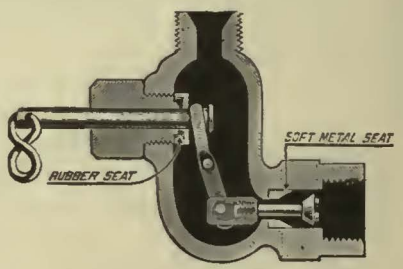
enables the sealing to be effected by pressure of several pounds instead of hundreds of pounds, as would be the case if the sleeve were yoked to the diaphragm. In this design the sleeve is entirely independent. An equilibrium is maintained in the regulator at all times, throttling the supply when the desired pressure is built up, and opening when the consumption lowers the pressure and an increased supply is needed.

The regulator is adapted for use with various gases by a change of the gages shown in the illustration. The rear connection is also changeable so that the regulator can be attached to various containers.

This regulator is the invention of A. F. Jenkins, who has long been associated with the acetylene industry.

Safeguard for Welding

A SAFETY valve for gas welding equipment has recently been placed on the market by the Mattingly Automatic Valve Company, St. Louis, Mo. This is designed to safeguard the welder and reduce fire hazards and losses of gas should the hose line become ruptured or



Safety Valve for Gas Welding

disconnected. In operation this valve is applied to oxyacetylene welding and cutting outfits between the hose and the gas tanks and does not interfere with the regular operation of the torch or regulator. An accompanying illustration shows a section of this valve. It consists of a right-angle body arranged for two connections. That at the right is connected to the regulator and the upper connection is for the hose. A valve with a soft metal seat operates between the connection to the regulator and the right-angle body. This valve is connected through a pivoted lever to a stem which extends to the left.

After the hose has been connected and all joints are tight, the stem connected to the valve is pulled to the left until pressure is built up in the hose line. With the normal pressure established any rupture or excessive leak will cause the pressure to drop suddenly in the right-angle body. The rush of gas from the tank will then automatically close the valve against the soft metal seat.

One of the most important advantages claimed for the valve is the feeling of security given the welder. The safety valve has no packing and the escape of gas around the stem used for holding the valve open is prevented by a soft rubber-seated valve which seats against a cone-shaped bushing through which the stem passes. This bushing can be unscrewed for any necessary attention.

Regular stock valves are carried for outfits using hose lines from 10

ft. to 60 ft. in length. Where other lengths are used, special valves are provided.

Brush-holder with Twenty-four Adjusting Points

THE new brush-holder for Westinghouse No. 508 railway motors shown in the accompanying illustration uses a "no-harness" type of spring mechanism fitted with cotter pin adjustment. Twenty-four adjusting steps are obtained by one revolution of the shaft. The inside end of the spring is anchored to the shaft, while the other end has a flat copper contact tip which bears on the top of the carbon brush.

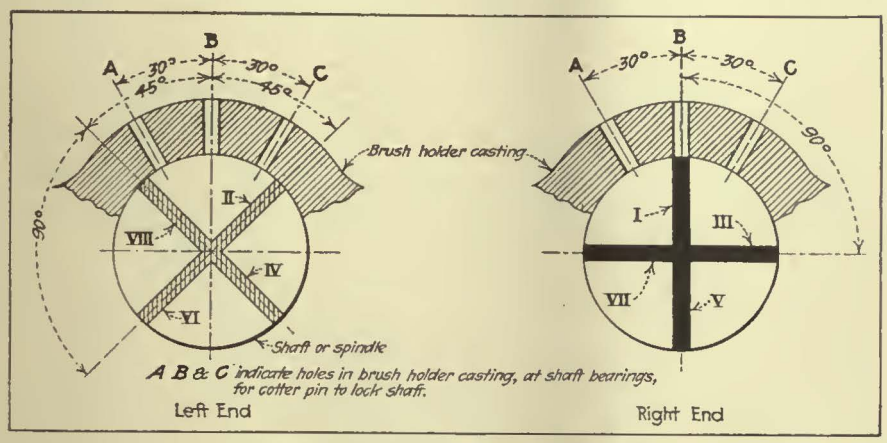
Two sets of three adjusting or locking holes, marked *A*, *B* and *C* on the accompanying diagrams, are drilled 30 deg. apart in the same plane in the brush-holder casting at the shaft bearings. Four adjusting holes, marked *I*, *III*, *V*, *VII*, are drilled 90 deg. apart in the same plane at the right end of the shaft, and four adjusting holes marked *II*, *IV*, *VI*, *VIII* are drilled 90 deg. apart in the same plane at the left end of the shaft.

These two sets of four holes are staggered with relation to each other.

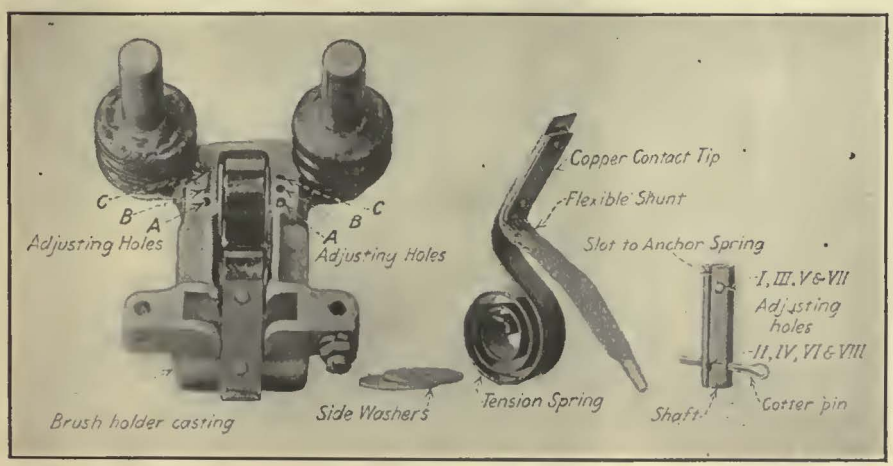
The use of the two sets of three holes in the brush-holder casting and the two sets of four holes in the shaft are necessary so as not to weaken the shaft construction.

To increase the tension on the top of the carbon brush it is necessary to wind up the pressure spring. This is accomplished by means of a screw-driver placed in the slot at the right end of the shaft. Starting with slot *I* at the right end of the shaft, which is in line with hole *B* in the brush-holder casting, and turning the shaft until slot *II* at the left end of the shaft lines up with hole *C* in the brush-holder casting, the shaft is advanced 15 deg. or one-twenty-fourth of a revolution.

It will be noted that with this arrangement on each consecutive adjusting step the cotter pin used to lock the shaft must be shifted from one end of the spindle to the other. Further, it must be placed in different locking holes *A*, *B*, and *C* in the brush-holder casting. Only one cotter pin is required to lock the spindle.



Sections of Shaft in Brush-Holder Casting



Brush-Holder Details

Compensating Fixture

A NEW lamp fixture for use in the series system of electric car lighting provides a means whereby the burning out of one or more lamps will not affect the remainder in the same circuit. This is being marketed by the Electric Service Supplies Company, Philadelphia, Pa. The accompanying illustration shows the "Type K" device in combination with a standard Safety Car Lighting Company's fixture and a reflector suitable for use in electric railway cars.

The control of the circuit is had by means of an enameled type resistor mounted in an ornamental fireproof canopy. Normally this resistor is out of the circuit; but the removal, breakage or burning out of a lamp automatically inserts the resistor in its stead.

In operation, if the circuit is opened, due either to removal of a lamp or breakage of a lamp filament, a small series solenoid is de-energized. The armature of the solenoid drops, establishing connections to substitute the resistor in place of the burned-out lamp. Placing a good lamp in the receptacle automatically energizes the solenoid and restores normal conditions.

This Fixture Has Device to Shunt a Burned-Out Lamp with Resistance

There is a growing tendency in car lighting to use high-powered incandescent lamps, with a corresponding reduction in their number and a simplification of the car wiring due to having fewer circuits. With such arrangements burning out one lamp would cause an entire circuit to be put out of service and would interfere seriously with the lighting. The use of this type of fixture is particularly suitable for such installations.

The News of the Industry

Operation to Cease on July 21

Commission Unable to Operate Spartanburg Property—Buses Will be Used—City Reticent

Another chapter in the railway affairs of the South Carolina Gas & Electric Company was concluded on June 22 when the Railroad Commission issued an order authorizing the discontinuance of operation within the city limits of Spartanburg on July 21. Service will be continued on the Clifton and Saxon lines and buses will be used inside the city limits to connect with the interurban cars which the company will continue to operate. It is expected that application will be made shortly to the city administration for permission to operate the new buses. The inability of the company to earn money is the reason given for the abandonment in the order of the commission. The company has been operating under the supervision of the commission since Jan. 13.

COMMISSION PRACTICED ECONOMIES

The railway problem in Spartanburg, referred to from time to time in the ELECTRIC RAILWAY JOURNAL, really came to a head on Dec. 31, 1922, when the operating company on the plea of heavy losses ceased to operate. On Jan. 13 after conferences with representatives of the company as well as a conference with the City Council of Spartanburg the commission took charge of the property, ordered service resumed, fixed schedules, rates, etc. At the very start the commission practiced the strictest economies so as to reduce operating expenses, but it was brought out at later conferences at which the public were heard that the service was not frequent enough. The commission went a step further and reduced rates from 10 cents to 5 cents in the desperate effort to furnish service to the residents of Spartanburg and environs at a rate which it thought would stimulate riding.

However, it was proved more and more conclusively that operation of this railway was a losing proposition and that something would have to be done in the near future. After operation by the commission for some sixty days the company petitioned the commission to arrive at a definite conclusion and take action. The commission went to Spartanburg for a public hearing in conjunction with the Chamber of Commerce. Nothing resulted from the meeting until the recent order of the commission.

The substitution of buses in Spartanburg was first advanced by the railway in the summer of 1922 after the foreclosure and reorganization of the property. The city, however, never acted on the proposition. It was the failure of the company and the city to reach an agreement over bus operation which led the company to place its cars in the carhouse in East Spartanburg on Dec. 31 last and leave them there until the commission took over the operation of the line.

The order which was issued by the commission in connection with the matter is in part as follows:

> Even in the face of the losses, the commission has kept the service moving since Jan. 13, 1923, until the present time, with practically the same result as shortly after the line was put into operation.
>
> The commission is fully cognizent of the decisions of the courts in many cases that while it has the authority to supervise service, rates, etc., it does not own and cannot operate and control these properties, and only in its earnest desire to furnish service to the people of Spartanburg has the commission gone as far with this matter as it has.
>
> Every effort and every method for improving the amount of traffic that is known to this commission has been tried, but all efforts have failed to develop sufficient traffic to warrant a continuance of the service. This could not be regretted more by anyone than by the Railroad Commission itself.
>
> The commission has realized from the beginning that anything it might promulgate and put into effect was only as a try-out and would furnish the commission with an actual basis for action one way or the other, and this matter has been publicly stressed through the press, by representatives of the commission, and by every means known to the commission, so that the commission could not be misunderstood in connection with the requirements of the law and its duty in matters of this kind. The results obtained have not been from hearsay evidence but are actual results from the rendering of service itself.
>
> The commission finds itself faced with the law requiring such rates as will yield reasonable return on the investment. In this case the commission has never been able to pull the revenue up as a result of the service to such point where a return of the investment could be figured at all, having been unable to even meet operating expenses. Therefore, to continue this service further would mean a violation of the provisions of all laws, as well as provisions of the constitution of our own state, and would without question result in the confiscation of this property. The commission's records will show many other things that could be put in evidence which would warrant the commission in issuing such order as it finds itself compelled to issue. It is not a pleasure or the desire of any member of the commission, but an absolute necessity to perform this duty.

George B. Tripp, president of the South Carolina Gas & Electric Company, said that the company would, of course, comply with the order of the commission and would do everything possible to work out successfully the problem of operating the Glendale-Clifton line with bus connections to the city proper. It is expected that the city authorities will resort to the courts, but Mayor John F. Floyd announced that the commission's order would not be discussed by the City Council until City Attorney Daniel returned from New York City, where he had gone on business.

Strike Threatened in Des Moines

Employees of Des Moines City Railway Show Evidence of Rejecting the Recent Wage Award

Des Moines is again facing the threat of a tieup of its railway lines. The present emergency is based on a threat of the men to strike following their dissatisfaction at the wage award made by the arbitration committee in a report brought in during the week ended June 23.

The findings of the arbitration board, composed of Rev. Elmer Nelson Owen, rector of St. Paul's Episcopal Church; J. G. Gamble, representing the company, and J. Ben Wiley, representing the men, provided for a scale during the year March 1, 1923, to March 1, 1924, of from from 48 cents to a maximum of 54 cents an hour. This is an increase of approximately 2 cents an hour, whereas the men were seeking an increase of 18 cents. Rev. Owen said that the new scale compared favorably with rates elsewhere and that any wage increase must also be considered with the effect it would have in bringing about a decrease in fare as provided by the franchise, thus benefiting the entire riding public of Des Moines.

Mr. Wiley signed the agreement, but immediately came out with a charge that he had been forced into signing by the threat that unless the increase was accepted as satisfactory the Reverend Owen would take a stand for no increase at all. This claim is not taken seriously. It is pointed out that in the event of a development such as Mr. Wiley cites the position of the men would have been improved had he refused to sign and then thrown the case before the public.

The men have appealed to the company from the finding, but were met with a statement from F. C. Chambers, president of the railway, that he could see no use of further negotiations.

Mr. Wiley has stated in the newspapers that the men will make every effort to avoid a walkout, and as this story is written the men say they will ask that the question of whether or not the contract calls for an arbitration of an award be submitted to the five judges of the court in Polk County.

There is a general feeling that the matter of wage disputes as covered in the agreement provides for submitting the question to three arbiters and that the decision of the arbiters should stand. The public therefore sees no occasion for a strike, particularly when the wage granted is comparable with that paid trainmen elsewhere.

Eight Killed in Brooklyn Elevated Accident

Cars Leave Structure and Fall Into Street at Busy Corner—Inquiries Under Way to Determine Responsibility—Cars Had Been Inspected Recently

EIGHT persons had died and thirty-seven were still in hospitals on June 29 as a result of an accident on the elevated railway in Brooklyn on June 25. Shortly after 2 o'clock on Monday afternoon both cars of a two-car train of the Brooklyn Manhattan Transit Company slid off the structure into the street, the rear truck of the rear car being the first to leave the track. The cars were of wood construction rebuilt in 1907 by the company. They were completely demolished in the fall. The accident occurred to a Bay Ridge two-car train westbound to New York as it was approaching the station in front of the Long Island Railroad terminal at the junction of Flatbush and Atlantic Avenues.

Inquiries into the cause of the disaster are under way by the public authorities, including the Transit Commission, and the company itself under the direction of President Menden. A statement issued by W. S. Menden, president of the railway, shortly after the accident was as follows:

The investigation of the cause of the accident this afternoon, while not complete, indicates that the rear truck on the rear car of the two-car train was derailed, for some cause not yet ascertained, at the frog of the switch just east of the Atlantic Avenue Station, causing the rear car to be precipitated into the street, dragging the forward truck of the rear car and the entire forward car, with its trucks, into the street, leaving the truck which was first derailed on the structure, practically at right angles to the running rails.

The track and switches at the location in question had been inspected in the morning, and found in good condition. Both cars of the train had been inspected on June 15, 1923, in accordance with the established practice, and found O. K. The two cars in the train had been operated on the same line over the same switch and frog for nine trips on the same day without any difficulty of any kind. The train was in charge of an experienced motorman with a good record.

The investigation is being continued in co-operation with public authorities to ascertain more definitely the cause of the derailment.

Investigations made by engineers of the railway, the New York Transit Commission and the city indicate that the rear truck of the rear car was the first to leave the track. The derailing occurred at a frog preceding a trailing switch, through which the train was operating. The switch controls movement through a cross-over which is used only for turning back trains at that point and forms a trailing connection between the two tracks of the elevated structure. The derailing occurred on a tangent level track, and the train had operated a distance of approximately 300 ft. on tangent track after it had passed around a curve from Fifth Avenue into Flatbush Avenue.

Information tending to show where the derailment occurred is furnished by the condition of the frog and ties immediately following it. The heel of the frog showed slight abrasions, and the first indications of cutting by the wheel flange on the ties was immediately following the frog. This cutting of the ties continued up and across them for a distance of approximately 10 ft. beyond the point of the switch, where the rear truck apparently was wrenched loose from the car body. This rear truck, according to a statement issued by Mr. Menden, remained on the elevated structure, all others being carried to the street below with the car bodies.

The real reason for the derailing at the frog has not been ascertained. Various conjectures as to what might have happened have been given out but definite information is lacking which would tend to give a solution.

The cars in the accident were numbers 913 and 919. They were originally purchased from the Wason Manufacturing Company in 1898. The motor trucks were Baldwin and the trailer trucks Wason.

One of the first among those to arrive on the scene was Mayor Hylan. He climbed the structure, looked over the scene and then submitted to being photographed as he examined a piece of the shattered guard rail. He rushed into print with a statement that somebody should and would be indicted; that he believed the accident was the result of using wooden cars; that he thought the switch had been tampered with after the accident occurred; that the truck probably was defective; that the Transit Commission was responsible through its inaction; that he would ask the Governor to call a special session of the legislature, and that the guard rails along the structure were unsafe.

These inept remarks merely brought down upon him fiery editorial protests from the *Eagle, Sun, Herald, World* and *Tribune* for seeking to make political capital out of a catastrophe to the community.

The protest thus made in the name of humanity was reiterated by Mr. Harkness of the Transit Commission, who spoke for that body in the absence of Chairman McAneny. Mr. Harkness said:

It seems to me that the accident is sad and deplorable enough without anyone try-

P. & A. Photo

View Taken Shortly After Brooklyn Accident, Showing Officials Examining Elevated Structure Near Switch

ing politically to capitalize it. I will not jump to any conclusions about it. We promptly sent engineers to the scene of the wreck and they in due time will turn in a report. A curbstone judgment on the cause of the accident is out of place.

Upon his return to the city Mr. McAneny reiterated the views expressed by his colleague on the commission. He accused the Mayor of playing politics with a heart-rending situation. In a later statement he said:

There may continue to be considerable difficulty in determining what actually did occur, but beyond the theory advanced by the commission's engineers that a bolt dropped from the mechanism of one of the trucks and caused the derailment, there is nothing as yet that offers a definite solution.

On Tuesday District Attorney Dodd announced that in order to assist him in his inquiry into the cause of the accident and to help fix responsibility for it, he had retained J. C. Brackenridge, now an independent consulting engineer but some years ago an officer of the Brooklyn Rapid Transit. He quoted Mr. Brackenridge as stating that the guard rails were intended to prevent such an occurrence as the accident, and that "if the timbers had been in good condition they doubtless would have done that."

To this statement Mr. Menden replied:

No guard rails could keep derailed cars from going over the side unless they were as high as the cars themselves. The beams are there to keep the trucks on the structure, and under ordinary circumstances the car bodies remain with the trucks. That the beams served their purpose in this instance is shown by the fact that the rear truck on the second car—the first one derailed—remained on the structure.

According to a report issued by the Transit Commission an inspection of the stretch of guard beams between Atlantic and St. Marks Avenues, a distance of 6,666 lineal feet, was made last December and revealed 36 ft. of damaged guard rail in three sections. These sections were reported on Jan. 9 as being "rotten and split from end to end." W. S. Menden acknowledged receipt of the report on Jan. 24.

Mr. Menden gave out a statement June 28 explaining that the commission's report covered a number of items and that he had given preferential consideration to more important ones. An inspection by B. R. T. engineers satisfied him that the beams complained of did not require immediate replacement. He said:

The designation "rotten and split from end to end," is a designation which has regularly been used by the commission's inspectors, and our check of these reports has shown that this heading did not properly describe the condition found either by the commission inspectors or by ours, and was not intended to indicate that the timbers were in such condition as to require immediate repairs.

Upon receipt of this report we had an inspection made of this line, and arrangements were made to give the matter all necessary attention, giving the more important items preferred attention, as indicated in letter to the executive officer of the commission dated Jan. 24.

Our inspection as well as that made by the commission's engineers indicated that the section between Thirty-sixth Street and Sixty-fifth Street required earlier attention. Our inspection did not indicate that immediate repairs were necessary to any part of the timber construction of the track between Fifth Avenue and Atlantic Avenue, all of which had been rebuilt new in 1913.

Reports of these physical surveys as made by the inspectors of the Transit Commission are sent to us from time to time as part of the routine inspection system in effect by the commission. These reports usually reach us about thirty days after the inspection has been made and are sent us for our information and attention.

We have always thoroughly inspected our property ourselves and have relied on our own inspection. We have never taken the position that we should await reports from the Transit Commission or any one else. Our own inspection has been thorough and reliable, but following any report from the Transit Commission we have immediately checked the results of that report, and this we did on the receipt of the report mentioned above.

Chairman Dahl Defends Employees

Gerhard M. Dahl, chairman of the executive committee of the B. M. T., in an announcement on June 28 regarding the switch at the scene of the wreck, which officials said was tampered with after the accident, stated that the investigation proved that the derailed truck might have thrown the switch and reversed the signal, so that it showed red. He also stated that if any individual threw the switch after the accident to mislead the authorities, he is a criminal and a fool. The statement by Mr. Dahl read in part as follows:

The motorman says the switch was in proper position, as he approached it. The signals showed green, meaning safety. The motorman is an old, trusted and experienced employee and we accept his statement as the fact.

It is undisputed that immediately after the accident the switch was in the reverse position, with the red or danger signal showing. It is also accepted that the switch was locked. The theory has been advanced that immediately after the accident, some one—presumably an employee with a key to the lock on the switch—unlocked the switch, reversed its position and changed the signals from green of safety to the red of danger.

We have no quarrel with either the honesty of purpose, sincerity, or good faith of those who advance this theory. But we do not agree with it, and in justice to our many employees, some of whom might rest under the cloud of suspicion, we believe it our duty to them and to the public to state our reasons.

The motorman of the train escaped with only minor injuries.

On Tuesday the Mayor announced that he would leave the matter in the hands of Mr. Dodd, and the inquiries into the causes of the wreck were in a measure merged. The Transit Commission, however, announced that it reserved to itself the right to conduct its own public hearings after the District Attorney had concluded.

Three engineers have been appointed by the B. M. T. to make an inspection of the structure where the accident occurred in an effort to determine the cause of the wreck. They are Dwight P. Robinson, J. H. Davies and George Pegram, chief engineer of the Interborough.

B. M. T. Has More Trouble

One woman was killed and a woman and a man severely injured when an auto in which they were sitting was crushed beneath a shower of bricks after wind had hurled the 30 ft. wall at the rear of the carhouse of the Brooklyn Company backing on Bushwick Avenue into the street.

Accepts Beeler Report

The Commission Council of New Orleans passed a resolution on June 26 accepting the report on the local railway system by John A. Beeler, consulting engineer, New York, as a guide for all future action with respect to railway matters. At the same meeting the Council ordered all the standard gage track changed to wide gage to conform with the remainder of the system. This embodies about 34 miles of track, and it means that the standard gage cars will also have to be changed for wide gage operation. Provision was originally made in the trucks of these cars so that this change in structure can be readily made.

The Council also ordered the railway to build the Broadway extension, the St. Claude-Rampart cutoff, the Paris-St. Bernard extension and rerouting, to make the rerouting of the South Claiborne and Freret lines and to build the Elysian Field track and the Gentilly extension and make the new routings. These are all in conformity with the Beeler report and involve the construction of 10 to 12 miles of track by the company.

Publicity vs. Propaganda

"How do you distinguish between legitimate publicity and propaganda?" That was one of two questions addressed recently by Paul L. Harrison of the department of journalism, University of Kansas, to William Randolph Hearst, the publisher. The Hearst newspapers answered the question as follows:

"Legitimate publicity" is the spreading of truthful information, or facts, about any cause or condition which is of interest or importance to people generally, and not for the pecuniary or other advantage of the person spreading it.

Propaganda is the giving out (or hiring of) opinions, arguments or pleas to induce people generally to believe what some individual, group of individuals or organizations want them to believe, for the pecuniary or other advantage of the individual, group or organization giving out (or hiring) the propaganda.

Public opinion, meaning all the people, cannot acquire facts and information necessary to reach a correct conclusion on any question without full publicity.

Public opinion is often deliberately misled, deceived or seduced by propaganda or hired opinions.

To see no difference between "publicity" and "propaganda" is to see no difference between nutritious food and insidious poison.

Wages to Be Arbitrated.—The union of conductors and motormen in the employ of the Boston Elevated Railway, has made a demand on the company for an increase in wages to 91 cents an hour. Their present schedule is 61 cents. In negotiations between the union committee and the management of the company an offer of 65 cents an hour was made, but that offer was rejected by the union on June 22. The question of wages will now go to arbitration. The union has selected James H. Vahey as its arbitrator. A second arbitrator will be selected by the company, and these two men will select the third member, who will be chairman of the board. The present agreement expires on July 1.

University of Iowa Holds Conference on Public Utility Regulation

Iowa Mayors, city attorneys and public utility men were invited by the college of law of the University of Iowa to attend a conference on public utility, regulation and rate making in June. Various subjects were discussed by authorities on public utility affairs in the state and several experts from the East spoke.

Methods of valuing and inventorying utility concerns for the purpose of taxation and rate making were discussed by Dean William G. Raymond of the college of applied science, University of Iowa. Many important rate cases have been decided by Dean Raymond, as the referee.

The work of the State Railway Commission was reviewed by Dwight N. Lewis of Des Moines, a member of the commission, and Mayor Alfred C. Mueller of Davenport and O. N. Elliott, city attorney of Cedar Rapids, discussed rate-making practices of Iowa municipalities.

Connecticut Company and Men Agree on Five-Cent Advance

Following a referendum held on June 15, which resulted in a four to one vote by the men that they accept an increase of 5 cents an hour in their pay, the Connecticut Company announced that it would grant the increase to its motormen and conductors. About 2,600 men are affected by the agreement. This ends the negotiations concerning the annual contract which have been going on for the past few weeks. The new agreement is retroactive to June 1.

By accepting the 5 cents an hour increase, the Connecticut Company raised its original offer 1 cent. The company had offered the employees 4 cents an hour increase, but this had been refused in an earlier referendum. The men then voted to bring the matter to arbitration, but the sentiment was very strong against arbitrating the wage question.

Under the old scale two-men car operators, started at 47 cents an hour. At the end of three months the pay was 49 cents and at the end of six months, 52 cents. With one-man car operators the scale was 54, 56 and 59 cents. The men originally requested a scale of 60, 62 and 65 with a 75, 77 and 80 cents scale for one-man car operators. In their second referendum vote, however, the men were willing to accept the scale of 52, 54 and 57, with 59, 61 and 64 cents an hour for one-man car operators. This was the scale accepted in the referendum vote of June 15, rather than let the matter go to arbitration.

J. K. Punderford, vice-president and general manager of the company, stated that for a number of years the company had always made its final proposition in the original offer, but as the committee now had power to sign an agreement and to close the matter without further discussion, hoping that the company's action in granting the additional cent would be appreciated and encourage the men to better efforts on behalf of the public, it was willing to grant the increase requested.

Chicago Arbitration to Start July 9

Arbitration of Chicago's street car and elevated railroad wage dispute scheduled to begin on June 25 was postponed until July 9, after a brief session held in the office of Mayor Dever. The hearings will be held in the City Council chambers. The postponement was decided upon in order to permit the City Council to adjourn for the summer vacation. The boards of arbitration plan to hold daily sessions. The proceedings will be open to the public.

Couzens Claims Detroit Railway Operates at Lower Cost

Senator James Couzens, former Mayor of Detroit, has written a letter to the New York *Tribune* criticising some statements made in an article in that paper on the Detroit Municipal Railway. The article, which is one of several on this subject, challenged the statement that the lines had made $1,000,000 profit. Instead, it claimed there was a deficit, if all costs properly chargeable to operation had been included.

In his letter, which is in the issue of June 29, Mr. Couzens said that the test of efficiency of the operation of the lines is best based on a comparison between the Detroit lines and street railways in other cities. He compares the operating statistics for April, 1923, with March, 1923, and says that the results are that in every division of operating activity the Detroit Municipal System showed a lower cost than railways in other cities. On the subject of track paving the letter says that it is admitted that the car tracks and paving are not in good condition but "it is proved that they are in better condition than when owned and operated by the Detroit United Railway a little more than a year ago."

Mr. Couzens in his letter did not claim anything miraculous in railway operation but he did make the claim that the Detroit Municipal Railway operated at a lower cost than private companies do. In an editorial under date of June 29 the *Tribune* states that it was not trying to demonstrate that the Detroit Street Railways were better or worse run than other street railways. It merely undertook to investigate the claim of a $1,000,000 profit in Detroit in 1922-1923.

Brooklyn Wages Increased

A general wage advance for the employees of the Brooklyn City Railroad was recently announced by Clinton E. Morgan, vice-president and general manager. The increase, effective on Aug. 3, averages from 4 to 5 per cent, and affects about 2,500 motormen and conductors. Corresponding increases apply to the supervisory force, including inspectors, starters, and workers similarly employed.

Under the new schedule, Mr. Morgan explained, Brooklyn City employees, during the first year of their service, will receive 50 cents an hour, with gradual increases during the initial five-year period of employment as follows: Second year, 52 cents an hour; third year, 54 cents; fourth year, 57 cents; fifth year 62 cents.

The hourly wage under the existing arrangement is 45 cents for the first six months, 48 cents for the second six months, 50 cents for the second year, 52 cents for the third year, 55 cents for the fourth, and 60 cents for the fifth. All increases will take effect on the same date. A similar increase for employees of the Brooklyn-Manhattan Transit Corporation was announced on June 25.

Wages Increased. — Railway employees of the Dubuque Electric Company have been granted an increased wage scale. The new scale is arranged in three steps. First-year men are to receive 40 cents an hour, second-year men 44 cents an hour and men over two years in the employ of the company 49 cents. An additional 5 cents an hour will be paid men operating one-man safety cars. The old wage scale ranged from 35 cents to 45 cents and was divided into four steps. The scale proposed by the union provided for a maximum of 60 cents, or approximately an increase of 33⅓ per cent.

Third Arbiter Named.—A new wage agreement is being prepared for the Eastern Massachusetts Street Railway, Boston, Mass. The men and the company have agreed upon working conditions, to be embodied in the new schedule, but they could reach no understanding on wages, and decided to submit that question to arbitration. The union has selected James H. Vahey as its representative on the special board of arbitration, and the company will be represented by Fred A. Cummings, assistant to the chairman of the board of public trustees. The third member, who will be chairman, is Henry C. Attwill, chairman of the Massachusetts Department of Public Utilities.

Wages and Fares Increased.—A wage and fare increase, affecting the employees and patrons, of the Homestead & Mifflin Street Railway, Homestead, Pa., was recently announced by officials of the company. The wage advance, effective June 1, will bring the schedule up to 70 cents and hour. The men were receiving 60 cents. The increase in rates of fare, effective June 15, will mean a cash fare of 10 cents, instead of 8 cents as formerly charged. Tickets will be sold at the rate of fifteen for $1, instead of eighteen for $1. Officials of the company stated that the increase in the rates of fare was due to the result of an increase in wages and the cost of power and material.

Financial and Corporate

Montreal Tramways & Power Company Reports

A report of the Montreal Tramways & Power Company, Ltd., a holding company for Montreal Tramways, Canadian Light & Power and several other companies, covering the fiscal year ended Nov. 30, last, has been issued, the first of its kind made public.

Total assets are $28,799,071, representing various securities of subsidiary companies which also include a profit and loss balance of $1,774,071. The liabilities include issued capital stock of $17,578,330, and five-year 6½ per cent notes of $7,300,000. In addition there is a Montreal Public Service loan account of $2,592,500, accounts payable $1,276,199, and accrued interest $52,041.

The profit and loss account for the year shows that the income from securities owned was $672,514. Of that amount $526,529 was disbursed in interest and after a few smaller disbursements there was a credit balance of $98,274.

Sale of Oakland Properties Ordered

Judgment of foreclosure and decree of sale of the San Francisco-Oakland Terminal Railway and subsidiaries were signed on June 18 by Superior Judge James G. Quinn in Oakland. Commissioner of Sale J. B. Lanktree is directed to conduct a public sale of the properties not earlier than twenty days. Judgment given by the court amounts to $24,000,000. Mr. Lanktree has suggested July 17 as a tentative date for the sale.

Operative property of the company was valued at $19,000,000 by the Railroad Commission on Aug. 11, 1919, and the non-operative properties were valued at $6,327,680 in 1915 by the same commission.

Judge Quinn decreed that no bid less than $10,000,000 can be accepted.

Sale of the property to satisfy the bondholders was ordered by Judge Quinn after a hearing of the suit brought by the Mercantile and the Union Trust Companies, trustees.

New articles of incorporation recently filed by officials of the company provide for three companies, the Key System Transit Company with a capitalization of $17,500,000; East Oakland Railway, capital stock $250,000, and the Oakland & Hayward Railroad, capital stock $250,000.

The reorganized company will have a total capitalization outstanding in the hands of the public of $28,239,785, of which $2,500,000 will take the form of 6 per cent notes, $11,861,385 bonds and the balance common, preferred and prior preferred stocks. Previous capitalization of the entire system was $48,332,000, of which $20,157,000 is represented in bonds and notes.

Prices of Traction Bonds Carried to Low Level in Recent Liquidation

Traction bonds are on the bargain counter, says the *Wall Street Journal*. It ascribes this to the recent wave of liquidation, following failures of several brokers, which carried prices of many traction bonds down to low level of the year, and in some instances to record low prices. This weakness was due solely to market conditions, and not to any development in traction companies or their individual securities. The *Wall Street Journal* recognizes that the traction industry has shown marked improvement throughout the United States, and particularly in New York City, during the past year. It says that the financial structures of the companies as a whole, as well as earning power, are in better condition than any time since the war.

A compilation of traction bonds, listed on the New York Stock Exchange follows, showing high prices reached in 1917, high and low levels in 1922, and closing or last prices on June 20, 1923, with income return:

Interest on Hudson & Manhattan adjustment income 5 per cent bonds is payable if earned, and is cumulative. Interest is being paid regularly, and all accumulated interest has been paid. Interest on Third Avenue Railway adjustment income 5s, 1960, is payable if earned, and is cumulative. Payments are being made regularly, and in past year 1¾ per cent was paid on accumulated interest now totaling 20 per cent.

Doherty Interests Buy Toledo-Western Line at Foreclosure

The Toledo & Western Railroad property was sold on June 19 by special masters at Sylvania, Ohio, to Frank R. Coates, representing Henry L. Doherty & Company. The purchase price was $600,000. The sale is subject to confirmation by the Federal court at Toledo, and was made in satisfaction of a decree in foreclosure brought by holders of the first mortgage bonds.

The line extends from Toledo to Pioneer, Ohio, with a branch to Adrian, Mich. It has been in the hands of receivers nearly three years. The company does a large freight business in that territory and some passenger business, with only a beginning made in the business of distributing power along the line.

Attorney Morton Seeley, Toledo, counsel for Mr. Coates, made the successful bid in opposition to Marion M. Miller, president of the Home Savings Bank and chairman of the bondholders' protective committee.

The sale gives the property to the Doherty interests at about $8,000 a mile, clear of all encumbrances, except some car trust obligations and customers' deposits. There were two underlying mortgages—one of $1,250,000 on the Toledo & Western and one of $250,000 on the Toledo, Fayette & Western, which, together with matured coupons unpaid, amounted to $1,773,096 at the time that the decree of sale was issued.

There was also a second mortgage amounting to $500,000 held by the Doherty interests.

The reorganization of the company will enable it to finance itself and provide new capital for improvements and betterments.

Issue:	1917 High	1922 High	1922 Low	1923 June 21	Per Cent Yield
B'way and 7th Ave 5s, '43	100	78	50	62	9.19
Brooklyn City con 5s, '41	101⅛	91	75	84½	6.44
Brooklyn Union El 5s, '50	101½	90½	75	80½	6.57
Chicago Rwy 1st 5s, '27	97⅛	85	67	79½	11.59
Conn Ry & Lt 4½s, '51	101⅛	82½	75	84	5.65
Detroit United 4½s, '32	86½	86½	63½	84	6.92
Ft. Smith Lt & Pr 5s, '36	84	..	..	70½	8.91
Hudson & Man ref 5s, '57	69½	88½	75	80½	6.44
adj income 5s, '57*	25½	67½	47½	55½	9.01
Interborough R T 5s, '66	73½	78½	54	63	8.06
10-year 6s, '32	..	83½	72½	61	13.40
convertible 7s, '32	..	98⅛	93½	88	8.99
Kings Co. Elev 4s, '49	86½	81	64	70	6.39
Manhattan Rwy 4s, '90	94	72½	57½	59	6.86
second 4s, 2013	60	63½	48⅛	55⅞	7.02
Manila Electric 7s, '42	..	..	..	97½	7.25
Manila El Ry & L 5s, '53	85	84	64½	82½	6.30
Market Street Ry 5s, '24	81½	92½	81	92½	13.00
5-year notes 6s, '24	..	97	90½	97	9.21
Milwaukee E R & L 5s, '26	103½	99	91⅛	98	5.73
ref & ext 4½s, '31	93	90	79½	89½	6.19
general A 5s, '51	91½	..	..	91⅛	5.62
Milwaukee E R & L 1st B 5s, '61	..	..	..	84⅛	6.00
Montreal Tramway 5s, '41	97½	92½	83	88⅛	6.03
Nassau Electric 4s, '51	74½	65	27	59½	7.45
N. Y. & N. Jersey 5s, '32	100⅛	97½	92	96⅞	5.45
N. Y. State Ry 4½s, '62	87½	73	61½	62½	7.42
1st cons 6½s, '62	..	..	..	94⅛	6.91
Northern Ohio T & L 6s, '47	..	97½	92	92¹	6.61
Portland Rwy ref 5s, '30	88½	91½	81	86⅛	7.50
Portland Ry Lt & P 5s, '42	78½	90	78½	82¹	6.63
refunding B 6s, '47	..	..	..	94½	6.46
refunding 7½s, '46	..	108½	102	105	7.06
Rapid Transit Sec 6s, '68	..	..	..	70½	8.62
Public Service of N. J 5s, '59	..	90½	73	83½	6.15
St. Paul cable 5s, '37	102½	..	..	92	5.84
Third Avenue ref 4s, '60	80⅞	69⅞	56¼	54½	7.83
adj income 5s, '60*	73½	68⅛	44½	49½	10.10
Third Avenue Ry 5s, '37	108	98½	88	92	5.84
Toledo Tr L & P 6s, '25	..	100	98⅛	98⅛	6.75
Union Elevated 5s, '45	84	..	..	70	7.90
United Rwy Invest 5s, '26	70	91	75	92	8.05
United Rys St. L 4s, '34	61½	69½	51½	62	9.69
Virginia R & P ref 5s, '34	93½	88½	72	84	7.12

* Direct return.

More than $200,000,000 Valuation

Present Seven-Cent Rate in Philadelphia with Four Tickets for a Quarter Declared Neither Unreasonable Nor Preferential by Pennsylvania Commission in Rate Case Dating Back to 1920

THE Public Service Commission of Pennsylvania has sustained the right of the Philadelphia Rapid Transit Company to the present rates of fare charged. The decision of the commission was rendered late on June 21. It means that the company will continue to charge a 7-cent cash fare and to sell four tickets for 25 cents. On the question of value the commission has ruled that the holdings of the company are in excess of $200,000,000. The contention of the company on that matter was for an allowance originally of $290,729,742 and of $316,423,557 as of May 1, 1923, while the city held out for a value for rate-making purposes of $189,265,781.

After discussing the details of the case the commission reached the following conclusion:

1. We do not find it necessary in this proceeding to arrive at a final determination of the present fair value of the property of the company. However, our consideration of the items of evidence before us, including the questions of depreciation and going concern value and of matters in dispute between the company and the city, leads us to the conclusion that under established legal principles the present fair value of the company's property is substantially upward of $200,000,000.

2. With regard to operating expenses, we are not disposed to interfere with the budget submitted by the company as long as the company continues its present policy of improved service and a high standard of maintenance.

3. In this connection we are of opinion that the company has established its rights to share in additional profits resulting from approved economies and efficiencies in its operation.

4. Looking to the future, we feel the present fares and the revenues and credit which they produce should make possible further and continued improvement and expansion of transportation service and facilities in Philadelphia to meet the growing needs of the city.

5. An assumed rate base as low as $200,000,000, with 7 per cent as the fair rate of return, results in the amount of $14,000,000 available as the fair return. This, plus the allowed operating expenses, as appears in respondent's budget of $30,868,000 and taxes of $2,818,000, gives an allowable annual gross revenue requirement of $47,686,000. The operating revenue for the year 1922 being in actuality $42,530,000, and the unimpeached estimate of operating revenue for the year 1923 being but $44,736,000.

The respondent's rates of fare as contained in its Tariff No. 81, now in effect and originally established under order of Oct. 18, 1920, are neither unjust nor unreasonable nor under the evidence are they unduly discriminatory or unjustly preferential.

The right of the company to continue to collect the fares thus established and in effect is confirmed and the complaint dismissed.

The commission says in effect that it would in any event allow a 7 per cent return as a minimum on the present fair value of the property and that were a definite valuation found necessary the fact that a 7 per cent return would produce a surplus after providing for a liberal operating budget is the best proof not only of the revenue-producing effect of the economies and efficiencies introduced by the company but also of the fact that the company is securing its fair share of these. In other words, as the commission sees it, the company is entitled to share in the results of the economies and efficiencies which it has brought about.

The proceeding had its inception on June 1, 1920, when the company filed a tariff which would effect an increase in gross revenues by the abolition of the free transfers and of certain exchange tickets then in use. The city protested and asked for a valuation of the property in connection with the determination of the general question.

This tariff was subsequently withdrawn. On Oct. 4, 1920, a petition was filed for a new tariff, but this the commission refused. In this proceeding the commission found that the proposed rates would be unreasonable and unjustly discriminatory, but as it appeared the company needed a greater revenue, the commission by an order entered Oct. 18, 1920, directed the company to file a tariff providing for a 7-cent cash fare, with four tickets for 25 cents, the transfer and exchange privileges to remain as theretofore. Throughout these various steps dealing with the rates of fare the commission reserved the matter of determining the value of the company's property and the order last referred to was an interim order pending such valuation and in terms effective for six months from Nov. 1 of that year. As the valuation had not been concluded at the expiration of the interim period, the company then filed a tariff continuing the rates originally prescribed by the commission and those rates are the ones now in effect.

VOLUMINOUS RECORD MADE

The record in the case comprised more than 6,000 pages of testimony and more than 2,100 pages of exhibits. It also contained detailed studies directed to the question of the reasonableness of the rates, based on comparisons, with charges for like service in similar cities and with the decreased purchasing power of the dollar.

The commission in its decision pointed out that respondent at the argument raised for the first time the point that there had been no complaint filed against the present tariff, and that, therefore, technically, the burden of proof rested upon the complainant city in the proceedings. It was the view of the commission, in the light of all the testimony presented, that this question was largely academic. The commission said that a full and comprehensive investigation has been made, and evidence presented on the part of the complainant and respondent, with a view of determining what are the just and reasonable rates which the company may charge and the allowable gross revenue which the company may receive. So full and complete was the testimony presented that the commission expressed the opinion that the case ought not turn on any narrow construction with respect to technical rules where there has been a full disclosure of all relevent facts necessary to reach a conclusion on the merits.

As noted in the ELECTRIC RAILWAY JOURNAL for May 19, page 863, arguments in the case were concluded on May 15. Early in the present month both sides presented briefs. In this controversial matter neither side was very sparing of the other in attempting to drive home its arguments, but all this is largely a matter of history now. In short, in its brief the company renewed its claim for a valuation of $316,423,557 on the price trended to May 1, 1923, and asked the commission carefully to consider the evidence in the case, "which tends strongly to show that a return of 7 per cent is within the realm of confiscation and that at least 8 per cent is necessary to achieve the protection the company requires."

The brief of the city pointed out that there necessarily were many differences in judgment between the company's experts and its experts, but it asked that certain paragraphs of the company's brief, considered by it not to be in good taste among opposing counsel be suppressed. This document alone was one of sixty-nine printed pages. In it specific reference was made to the operating contract of 1907, between the city and the company. Counsel for the city said that this contract fixes the rate of fare at the then prevailing rate and stipulates that it shall continue unchanged without the city's consent during the life of the contract, which expires in 1957. It was not suggested by the city that the commission in ordinary cases is without power to alter rate provisions of contracts between utilities and their patrons, but the city did call the attention of the commission "special circumstances which take this contract beyond the power of the commission to alter the rate of fare provisions in it."

Mayor Moore was one of the members of the party on the Leviathan when the decision was announced, but immediately upon his return he stated that the city would appeal the decision. The idea that has been conveyed is that if the contract of 1907 is to be modified, it should not be done without the consent of the city.

$73,114 Profit for Detroit Lines in May

Ross Schram, assistant general manager of the Detroit Department of Street Railways, reports that the earnings of the department for May showed gross revenue from transportation of $1,762,166, a daily average of $377 above that received for April. Operating expenses were $1,352,337, with profit at $73,114.

Line Purchased.—The West Chester, Kennett & Wilmington Electric Railway, Kennett Square, Pa., was purchased by a committee of bondholders at the sale held on June 1 at the office of the trustee, the Integrity Trust Company, Fourth and Green Streets, Philadelphia.

City Wants $27,474,767 Cut from St. Louis Valuation

A complaint that the Missouri Public Service Commission valuation of $52,838,110 for the United Railways, St. Louis, is excessive, unlawful, unjust and unreasonable to the extent of at least $27,474,767 is made by the city of St. Louis in an application for a rehearing filed with the commission this week. The railway will ask for a rehearing on the ground that the sum set is too low.

The items attacked by the city and the reasons are as follows:

Construction Overhead Costs.—No deduction for depreciation of this item was made, and it hence is at least $2,179,585 too high. The item itself should be cut $5,252,013.

Depreciation of Physical Property.—The deduction for this item was at least $6,039,815 too low.

Pricing of Physical Inventory.—The commission made a grossly excessive allowance for increase of prices to reflect present value, and this item should be reduced $8,753,355.

Going Concern Value.—The commission allowed $2,500,000. The city asserts no allowance should have been made.

Promoting, Financing and Consolidation.—The entire allowance of $2,700,000 should be deducted.

Working Capital.—This item should be reduced $49,999.

The company's appeal probably will be filed soon. In the meantime reorganization plans are held up.

As to the 7-cent fare charged in St. Louis by the United Railways under the commission's order, the city's motion reads as follows:

The fares prescribed by the commission, by its supplemental order, made and entered in the above entitled proceedings on April 2, 1920, and thereafter from time to time extended as the maximum fares to be charged by the receiver for the United Railways in the city of St. Louis, to wit, 7 cents for adult passengers and 3 cents for half fare passengers, are excessive, unjust and unreasonable, yielding, as they do, an amount available for return on capital after paying thereout the operating expenses, including taxes and $1,500,000 per year, for depreciation, which is equal to a return of more than 13 per cent upon the true fair present value of said property, and the said order of the commission, made and entered in the above entitled proceedings, on June 4, 1923, is erroneous and the commission erred therein in its finding and conclusion that no reduction of said fares will be justified until operating conditions shall have been improved either from increased revenues or decreased operating expenses.

Said order is erroneous and the commission erred therein in its finding and conclusion that no reduction in the fares charged by the receiver for the United Railways in St. Louis will be justified until operating conditions shall have been improved by either increased revenues or decreased operating expenses; the said finding being based upon the erroneous valuation of the property of the said company aforesaid, and upon the erroneous assumption that the gross income of $3,425,155, being the amount available for return on capital after paying out of revenues the operating expenses, including taxes and $1,500,000 a year for depreciation is equivalent to a return of more than 13 per cent upon the true fair present value of said property, which return is excessive, unjust, unreasonable and unlawful.

Seattle Mayor Opposes Boston Negotiations

Immediate negotiations between the city of Seattle and the trustee for the holders of the Municipal Street Railway purchase bonds of $15,000,000 has thus far been blocked by Mayor E. J. Brown, who states that he is "unalterably opposed to any trips to Boston," where the trustee states the conference must be held between the bondholders and representatives of the city. The City Council announces that it will adopt an ordinance immediately which will instruct the Mayor, Corporation Counsel, president of the City Council and chairman of the finance committee to go to Boston to negotiate an extension of the street railway bonds, and the proposition will then be up to the Mayor.

The ordinance contains no thirty-day alternative clause so if the Mayor vetoes the ordinance, the proposal will be abandoned, and it will then be up to Mayor Brown to make a better proposal. The Council states that it has no intention of over-riding the Mayor; it merely believes the Boston trip would be the best plan, and is putting it up to the Mayor.

According to an opinion by Corporation Counsel T. J. L. Kennedy, extension of time on the remaining purchase bonds of the municipal railway, if agreed to by the city and the bondholders, would amount to a ratification of the purchase contract and would prevent the city from rescinding the contract by future litigation on the ground of fraud and deceit. Such an agreement might not prevent the city from bringing suit for damages, he said.

The present plan is to ask an extension that would permit the city to pay $250,000 on the principal every six months, or more if the money were on hand. The utilities committee has found that under the present conditions the street railway will be on a warrant basis until September, 1924, and the largest total of outstanding warrants will be $592,057 on July 25, when supplies, salaries and appropriation for principal and interest must be met.

London's Municipal Trams Report Surplus.—The London City Council reports for the year a surplus of £230,000 from the municipal tramways operations.

Auction Sales in New York.—At the public auction rooms in New York on June 27 there was offered $2,000 of the Cleveland, Elyria & Western Railroad extended 7 per cent bonds, due 1923, 60 per cent.

Will Not Oppose Track Abandonment.—The Twin State Gas & Electric Company, Brattleboro, Vt., now intends to abandon its tracks by Sept. 1. West Brattleboro residents, who obtained a stay of the proposal, are said to have decided to withdraw their opposition to the substitution of buses for the railway.

Net Income Increased. — For the eleven months period ending May 31, 1923, the Brooklyn City Railroad realized a passenger revenue of $10,702,607 against $10,406,126 for the similar period ending May 31, 1922. After considering income deductions the net corporate income for the period of this year was $2,011,550. This compares with $1,566,169 for the eleven months ending May 31, 1922.

First Run Over Section of Old Shore Line.—A trial run was made a few days ago over the revamped section of the old Shore Line Electric Railway from New Haven to Trap Rock, Conn. A. William Sperry, New Haven, who has undertaken to reclaim the road, was aboard the first car. Among others who witnessed the test were representatives of the bankers interested in financing the new company which will operate the line.

To Be Sold at Auction.—The Concord, Maynard & Hudson Street Railway, Maynard, Mass., was to be sold at public auction on June 29. Operation was suspended in March of this year when a bus service was organized to supplant the railway. The property went into the hands of a receiver in March, 1922, and operation was ordered discontinued by the court because it could not be made to pay. The discontinuance of this line has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Quarterly Dividend Reduced.—The directors of the United Electric Railways, Providence, R. I., have reduced the quarterly dividend from 1½ per cent to 1 per cent, payable on July 2, to holders of record on June 20. Because of the unusually heavy operating expenses in the first quarter of the current year, and the inability of the company to start, as soon as was expected, many increases in operating efficiency which had been planned when the fares were reduced to 5 cents, the directors found it necessary to take this action.

Stabilizing Fund Reduced in Toledo.—The fare stabilizing fund of the Community Traction Company, Toledo, was reduced by $17,906 following May operations, which brought into effect the increase in wages for trainmen and shopmen and was followed by a slump in riding. It is expected the operations for the next few months will show deficits even though two months ago the peak was reached in surplus earnings. Bus feeder operations are more satisfactory with the Oak Street line earning 78.86 per cent of operating expenses. The Erie Street line, however, is only bringing in 20.98 per cent of the cost of rendering the service.

Gold Bonds Offered. — Bonbright & Company and W. C. Langley & Company are offering $2,500,000 of first and refunding mortgage gold bonds of the Carolina Power & Light Company, known as 6 per cent series of 1953. The bonds are dated June 1, 1923, and are due June 1, 1953. The bonds are offered at 97½ and accrued interest to yield more than 6.15 per cent. The proceeds from the sale of these bonds will be used to pay, in part, for the acquisition of a new power station which will have an initial installation of 15,000-kw. and for other corporate purposes. The Carolina Power & Light Company operates the entire electric power and light, street railway and gas service in Raleigh, the gas service in Durham, the electric power and light service in Goldsboro, Henderson, Oxford, Sanford, Dunn and Jonesboro, and supplies electric power to sixteen other communities in North Carolina.

Traffic and Transportation

Saginaw Approves a Fifteen-Year Car-Bus Franchise

After a suspension of street car service since Aug. 10, 1921, Saginaw is again to swing into line with other cities of the country having approved a fifteen-year street car-bus franchise at a special election held on June 25. The vote was 9,112 to 3,061, which is 1,808 more than the required 60 per cent for approval. The franchise provides for a 10-cent cash fare with four tickets for 25 cents.

More votes were cast than at any special election in the history of Saginaw and the franchise received a 60 per cent approval in twenty-five of the twenty-seven voting precincts and in the two it received a majority vote.

The franchise approved is a modification of two grants that were submitted on Nov. 7 and again on April 2, both of which lacked only a few votes of the required 60 per cent. With the new city administration taking office on April 9, steps were immediately taken to eliminate from the other contracts features that the present Council members believed were the cause of the failures of the franchises, and as soon as the finished document was approved by the bond owners' protective committee of the bankrupt Saginaw-Bay City Railway Company, the Council submitted the measure.

While there was some work done in behalf of the measure the election was exceedingly quiet. A few days before the election the Mayor and three of the four councilmen issued a public appeal to the electors to support the measure. One councilman asked that it be defeated.

Probably four to five months will be required before the system becomes operative. Motor buses must be purchased, the rolling stock renewed, painted, etc., tracks repaired, special crossings that were removed by steam railroad companies will have to be replaced and much new track laid. All told, at least $400,000 will be required to rehabilitate the property.

The company when organized will be operated independent of any other local utility and at least six of the nine members of board of directors must be citizens of Saginaw.

Token Fare Now 8½ Cents in Seattle

Increase in the fare on the Seattle Municipal Railway went into effect on June 16, without a hitch. Special messengers of the railway were stationed at all transfer and junction points, and several automobiles were pressed into service in an effort to keep conductors supplied with the new 8½-cent tokens. The fare is now 10 cents cash, or three tokens for 25 cents. The increase was made after an experiment with the 5-cent cash fare which lasted three and one-half months. New fares provide transfer privileges to all car and bus lines in the city, as well as the privately owned Seattle & Rainier Valley lines. An increase in revenues of $5,000 a day is expected under the new fare.

Advertising Value of the 5-Cent Fare Capitalized

The cars now being built for the San Francisco Municipal Railway have the words "Fare 5 Cents" neatly painted on the sides near the entrance at either end. The letters are gold leaf, 2 in. and 4 in. high, so the words can be easily read from the sidewalk. Being near the entrance they suggest to the passenger the idea of having the fare ready and to the visitor they advertise the low fare which the city's residents enjoy on the municipal railway.

Payment of Taxes Deferred to Prevent Fare Increase in Cincinnati

An ordinance to defer consideration of the franchise tax of the Cincinnati Traction Company until January, 1924, as a factor in fare rate making was passed by the City Council, by a vote of twenty-seven to three, two members being absent. Passage of the measure prevents an increase in fares.

When Councilman-at-Large W. E. Hess, a member of the street railway committee, protested that the ordinance had not been before that committee, Councilman Charles O. Rose insisted that the rule of reference be lived up to, whereupon Floor Leader C. E. Martin withdrew his motion for suspension and the ordinance took the regular course.

The ordinance, however, was not passed until Councilman Edwin E. Kellogg again had advanced arguments against the measure that he had made on former occasions when similar action was taken by the Council to prevent an increase in fares.

Councilman Martin in answering the argument of Councilman Kellogg said the tax could be paid only if "earned" and it could be earned only out of the car riders. He said if the ordinance was not passed fares would automatically advance one-half a cent. The ordinance must be accepted by the traction company before it is in effect. It is understood the fare will remain at the present rate.

Under the terms of the service-at-cost franchise the tax of $350,000 annually is not due until it is earned. The ordinance defers payment of the tax for another six months.

Authorizes Six-Cent Fare Continuation in Dallas

The 6-cent fare charged by the Dallas Railway was extended for eighteen months from June 27 on condition that the railway spend $705,915 in extensions, rebuilding and repairs and in the purchase of thirty additional cars during the eighteen months. The company is given ten days to signify its acceptance or rejection and the 6-cent fare is extended for ten days.

The program of improvements demanded by the city includes the extension of the Junius Heights line into Lakewood Heights, a distance of about 1 mile; extension of State Street line for ten or twelve blocks and local car service over the new Denton Interurban. In addition to these extensions the railway must take over the Trinity Heights line and establish the 6-cent fare some time during the eighteen months. The company, however, is left to work out the details of taking over this line, which is now operated by the Texas Electric Railway.

It was at first proposed by the city officials to demand improvements costing only $500,000 during the year in return for the fare extension, but Mayor Louis Blaylock said that a close examination of the earnings of the Dallas Railway showed that the company could well expend a larger sum and still show a fair return on its investment. The extensions and other improvements demanded are such that they increase the earnings of the traction company, Mayor Blaylock said.

John W. Everman, supervisor of public utilities, has made a close study of the traction company earnings, needs of traffic, etc., and the program of improvements demanded by the city is in line with his recommendations.

Formal application for extension of the 6-cent fare was made to the City Commission by Judge Holland, president of the Dallas Railway Company, but in this formal application the traction company did not suggest any extensions or improvements to be made in return for the fare extension, and this fact caused some surprise among members of the City Commission.

In his application for a continuation of the 6-cent fare Judge Holland said that the earnings from a lesser rate of fare would be wholly inadequate to enable it to provide the character of service required by the people of Dallas to make the remaining improvements designated in the Everman plan.

Court Decides Bus Competition Will Not Be Tolerated

The Supreme Court of Illinois on June 24 affirmed a judgment recently handed down by the Superior Court of Cook County wherein it reversed the order and decision of the Commerce Commission relative to the operation of a bus line in competition with an electric railway.

The opinion of the court was delivered by Chief Justice Farmer. It is regarded

as bringing to light phases of public utility operation and ownership relative to service and rates of fare which may serve as a precedent in future controversies of the kind.

The bus company had secured a certificate of necessity and convenience from the Illinois Commerce Commission, and after complying with the rules and regulations of the commission it started to operate buses along a route which in many places parallels the existing railway.

Notwithstanding the opposition of the railway when the bus line first sought an operating permit, the Illinois Commerce Commission decided to issue a certificate of necessity and convenience to the bus company, but this order was reversed by the Superior Court of Cook County. The bus company then appealed the decision to the Supreme Court of Illinois.

In a few words, the ruling of the high court of the state is interpreted to mean that a bus company will not be granted the right to operate through a territory served by an electric railway unless the public as a whole as distinguished from any number of individuals is convenienced by such an operation.

The bus company has petitioned the Supreme Court of Illinois for a rehearing. If this is not allowed it is expected the case will be carried to the Supreme Court of the United States on the ground of confiscation of property.

Louisville Railway Subsidiary Starts Bus Operation

The Kentucky Carriers, Inc., the $200,000 subsidiary of the Louisville Railway, started service on Third Avenue on June 24, using four buses, each seating twenty-six people, and being of the single-deck type. These four cars maintained a ten-minute schedule under a 10-cent fare, on a route from Main Street to the Confederate monument, a distance of twenty blocks.

The first installment of cars consists of six, with six more to arrive about July 1. They come from Cleveland and represent Bender bus bodies on White bus chassis, equipped with double pneumatic tires in back and single pneumatics in front.

A total of twelve double-deck buses will be placed in service in September or October, these also to be built on the White bus chassis, using bodies of the Yellow Coach Company, Chicago, and to seat sixty-eight persons.

One operator is employed on the single deckers and two will be employed on the double deckers. Drivers are being picked from the company's own organization, a call having been issued for men who have had experience in driving White or similar trucks.

The trucks are finished outside in royal blue and on the inside are upholstered in leather and finished in mahogany.

The plan of the company to use buses was reviewed in the ELECTRIC RAILWAY JOURNAL for June 2, page 944.

City Will Fight Houston Fare Rise

The city of Houston will fight to the last ditch the suit filed by the Houston Electric Company in the United States Court for the Southern District of Texas, seeking a higher fare for the company in Houston. The company in its petition for a bill in equity set forth that the present fare of 7 cents with four tokens for 25 cents is inadequate and amounts to a confiscation of its property, and in support of this allegation the company sets forth a long statement of its earnings and operating expenses. The figures given in this statement are the same as those filed with the City Council some weeks ago in its petition for an increased fare, which the city declined to grant, but in return agreed to cut the number of jitneys operating in Houston to 150.

Judge J. C. Hutcheson, before whom the petition was filed, has set the matter for hearing on July 5. The hearing will be upon the question of an injunction to restrain the city from prohibiting the company in its efforts to charge and collect a higher fare than that fixed by the city. It is regarded as probable that Judge Hutcheson will appoint a special master in chancery to hear evidence as to the valuation, earnings, operating costs and other factors entering into rate-making questions. The special master will make a report of his findings to Judge Hutcheson, who will then render final judgment.

Mayor B. F. Holcombe says the city will fight to the end any effort of the traction company to secure a fare increase through the courts. The city will employ traction experts to make surveys of the company's property and fix valuations thereon and to examine the company's books and make report of earnings and operating costs. Among the things to be attacked by the city will be the traction company's valuation figures, it being contended by the city that the valuation is fixed too high, and that a fair return would be showed under the present fare, if the property valuation figures were placed at the proper level.

Buses Now Operating in Grand Rapids

Six Fifth Avenue Coach Company passenger buses, type J, of the single-deck variety, have been purchased by the Grand Rapids Railway to augment the service being rendered under the new franchise granted the company about a year ago.

Four of the buses now are in daily use on the Alpine-Avenue line, running to the corner of Richmond and Tamarack in the outskirts of the city. The downtown terminal of this auxiliary line is opposite the new Rowe Hotel, situated at one of the most prominent street crossings in the business district.

In traversing the route from the Rowe to the city limits terminal, the buses penetrate an industrial section hitherto without any transportation service. Nearing the outskirts, the buses pass through a residential district. Opposite the city limits terminal is situated the new Richmond municipal playground, which the city plans to make one of its chief amusement and recreation centers.

Fares are the same as on the railway lines and transfers are issued exactly as on city street cars. The rate is 10 cents a single ride with seven tickets sold for 50 cents.

Five-Cent Fares to Continue.—Five-cent car fares for passengers having identification cards and 10-cent fares for those who do not obtain cards, will be in effect for another year in Muscatine. A contract to this effect between the city of Muscatine and the Clinton, Davenport & Muscatine Railway, was renewed by the City Council for another twelve months.

Agree on Rate.—Discontinuance of further proceedings against the Fonda, Johnstown & Gloversville Railroad to bring the rate in West Main Street in Amsterdam to 5 cents in place of the present 8 cents was consented to by Corporation Counsel Fitzjames at a hearing before the Public Service Commission on June 20. The city also consented to the continuance of the present 8-cent fare. No further hearings will be held by the commission.

Two-Cent Rate Continued on Interurban.—A report from Lansing, Mich., says the Public Utilities Commission has directed continuation of the 2-cent-a-mile fare on the Detroit United Railway. The order is said to be based on tentative appraisals and valuation fixed by the commission. The total, including Detroit city and interurban property, was placed at $33,975,613. The commission fixed the value of interurban lines and the value of the use of city lines for interurban purposes at $26,691,320. It is the opinion of the commission the 2-cent fare will return the company 7 per cent of this valuation.

Wants Six-Cent Rate.—The Fairburn & Atlanta Railway & Electric Company, Atlanta, Ga., has applied to the Public Utilities Commission for permission to increase its passenger rate between Fairburn and Atlanta from 5 cents per zone to 6 cents. The company operates passenger-carrying gas cars between Atlanta and Fairburn. The company was formerly granted permission by the commission to increase its zone charge to 7 cents, but in order to meet the jitney competition voluntarily reduced its rate to 5 cents. Later the company itself operated a number of buses in competition with the independent jitneys, and the result of the rivalry has been that both sides have lost money. It is now claimed that the rival jitneys have been forced out of the business by reason of their losses. The company now proposes to discontinue its own motor buses and revert to the old method of handling all the traffic on its gas cars. It claims that it is necessary to charge the 6-cent rate in order to operate at a profit.

Personal Items

H. S. Clark Promoted by Westinghouse Brake Company

Horace S. Clark has been appointed Pacific district manager of the Westinghouse Traction Brake Company, to succeed C. P. Cass, who has resigned to devote more time to the Westinghouse Pacific Coast Brake Company, of which he is president. Mr. Clark, who was assistant manager of the Pacific district, will continue to maintain headquarters in San Francisco. Before going to the Pacific district, Mr. Cass had been located in St. Louis as Southwestern district manager and president of the Safety Car Devices Company. Both Mr. Clark and Mr. Cass have a wide acquaintance among railway men throughout the country. The Westinghouse Traction Brake Company has also announced the appointment of E. R. Fitch as Southwestern district engineer, with headquarters in St. Louis. Lawrence Wilcox, mechanical expert at Chicago, has been promoted to representative and transferred to the office at Columbus, Ohio. S. T. Reid succeeds Mr. Wilcox in Chicago.

H. S. Clark

Changes Made in East Penn Electric Company

Samuel H. Sarena, the new superintendent of the railway department of the East Penn Electric Company, first became identified with the electric railway business in May, 1899, when he entered the employ of the New York & Queens County Railway, later becoming superintendent of this property. This system was one of the large ones in Greater New York and, previous to the Interborough Rapid Transit Company's operating its trains in Queens, served most of the Borough of Queens, operating 300 cars daily. In December, 1907, Mr. Sarena entered the employ of the Public Service Commission of New York State in the transit bureau. He remained there until Aug. 1, 1909, when he was reappointed superintendent of transportation of the New York & Queens County Railway. He remained in this capacity until Feb. 1, 1923, when he became superintendent of railways of the East Penn Electric Company, with headquarters at Pottsville. This company is controlled by the J. G. White Management Corporation of New York.

Along with the announcement of Mr. Sarena's acceptance of the abovementioned post came the news that Samuel Cochrane of the East Penn Electric Company had been promoted to the position of superintendent of maintenance of the railway department.

L. C. Bewsey Leaves Michigan United

L. C. Bewsey, superintendent of the Michigan United Railways at Kalamazoo since July, 1921, severed his connections with that company and on June 16 became general manager for the holdings in Cuba of the Electric Bond & Share Company of New York. His headquarters are in Santa Clara. Mr. Bewsey has been associated with electric railways since 1899, when he became identified with the Lafayette Street Railway. He remained with this company until 1904, when he was made superintendent of the Union Traction Company of Indiana at Indianapolis. Ten years later he took on the work of general superintendent of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y. From 1917 to 1921 Mr. Bewsey was engaged in the Philippine Islands in the capacity of superintendent of transport and motive powers for the Manila Electric Company and for one year as electrical engineer in charge of estimates, designs and construction for the engineering department of the Pacific Commercial Company. He left the last mentioned position to become superintendent of the Michigan United Railways, which he held up to June 15 of this year.

James Dalrymple, general manager of the Glasgow Corporation Tramways, expects to visit the United States in September and to prolong his stay so as to permit him to attend the convention of the American Electric Railway Association in Atlantic City in October. Mr. Dalrymple will be accompanied by Mrs. Dalrymple. In a combined business and pleasure trip they expect to travel across the country as far as Vancouver.

James H. Mulligan, car inspector of the United Traction Company, Albany, has resigned to join his son in business. Mr. Mulligan has been in the service of the company for thirty-three years, during which time he worked under six general managers. His first job was changing horses on the cars. In 1890 he was appointed conductor and in 1892 was promoted to inspector. He held this position until Aug. 14, 1897, at which time he was promoted to chief inspector. Later, when J. F. Hamilton was made general manager of the company, the position of chief inspector was abolished and Mr. Mulligan went back to the old position of plain inspector.

E. E. Carpenter Appointed Chief Engineer in Vancouver

E. E. Carpenter has been appointed chief engineer of the British Columbia Electric Railway, Vancouver, B. C., and has already assumed his new duties. Following his graduation from Stanford University in 1898 with the degree of B. S. in civil engineering, he filled successfully various railway engineering positions for some seven years. He served at one time as chief engineer for Sanderson & Porter, in charge of the design and construction of the power development installation — 5,000 hp., initial—for the British Columbia Electric Railway at Jordan River, Vancouver Island, Canada. As a member of the firm of Baker & Carpenter, engineers, San Francisco, he engaged in general consulting and executive engineering practice. Among the major projects undertaken by that firm and with which Mr. Carpenter was connected was the shipbuilding plant at Raymond, Wash., for Sanderson & Porter. Mr. Carpenter is a member of the American Society of Civil Engineers, the American Association of Engineers as well as a member of the firm of Baker & Carpenter.

E. E. Carpenter

C. Melvin Sharpe has been made executive assistant to President William F. Ham to assist particularly in the direction of the activities of the Washington Railway & Electric Company. Mr. Sharpe formerly was associated with the Chamber of Commerce of the United States, but comes to his new position from the La Salle Extension University of Chicago.

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

Record Production of Hard Coal

The revised estimate of the Department of the Interior for anthracite production in May, based on final data on shipments, places the total at 8,573,000 net tons, including mine fuel, local sales and the product of washeries and dredges. Output during May has only twice, in 1917 and in 1918, exceeded this figure, which is 6 per cent above the average for the eight years 1914 to 1921. The total production of anthracite in the first five months of the present calendar year was 42,504,000 net tons, which is the maximum production recorded for a like period, and is 15 per cent more than the average for eight years preceding 1922.

Properties of a Good Wood Preservative

To protect wood from decay a preservative must first of all be poisonous to wood-destroying fungi. Decay in wood, according to the American Wood Preservers' Association, is not due to direct chemical action, or action of the elements, but is always the result of the activity of low forms of plant life which feed on the wood and thus destroy it.

The preservative must also be able to penetrate the wood sufficiently to form a continuous exterior treated shell deeper than any surface checks which are likely to develop, and to retain its toxicity, or poisoning power, under service conditions.

Electric Steel Founders Standardize Practices

At a recent meeting in Pittsburgh of the several companies which constitute the Electric Steel Founders' Research Group a standard set of trade practice rules was adopted. Suitable pattern equipment for economical molding shall be furnished by the customer. The foundry will not be responsible for correctness of pattern equipment, except when such equipment is made for the customer under the supervision of the foundry. Repairs on pattern equipment shall be paid for by the customer except when caused by carelessness of the foundry. Patterns must have distinctive colors to identify separately the core prints, machined surfaces and rough casting. All patterns, core boxes and loose pieces thereof must be properly numbered for identification. All transportation charges on pattern equipment to and from the foundry shall be paid by the customers. The foundry will not carry insurance on the customer's pattern equipment. Free replacement will be made of defective castings if reported and returned to the foundry within a reasonable time. The foundry will not be responsible for any expense on defective castings incurred by the customer. The customer will be charged with the cost of mold and cores discarded by the foundry due to change in patterns or core boxes.

Progress Is Slow in Lamp Standardization

In spite of the clearly defined tendency toward standardization of commercial products during recent years, little progress in this direction has been made so far as the manufacture of electric lamps is concerned. Commercial installation of incandescent electric lamps began in 1880. A few years later, after the first central station generating and selling current had been built in New York City, there were only two standard lamps, of 8 cp. and of 16 cp. Twenty years ago about a dozen types were being made. Today there are more than 200 standard types of lamps, exclusive of the miniature sizes. Although it might appear from this that no progress whatsoever is being made in the direction of lamp standardization, nevertheless the situation is not really so bad as that, and manufacturers say that it may reasonably be hoped that in the not distant future steps will be taken materially to reduce the number of standard types.

There are today several thousand different types of lamps that are occasionally manufactured. In spite of this situation, and the existence of 200 standard types already mentioned, nevertheless the fact remains that about 90 per cent of the total demand is now covered by twenty lamp types. This factor has aided materially in reducing the cost of lamp manufacture.

A further reduction in the number of types of electric lamps in common use may be expected, manufacturers say. It has been proposed that the more important lamps, which are sometimes called the "bread and butter" types, now made in 10, 15, 25, 40, 50 and 60-watt sizes, be standardized to three sizes each for the Mazda B and for the Mazda C. The scheme is that in the future Mazda B lamps shall be manufactured in sizes 15, 25 and 50 watts only. Mazda C lamps are to be manufactured in sizes of 50, 75 and 100 watts.

Because of this economic advantage such standardization of commercial lamp sizes should have a definite appeal to the general public. Centralization of production, which has resulted in material saving in the cost of manufacture, is impractical in the lamp business. In order that shipment of these fragile articles shall be reduced to a minimum distance it is necessary that each factory manufacture all the different types of lamp.

Price of Food Has Doubled in Past Decade

As compared with the average cost in the year 1913 the cost of food in May, 1923, was 53 per cent higher in Richmond, 51 per cent in Washington, D. C.; 49 per cent in Baltimore, Detroit, New York, Philadelphia and Scranton, 48 per cent in Birmingham, Chicago and Providence, 47 per cent in Boston, Buffalo and Charleston, 45 per cent in Fall River, Manchester, Milwaukee and Pittsburgh, 44 per cent in Minneapolis and St. Louis, 43 per cent in Cleveland and New Haven, 41 per cent in Atlanta, Cincinnati, Dallas, Newark, New Orleans and Omaha, 40 per cent in Indianapolis and Kansas City, 39 per cent in Little Rock, 38 per cent in San Francisco, 37 per cent in Los Angeles, 36 per cent in Jacksonville, Memphis and Seattle, 34 per cent in Louisville, 33 per cent in Denver, 29 per cent in Portland, Ore., and 22 per cent in Salt Lake City. Prices were not obtained from Bridgeport, Butte, Columbus, Houston, Mobile, Norfolk, Peoria, Portland, Me.; Rochester, St. Paul, Savannah and Springfield, Ill., in 1913, hence no comparison for the ten-year period can be given for these cities.

General Electric Company's Business Grows

The General Electric Company reports that it has booked during the first five months of the present year new business amounting to approximately $143,000,000. In 1922 this company billed out slightly more than $200,000,000 worth of goods, or about $16,600,000 a month. For the first four months of 1923 outgoing shipment averaged about $20,000,000 a month in value. Much large equipment which has been for a long time in process of manufacture will soon be shipped, and it may be expected that the coming months will show an even greater volume of business.

Metal, Coal and Material Prices

Metals—New York	June 26
Copper, electrolytic, cents per lb	14.687
Copper wire base, cents per lb	18.00
Lead, cents per lb	7.00
Zinc, cents per lb	6.12
Tin, Straits, cents per lb	40.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.625
Somerset mine run, Boston, net tons	2.625
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.80
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.50
Weatherproof wire base, N. Y., cents per lb.	18.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.11
White lead, in oil (100-lb. keg), N. Y., cents per lb	13.125
Turpentine, (bbl. lots), N.Y., per gal	$.95

Hot Air and Electric Heating Compared

Maker of Hot Air Apparatus Furnishes Figures Which Show Decided Advantage in Economy for Coal System

AN ARTICLE which appeared in the Manufactures & Markets Department of the JOURNAL for June 16 pointed out that there has been an increasing activity in the market for electric heaters for cars. In the discussion of contributing conditions for this tendency, the high price of coal and the increased amounts paid for labor were mentioned as reasons for increased interest in electric heating. In this connection, a large manufacturer of hot-air heating equipment points out that there is still considerable margin of economy in favor of heating by hot air as compared with electric heating and has furnished some figures to show actual and estimated heating expense by the two systems for comparison.

Table I is a tabulation of actual costs for heating by hot air for an electric railway operating 271 double-truck cars in a northern climate where extreme winter conditions prevail. The average total cost per car per season when heating with hard coal and air heaters is shown to be $190.72, including interest and depreciation. This is compared to tests made with electric heaters on cars of corresponding size and with similar climatic conditions, showing an average cost in excess of $400 per car per season of 160 days, exclusive of interest and depreciation.

The last item of $40 per car per season for attendance and handling fuel is considered by the manufacturer to be about 40 per cent too high as judged from the similar item on other properties. It is attributed to an expensive method of handling in which changes are to be made next winter.

Table II gives test data from a Pennsylvania property for electrically heating a Peter Witt car, 46 ft. 3 in. long by 8 ft. 2 in. wide, using sixteen electric heaters with thermostatic control and hand operated ventilators. The actual energy consumption of the heaters was measured with a Sangamo watt-hour meter and the test covered the period from Jan. 8 to April 2, 1923, during which the car was out of service fourteen days. The average mean temperature during the period was 27 deg. F., average maximum temperature of 33 deg. and average minimum of 21 deg. Estimated costs for heating the same car by means of coal are given in the lower part of the table.

Table III gives similar test data from the same railway for heating a single-truck, one-man car, 26 ft. 2 in. long by 7 ft. 8 in. wide, using twelve electric heaters without thermostat. The energy consumed by the heaters was measured by a Sangamo watt-hour meter and the test extended over the period from Jan. 8 to March 12, 1923. The average mean temperature during the period was about the same as given above for the data of Table II. For comparison the estimated cost of heating this car with coal is printed in this case also, as a part of Table III.

In both these test cases, the meters were installed and the data collected by the railway and a copy of the report furnished weekly to the manufacturer.

TABLE I—ACTUAL EXPENSES FOR HEATING CARS—SEASON FROM AUGUST 1, 1921, TO JULY 31, 1922

Month 1921	Fuel for Heating	Labor Heating Cars	Maintenance of Equipment: Stove	Motors	Stacks	Hot-Water Heaters	Total Expense for Season
August	12.55	36.89	7.76	196.13	2.40	.....	255.72
September	0.93	19.90	302.76	561.93	58.96	.....	944.48
October	.....	101.98	486.92	549.77	386.00	.....	1,524.67
November	228.47	1,630.92	569.08	523.01	136.20	68.84	3,156.52
December	7,750.89	2,086.35	30.85	81.21	1.66	177.23	10,128.19
1922							
January	6,579.87	2,083.37	149.21	94.91	17.34	140.61	9,065.31
February	5,796.28	1,828.78	107.07	94.05	27.06	66.04	7,919.28
March	4,290.88	2,004.29	64.55	125.36	0.75	27.66	6,513.49
April	1,125.64	628.38	4.86	25.73	1.35	4.92	1,790.88
May	.....	18.82	0.60	.....	29.93	.....	49.35
June	67.80	.....	.....	.....	1.12	.....	66.68
July	.....	59.64	6.68	.....	3.71	.....	70.03
	25,717.71	10,499.32	1,730.34	2,252.10	666.48	485.30	41,351.25

271 cars in operation—Double-truck. Body 34 ft. inside bulkheads.

Average operating cost per car per season	$152.59
Add for operation of blower motor per car 810 kw.-hr. at 0.00695 (estimated)	5.63
Add interest at 6 per cent on $250 cost of equipment per car	15.00
Add depreciation at 7 per cent on $250 cost of equipment per car	17.50
Total	$190.72
Fuel consumption per car per season	4.8 tons
Cost of anthracite coal per ton	$19.80
Maintenance of heating equipment per car per year	19.00
Attendance and cost of handling and distributing fuel per car per season	40.00

TABLE II—TEST DATA FOR ELECTRIC HEATING OF PETER WITT TYPE CAR WITH ESTIMATE OF COST TO HEAT SAME BY COAL

Car-hours operated during test period	952.37
Car-miles operated during test period	8,605.22
Kilowatt-hours consumed during test period	13,070.
Kilowatt-hours consumed per car-hour	13.72
Kilowatt-hours consumed per car-mile	1.285
Total cost of current for electric heat during test period of seventy days = 13,070 kw.-hr. x 1.4 cent	$182.98
Average cost of current per car-hour = 13.72 kw.-hr. x 1.4 cent	0.1921
Average cost of current per car-mile = 1.285 kw.-hr x 1.4 cent	0.018
Average cost of current per car-day =	2.61
Average cost of current per car per season of 160 days on the above basis	417.60
No items of interest, depreciation, maintenance or heater haulage included.	
The average cost of heating by a hard coal-fired hot-air heater, during the period of electric heating test is estimated as follows: (Car out of service fourteen days).	
Total thermal value of 13,070 kw.-hr. consumed during the electric heat test period of seventy days =	44,594,840 B.t.u
Quantity of 13,000 B.t.u. per pound hard coal required to produce 44,594,840 B.t.u. = 3,430 lbs. at 100 per cent efficiency of heater.	
Efficiency of heater is actually about 50 per cent; therefore total quantity of coal required, would have been 6,860 lb. or	3.43 net tons
Fuel cost—heating car while in service = 3.43 net tons at $13.00 per ton delivered	44.59
Fuel cost—banking fires, while car is not in service = 2 lb. coal per hour, twelve hours per day for seventy days = 0.85 net ton at $13 per ton delivered	11.05
Kindling and kerosene—lighting fires at 2 cents per day x seventy days	1.40
Attendance—labor kindling fires, removing ashes, etc., at 15 cents per day x seventy days	10.50
Cost of power—to operate blower motor—250 watts per hour x eleven hours per day x seventy at 1.4 cents per kilowatt-hour	2.70
Maintenance—952 car-hours at 0.75 cents per car-hour	7.14
Stove haulage—8,605 car-miles x 315 lb. (weight of heater) ÷ 2,000 lb. = 1,350 ton-miles at 0.3475 cent	4.69
Total cost for seventy days	$82.07
Average cost per car-hour	$0.086
Average cost per car-mile	0.0095
Average cost per car per day	1.17
Average cost per car per season of 160 days	187.20

TABLE III—TEST DATA FOR ELECTRIC HEATING OF SINGLE-TRUCK ONE-MAN CAR

Car-hours operated during test period	1,012.
Car-miles operated during test period	8,505.
Kilowatt-hours consumed during test period	8,115.
Kilowatt-hours consumed during test period per car-hour	8.02
Kilowatt-hours consumed during test period per car-mile	.954
Total cost of current for electric heat during test period of sixty-three days = 8,115 kw.-hr. at 1.4 cent	$113.61
Average cost of current per car-hour 8.02 kw.-hr. x 1.4 cent	0.1123
Average cost of current per car-mile 0.954 kw.-hr. x 1.4 cent	0.0134
Average cost of current per car per day $113.61 ÷ sixty-three days	1.80
Average cost of current per car per season of 160 days on the above basis	288.00
No items of interest, depreciation, maintenance or heater haulage are included.	
The operating cost of heating car with hot-air heater during the sixty three-day test period would have been about as follows:	
Thermal value of 8,115 kw.-hr. consumed in electric heating of car during the sixty three-day test period =	27,688,380 B.t.u
Quantity of 13,000 B.t.u. per pound hard coal required to produce 27,688,380 B.t.u. = at 100 per cent efficiency of heater	2,130 lb.
Efficiency of heater is actually 50 per cent; therefore total quantity of coal required would have been 4,260 lb. or	2.13 net tons
Fuel cost—heating car while in service = 2.13 tons hard coal at $13 per ton delivered	$27.69
Fuel cost—banking fires when car is not in service = 2 lb. coal per hour at eight hours per day x sixty three days = ½ ton hard coal at $13 per ton delivered	6.50
Kindling and kerosene for lighting fires at 2 cents per day. =	1.26
Attendance—labor kindling fires, removing ashes, etc., at 15 cents per day x sixty three days	9.45
Cost of power—to operate blower motor = 250 watts per hour x 16 hours per day x sixty three days = 252 kw.-hr. at 1.4 cents	3.53
Maintenance—1,012 car-hours at 0.75 cents per car-hour	7.59
Stove haulage—8,505 car-miles x 315 lb. (weight of heater) ÷ 2,000 lb. = 1,334 ton-miles at 0.375 cents	5.00
Total cost for sixty three days	$61.02
Average cost per car-hour	$0.06
Average cost per car-mile	0.0072
Average cost per car per day	0.97
Average cost per car per season of 160 days	155.20

Rolling Stock

Long Island Railroad, New York, N. Y., announces that of the ninety-two new steel passenger cars on order twenty-one have thus far been delivered. The company also reports that the contractors are making rapid progress with the seventy-one steel cars under construction and scheduled for delivery this year.

San Francisco Municipal Railway on June 20 received the first of the twenty cars which are being built for it by the Bethlehem Shipbuilding Corporation at San Francisco. Owing to the steady increases in traffic, San Francisco's Municipal lines now have barely enough cars to maintain service with the minimum number of spares in repair and paint shops. This has been due to the rapid building up of outlying residential districts. In the Richmond district the traffic has increased 60 per cent since 1914 and in other districts increases of 70 per cent or more have been recorded since the Municipal system has been in operation.

Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, as was announced in the June 23 issue of this paper, has purchased four new passenger cars. The specifications for these cars are as follows:

Builder of car body	Kuhlman Car Company
Seating capacity	56
Total weight	34,500 lb.
Bolster centers, length	24 ft. 6 in.
Length over all	47 ft. 6 in.
Width over all	8 ft. 6¼ in.
Body	Steel
Interior trim	Cherry
Headlining	White
Roof	Arch
Air Brakes	G. E.
Armature bearings	Bali
Control	"K"
Curtain material	Pantasote
Designation signs	Hunter
Gears and pinions	G. E.
Hand brakes	Peacock
Heater equipment	Consolidated
Headlights	G. E.
Lightning arresters	G. E.
Motors	G. E. 264, Inside hung
Seats	Brill
Seating material	Brown imitation leather
Trucks	Brill 77E
Wheels	Rolled steel 26 in. x 3½ in.

Track and Roadway

Mississippi Valley Electric Railway, Iowa City, Ia., expects to build 1,700 ft. of new track and to pave 1,200 lin.ft. of track.

Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, is stringing 30 miles of high-tension wire between the Toledo city limits and Port Clinton.

Johnstown & Somerset Railway, Somerset, Pa., contemplates extending its line to Jerome, a distance of 5 miles. Work on the extension will be started on Aug. 1.

Seattle Municipal Railway recently awarded to the Pacific States Electric Company, Seattle, the contract for furnishing 10 miles of No. 2 hard-drawn, round copper trolley wire in 1-mile reels. The contract totals $4,020.

Laredo (Tex.) Electric & Railway Company, is preparing to extend its lines to give service to many portions of the city of Laredo not now served. Workmen are now laying track on Matamoros Street for an extension of one of the lines. Approximately $250,000 will be spent in extensions.

Department of Street Railways, Detroit, Mich., has started construction on two new extensions of the municipal system, the Linwood and Warren Avenue east lines. Plans are also made for an extension on Warren Avenue west. The Linwood extension from the present line at Joy Road to Davison Avenue will include about 1½ miles of double track and the East Warren extension from Bewick Avenue to St. Jean Avenue will include about ½ mile of double tracks.

Power Houses, Shops and Buildings

Springfield (Mass.) Street Railway is about to construct a new office building in Westfield. It will be of brick and will cost $5,630.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order from the Brazilian Hydro-Electric Company, Ltd., a subsidiary of the Brazilian Traction, Light & Power Company, Ltd., of Rio de Janeiro and São Paulo, Brazil, for seven power transformers and a large amount of switching equipment for a new plant located on the Parahyba River, about 100 miles northeast of Rio de Janeiro.

Trade Notes

Stone & Webster, Inc., have been engaged to supervise the construction of the Paducah Electric Company's $400,000 electric generating plant.

A. Gilbert & Sons Brass Foundry Company, St. Louis, Mo., announces that it has just doubled the size and capacity of its machine shop to take care of its growing business.

Magnus Electric Company, Inc., New York, N. Y., manufacturer of electrical specialties, wiring devices and radio accessories, has established a new district sales office at 231 North Wells Street, Chicago. The office is in charge of Leo Hirschfeld and M. B. Geiger.

Dr. W. R. Whitney, director of the research laboratory of the General Electric Company, was recently elected a member of the corporation of the Massachusetts Institute of Technology for a term of five years. He was graduated from the Massachusetts Institute of Technology in 1890 and has been for some time a non-resident professor of theoretical chemistry at that institution.

Roller-Smith Company, 233 Broadway, New York, N. Y., announces the appointment of H. D. Baker, 525 Woodward Avenue, Detroit, as its representative in the State of Michigan. Mr. Baker will handle the Roller-Smith Company's lines of instruments, circuit breakers and radio apparatus in that territory. Mr. Baker has been associated with the Roller-Smith Company in various capacities for several years, knows the company's products well and has a wide acquaintance in his territory.

Peter Smith Heater Company, Detroit, reports a number of recent orders. Among recent orders or shipments are the following: ten heaters, type O-C-2, for the new passenger cars of the Chicago, North Shore & Milwaukee and ten heaters of the 2-P type for the parcel freight cars of the same company, 125 heaters of the 2-P-O type for the Toronto Transportation Commission; fifty heaters of the 2-P-N type for the Cleveland Railway; four heaters of the 3-P-O type for the Chicago & West Towns Railway and fifty of the 3-P-O type for the St. Louis Railways. The company has also supplied many heaters for the gas rail cars used by a number of the steam railroads.

New Advertising Literature

Bethlehem Shipbuilding Corporation, Ltd., Bethlehem, Pa., has issued a new sixty-five-page catalog on pumps for feed and other duties. The catalog also contains a description of the corporation's line of pumps for handling oil.

Conveyors Corporation of America, Chicago, has just issued an eight-page booklet, "Representative Installations." It contains illustrations of a number of buildings and power plants which are equipped with the company's American steam jet ash conveyor, a method of ash removal which has come into marked favor among power plant engineers during the past four or five years. Copies will be sent to any who are interested in the steam jet method of ash handling.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued its 1923-1924 supply catalog. In appearance the new catalog does not differ greatly from its predecessor. The former editions have proved so useful and satisfactory that no essential features were altered, the improvements being largely a matter of detail and refinement. The catalog is indexed according to subjects and to sections, and also has a style number and a thumb index. In addition, a new feature—a classified index—has been added to the introductory section under the title "How this catalog serves." Here is listed apparatus of particular interest to central stations, electric railways, industrial plants, mines, contractor-dealers and architects. The catalog announces the opening of a new plant at Homewood, Pa. In all, 1,300 pages are devoted to descriptive matter, technical data, dimension drawings, specifications and prices. The material includes all new apparatus developed in the last two years.

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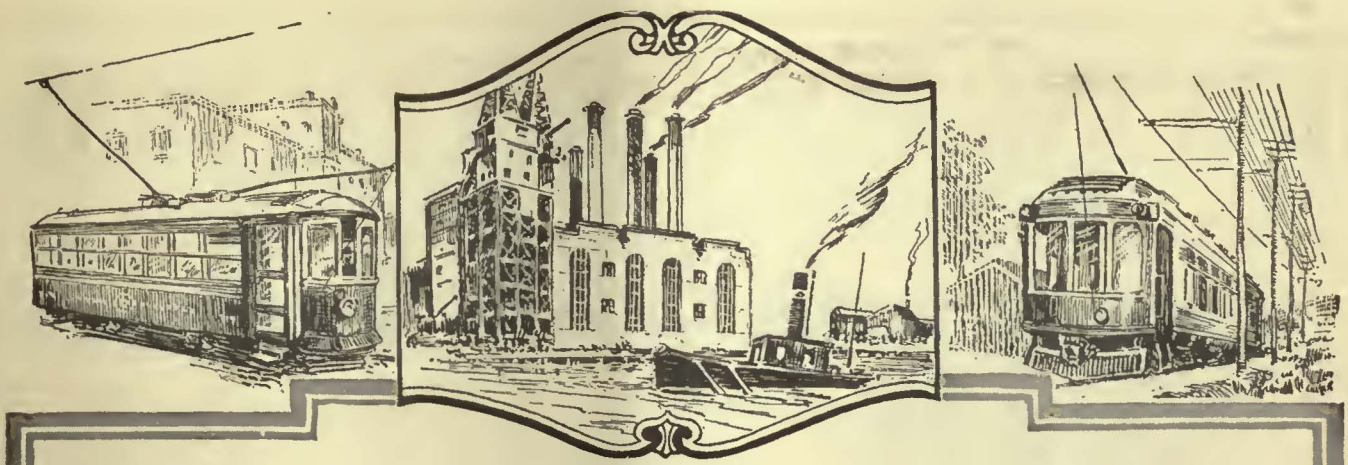
is the other type—with rotating grinding wheel—especially suitable for removing surplus metal after welding. It is light and fast, easily operated by two men, and quickly removable from track to permit cars to pass.

Railway Track-work Company

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

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



As we understand cooperation

(Taking the power plant as an example)

Your Chief Engineer knows his units.

Texaco Lubrication Engineers know lubricants and they understand their application to prime movers and machines.

Get these two together. Let them talk things over.

And then the Texaco Lubrication Engineer sent out on the job will submit a list of recommendations covering the right oil for each particular unit or machine and the correct application and quantities for most efficient service.

He will show you the most gratifying kind of cooperation through your chief engineer.

The two of them, working together, will show you almost unheard of operating economy in your power plant.

So, then, let us get together to save costs when you *make* power, and to save money when you *buy* it.

That is the net result of Texaco Lubrication Service.

Probably we don't have to say this, but it may be worth while calling it to your attention. "The same high quality, which has put and kept Texaco Lubricants on the cars of many of the most carefully conducted Roads is equally apparent in TEXACO TURBINE OILS, TEXACO STEAM CYLINDER OILS, TEXACO ENGINE OILS, TEXACO GREASES."

THE TEXAS COMPANY

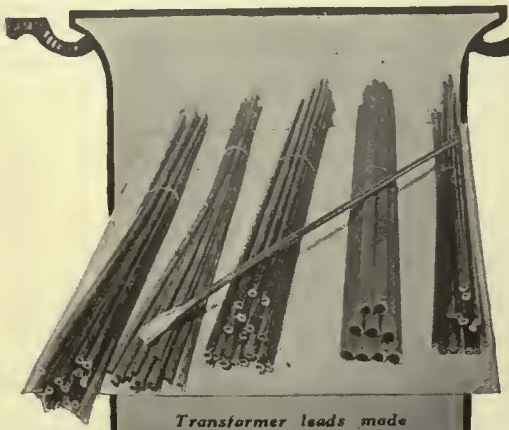
DEPT. R-J · 17 BATTERY PLACE · NEW YORK CITY

HOUSTON · CHICAGO · NEW YORK

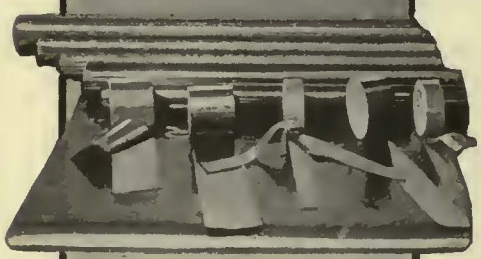
OFFICES IN PRINCIPAL CITIES

IRVINGTON INSULATION

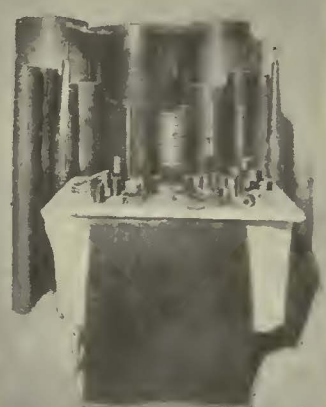
Means Longer Life for Electrical Equipment



Transformer leads made in all sizes and strengths.



Varnished paper—1, 2 and 3 ply for condensers, small armatures, radio transformers, coils, ignition, and instrument work.



Cellulak, Laminated shellac construction. transformer bushings, insulating sleeves, and tubes up to 30 in. diameter.

Since 1905, the Irvington Insulator & Mfg. Co. has been the leading manufacturer of varnished insulating products. As a result, today the majority of high tension insulated wires and cables are protected by Irvington black varnished cambric.

To maintain its leadership as the largest manufacturer of varnished cambric in the world, this company has continually improved its products and enlarged its line.

Hence Irvington Products now meet your requirements 100%. They include every kind of insulation manufactured: cloth, paper, liquid, tubular and solid.

Irvington Products are manufactured in its new brick and reinforced concrete plant—fire-proofed throughout to insure the user a continuous supply of varnished insulation.

For samples and prices, write our nearest sales representative.

Irvington Products

- Varnished Silk
- Varnished Paper
- Black and Yellow Varnished Cambric
- Straight and Bias Varnished Cambric Tapes
- Flexible Varnished Tubing
- Special Folded Paper for Coil Windings
- Transformer Leads
- "Cellulak"
- Special Adhesive
- High Dielectric Paper
- Insulating Varnishes and Compounds
- "Irv-O-Slot" Insulation

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

POSITIONS VACANT

MASTER MECHANIC wanted immediately by electric street and interurban railway company in Pennsylvania, operating five to twelve cars and own generating power station. One who can rewind his own car motor armatures preferred. Give full statement of experience, education, age, references, salary expected, and when available. P-572, Elec. Railway Journal, 10th Ave. at 36th St., New York.

ROADMASTER wanted with considerable experience for large property in Central Ohio. P-571, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

TWO master mechanics wanted, 1 for city with 45 city cars, 1 for interurban with 40 interurban cars. Both shops located in the Middle West. Have good shops, tools and machinery. P-567, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

MANAGER or superintendent railway, light and power properties, technical successful organizer and tactful in public relations and very resourceful in rehabilitating properties. Member A.I.E.E. Available in 30 days. PW-557, Elec. Railway Journal, 10th Ave. at 36th St., New York.

MASTER mechanic or superintendent of rolling equipment, open for a position in two weeks. Have had charge of all repairs 500 cars. Can get results. 20 years' experience. Age 38. PW-570 Elec. Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

SUPERINTENDENT of rolling equipment with a successful record of 20 years on large properties desires a change and solicits correspondence with managers that are in need of a capable progressive man who knows how to get results in economical operation. Age 38. PW-569, Elec. Railway Journal, 10th Ave. at 36th St., New York.

FOR SALE

25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped

Excellent Condition

Immediate Delivery

FS-566, Electric Railway Journal
10th Ave. at 36th St., New York City

1500 Tons

85 lb. A. S. C. E. Section

Relaying Rails

with Angle Bars

Immediate Shipment

Central South and Southwestern delivery

S. W. LINDHEIMER

1st National Bank Bldg.
Chicago, Ill.

Rails and Track Material

Keep your eye on the Searchlight and your advertisements in it.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

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

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

New Motor Repair Parts

IMMEDIATE SHIPMENT

We have in stock virtually every part necessary to complete all of the types of non-interpole motors. They are new and were manufactured by either the Westinghouse Company or the General Electric Company. They may be purchased at 25 per cent less than the manufacturers' present prices.

Send your orders to us and deduct 25 per cent from the current quotations.

What have you for sale?

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

FOR SALE

6 Oil Tank Cars

for electric railways, 5,000 gallon capacity. Also half mile of Industrial Track with track scales, turntable, steel ties and 16 steel side-dump cars to go with same at exceptionally low price for quick sale. Wire, phone or write.

Tate, Fisher & Rice Company
258 Washington St., Boston, Mass.

FOR SALE

Two—4 cylinder Reo Motor 15 Passenger Busses

Mounted on Standard Steel RR Wheels and Axels

Also a 13-foot Long Box Car Trailer

All in Good Condition

A very handy, convenient and economical outfit for a small railroad

Also the original tires and axels to readjust for general road work

WRITE FOR PHOTO AND PARTICULARS

Bargain for Quick Transaction

Hyman-Michaels Company
531 Peoples Gas Bldg., Chicago

FOR SALE

D. C. ENGINE DRIVEN SETS

ATTRACTIVE PRICE FOR QUICK SALE

1—Buckeye Engine, 18¾ x 18¾, direct connected to General Electric Co.'s generator, Type MP, Class 8-165-240, Form A-2, volts 250/275, generator No. 25826.

1—Buckeye Engine, 18¾ x 18, direct connected to General Electric Co.'s generator, Type MP, Class 8-165-240, Form L, volts 250/275, generator No. 31345.

1—Buckeye Engine, 18¾ x 18¾, direct connected to General Electric Co.'s generator, Type MP, Class 6-165-240, Form R, volts 250/275, generator No. 159425.

1—22 x 36 x 42 cross-compound vertical Corliss Engine, made by Filer-Stowell Co., Milwaukee, Wis., direct connected to General Electric Co.'s 525 kw., 525/575 volt, 100 r.p.m., generator No. 31209.

2—Allis-Chalmers 26 x 36 Corliss horizontal Engines, direct connected to Allis-Chalmers 500 kw., 550/575 volt, 125 r.p.m., generators Nos. 38316 and 38382.

The switchboard equipment for these generators will consist of generator panels only, which includes circuit breaker, ammeter and switches.

Filer-Stowell Engine and Generator available about July 1st, 1923. Allis-Chalmers Units available about August 10th, 1923. All of the above equipment is now in operation in the Pittsburgh district. Address T. S. Duncan, P. O. Box 940, Pittsburgh, Pa.

WHAT AND WHERE TO BUY

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

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Electric Service Sup. Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badgrs and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Barges, Steel
American Bridge Co.
Batteries, Dry
National Carbon Co.
Bearings an Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Westinghouse E. & M. Co.
Bearings Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Boilers
Babcock & Wilcox Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
Book Publishers
McGraw-Hill Book Co., Inc.
Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
Bridges, Steel
American Bridge Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
Westinghouse E. & M. Co.
Brushes, Graphite
National Carbon Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Buildings, Steel
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Bus Seats
Hale & Kilburn
Heywood-Wakefield Co.
Cables (See Wires and Cables)
Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes Carbon)
Car Lighting Fixtures
Electric Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Catchers and Retrievers, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Ceiling, Car
Pantasote Co., The
Change Carriers
Cleveland Fare Box Co.
Circuit Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Economy Electric Devices Co.
Electric Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Rome Wire Co.
Coils, Choke and Kicking
General Electric Co.
Westinghouse E. & M. Co.
Coin-Counting Machines
Cleveland Fare Box Co.
Electric Service Sup. Co.
Internat'l Register Co., The
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrapping Machines
Cleveland Fare Box Co.
Commutator Slotters
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
Westinghouse E. & M. Co.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air, Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensar, Papers
Irvington Varnish & Ins. Co.
Conduits, Flexible
Alphaduct Co., The
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car-Heat'g Co.
Electric Service Sup. Co.
Ohio Brass Co.
Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Electric Service Sup. Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Cord Adjusters
National Vulcanized Fibre Co.
Cord, Bell, Trolley Register, etc.
Brill Co., The J. G.
Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Cord Connectors and Couplers
Electric Service Sup. Co.
Samson Cordage Works
Wood, Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossings
Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frog and Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Crushers, Rock
Allis-Chalmers Mfg. Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Sup. Co.
Morton Mfg. Co.
Pantasote Co., The
Dealers Machinery
Electric Equipment Co.
General Electric Co.
Derailing Devices (See Track Work)
Derailing Switches
Ramapo Ajax Corp.
Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Detective Service
Wish Service, P. Edward
Door Operating Devices
Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Draft Rigging (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Sup. Co.
Ears
Ohio Brass Co.
Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., J. A.
Electric Grinders
Railway Track-Work Co.
Electric Transmission Towers
American ridge Co.
Electrodes, Carbon
Railway Track-Work Co.
Electrodes, Steel
Railway Track-Work Co.
Enamels
Beckwith-Chandler Co.
Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Byllesby & Co., H. M.
Day & Zimmerman
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Kelly Cooke Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Inc., Dwight P.
Sanderson & Porter
Sangster, Andrew & Co.
Stevens & Wood, Inc.
Stone & Webster
White Engineering Corp., The J. G.
Wortham, Edwin
Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices Co.
National Ry. Appliance Co.
Ohmer Fare Register Co.
Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Fibre and Fibre Tubing
National Vulcanized Fibre Co.
Westinghouse E. & M. Co.
Field Coils (See Coils)
Flangeway Guards, Steel
Godwin Co., Inc., W. S.
Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Frogs and Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Wharton, Jr., & Co., Wm.
Frogs, Trolley
Ohio Brass Co.
Furnaces, Electric
Pittsburgh Elec. Furnace Corp.
Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
General Electric Co.
Westinghouse E. & M. Co.
Fuses, Refillable
Columbia M. W. & M. I. Co.
Gages, Oil and Water
Ohio Brass Co.
Gaskets
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gasoline Torches
Economy Electric Devices Co.
Gas Producers
Westinghouse E. & M. Co.
Gatrs, Car
Brill Co., The J. G.
Gear Blanks
Carnegie Steel Co.
Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co
Gears and Pinions
Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
Generating Sets, Gas-Electric
General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
Girder Rails
Lorain Steel Co.
Goggles, Eye
Smith Heater Co., Peter
Gongs (See Bells and Gongs)
Greases (See Lubricants)
Grinders and Grinding Supplies
Railway Track-work Co.
Grinders, Portable
Railway Track-work Co.
Grinders, Portable Electric
Railway Track-work Co.
Grinding Bricks and Wheels
Railway Track-work Co.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail and Manganese
Ramapo Ajax Corp.
Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Hammers, Pneumatic
Ingersoll-Rand Co.
Hand Holds
Central Equipment Co.
Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Headlining
Pantasote Co., The
Headlining Enamel
Anglo-American Varnish Co.
Heaters, Car (Electric)
Consolidated Car-Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter
Heaters, Car (Stove)
Electric Service Sup. Co.
Sterling Varnish Co.
Westinghouse E. & M. Co.
Helmets, Welding
Railway Track-work Co.
Heroult Electric Furnaces
American Bridge Co.
Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Ingersoll-Rand Co.
Hose, Bridges
Ohio Brass Co.
Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Instruments, Measuring and Recording
Economy Electric Devicea Co.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
National Vulcanized Fibre Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co.
Insulating Silk
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
Insulation (See also Paints)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Insulation, Slot
Irvington Varnish & Ins. Co.
Insulators
(See also Line Material)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Electrose Mfg. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Insulator Pins
Electric Service Sup. Co.
Hubbard & Co.
Insulators, High Voltage
Lapp Insulator Co.
Insurance, Fire
Marsh & McLennan
Jacks (See also Cranes, Hoists and Lifts
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Joints, Rail
(See Rail Joints)
Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Junction Boxes
Standard Underground Cable Co.
Lamp Guards and Fixtures
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Lamps, Arc and Incandescent
(See also Headlights)
Anderson Mfg. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.
Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.
Lanterns, Classification
Nichols-Lintern Co.
Lightning Protection
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
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Line Material (See also Brackets, Insulators, Wires, etc.)
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Electric Ry. Equip. Co.
Electrose Mfg. Co.
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General Electric Co.
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Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.
Lubricants, Oils and Greases
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.
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Columbia M. W. & M. I. Co.
Machine Work
Columbia M. W. & M. I. Co.
Manganese Steel Castings
Wharton, Jr., & Co., Wm.
Manganese Steel Guard Rails
Ramapo Ajax Corp.
Manganese Steel Special Track Work
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Meters (See Instruments)
Meter Car Watt-Hour
Economy Electric Devices Co.
Motor Buses
(See Buses, Motor)
Motor Leads
Motormen's Seats
Brill Co., The J. G.
Electric Service Sup. Co.
Heywood-Wakefield Co.
Wood Co., Chas. N.
Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
Motors and Generators, Sets
General Electric Co.
Nuts and Bolts
Allis-Chalmers Mfg. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Oils (See Lubricants)
Oxygen
International Oxygen Co.
Packing
Electric Service Sup. Co.
Westinghouse E. & M. Co.
Paints and Varnishes (Preservative)
Ackley Brake & Supply Corp.
Beckwith-Chandler Co.
Lucas & Co., John
Paints and Varnishes for Woodwork
Beckwith-Chandler Co.
Lucas & Co., John
National Ry. Appliance Co.
Pavement Breakers
Ingersoll-Rand Co.
Paving Guards, Steel
Godwin Co., Inc., W. S.
Paving Material
Amer. Br. Shoe & Fdry. Co.
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Electric Service Sup. Co.
Ohio Brass Co.
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Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.
Pinions (See Gears)
Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
Pipe Fittings
Westinghouse Tr. Br. Co.
Planers (See Machine Tools)
Plates for Tee Rail Switches
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Electric Service Sup. Co.
Pole Reinforcing
Hubbard & Co.
Pole Line Hardware
Ohio Brass Co.
Poles, Metal Street
Bates Exp. Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.
Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nuttall Co., R. D.
Poles, Tubular Steel
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Poles and Ties, Treated
Bell Lumber Co.
International Creosoting and Construction Co.
Poles, Ties, Post, Piling and Lumber
Baker Wood Preserving Co.
Bell Lumber Co.
International Creosoting and Construction Co.
Porcelain, Special High Voltage
Lapp Insulator Co.
Potheads
Okonite Co.
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Economy Electric Devices Co.
National Ry. Appliance Co.
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General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
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Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Pumps, Vacuum
Ingersoll-Rand Co.
Punches, Ticket
Bonney-Vehslage Tool Co.
International Reg. Co., The
Wood Co., Chas. N.
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Ramapo Ajax Corp.
Rail Grinders (See Grinders)
Rail Joints
Carnegie Steel Co.
Rail Joint Co.
Rails, Steel
Carnegie Steel Co.
Railway Paving Guards, Steel
Godwin Co., Inc., W. S.
Railway Safety Switches
Consolidated Car-Heating Co.
Westinghouse E. & M. Co.
Rail Welding
Metal & Thermit Corp.
Railway Track-Work Co.
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Electric Service Sup. Co.
Hale & Kilburn
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Rooke Automatic Reg. Co.
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Resistance, Wire and Tube
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Westinghouse E. & M. Co.
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Consolidated Car-Heating Co.
Retrievers, Trolley (See Catchers and Retrievers, Trolley)
Rheostats
General Electric Co.
Westinghouse E. & M. Co.
Roofing Car
Pantasote Co., The
Roller Bearings
Stafford Roller Bearing Car Truck Corp.
Sanders, Track
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
Sash Fixtures, Car
Brill Co., The J. G.
Sash, Metal Car Window
Hale & Kilburn
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Screw Drivers, Rubber Insulated
Electric Service Sup. Co.
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Pantasote Co., The
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St. Louis Car Co.
Seats, Car (See also Rattan)
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Hale & Kilburn
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St. Louis Car Co.
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Brill Co., The J. G.
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Brill Co., The J. G.
Hubbard & Co.
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Con. Car Heating Co.
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.
Signals, Indicating
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Electric Service Sup. Co.
Nachod Signal Co., Inc.
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Nachod Signal Co., Inc.
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Morton Mfg. Co.
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Strand
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Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
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Ramapo Ajax Corp.
Tampers, Tie
Ingersoll-Rand Co.
Railway Track-Work Co.
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Tee Rail Special Track Work
Ramapo Ajax Corp.
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Standard Underground Cable Co.
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...ite-Thermic Corp.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

Welders, Steel
Indianapolis Switch & Frog Co.

Welding, Steel
Railway Track-work Co.

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Wheel Presses (See Machine Tools)

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Griffin Wheel Co.

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Bemis Car Truck Co.
Carnegie Steel Co.

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Nuttall Co., R. D.
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General Electric Co

Ohio Brass Co
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Roebling's Sons Co., J. A.

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Amer. Elec'l Works
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Okonite Co.
Roebling's Sons Co., J. A
Rome Wire Co.
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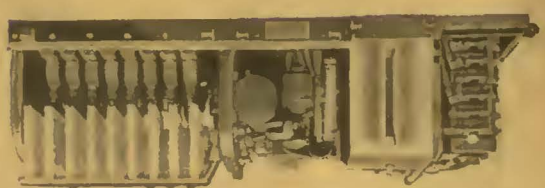

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