

ELECTRIC RAILWAY JOURNAL

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JUNE 9, 1928

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Vol. 71, No. 23

June 9, 1928

Pages 927-968

CONTENTS

Graphs Assist in Lowering Costs and Improving Service 930

By J. R. BLACKHALL

How can the railway manager know whether merchandise tonnage increased or decreased last month? How can he tell if the departments are staying within their budgets? These and many other questions any management should be able to answer without hesitation. This article tells how the North Shore makes use of graphs to study its figures and answer such questions.

Many German Railroads Are Electrified 937

By KENT T. HEALY

Since 1903, when the first suburban line in Germany was electrified, the mileage of electric railroads in that country has steadily increased. The history of this expansion and the characteristics of the various units of the German Federal Railroads are extremely interesting.

Electrical Equipment for Broad Street Subway Cars Has Interesting Features 942

One-piece armature coils with "double-deck" construction in the 210-hp. motors and use of integral, interchangeable switches in the control equipment, are some of the features of the new electrical equipment described in this article.

Editorials 927	Electrically Welded Car Bodies and Trucks 932
<i>Enlivening the Cold Figures</i>	What Happens to an Anti-Climber? 933
<i>A New Kind of Transportation Needed</i>	Has the Economic Limit in Car Fare Been Reached? . 935
<i>Consider the Customer-Owner Carefully in Conversions</i>	Maintenance Methods and Devices 945
<i>Twenty-five Years of Accomplishment in New Jersey</i>	Association Activities 947
<i>Opinions Differed in Key System Fare Case</i>	News of the Industry 954
<i>Widening Horizons</i>	
<i>Successful Selling Requires a Constant Search for Buyers</i>	

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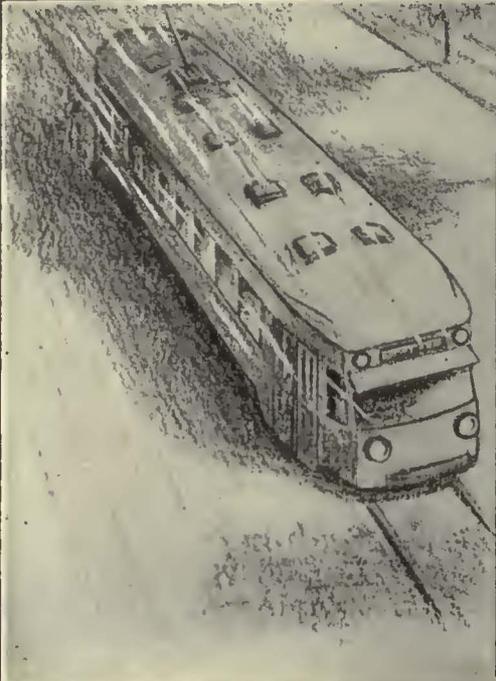


1928

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SPEED is the demand in present-day methods of transportation. Automobiles and busses have attained their present popularity through ability to meet this modern and imperative demand.

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Westinghouse automatics have proved over a period of years, that they do increase scheduled speed by maintaining proper trolley voltage conditions at all times. Their superior features of design are responsible for the success of Westinghouse automatic substations.

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1928

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with

Westinghouse

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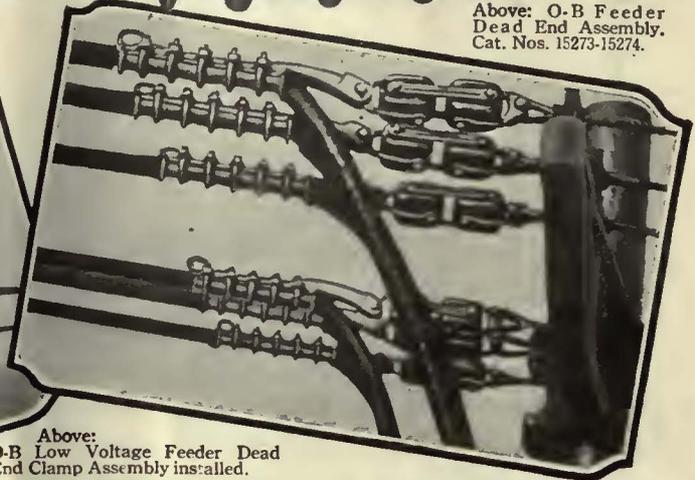
DOLLARS AND SENSE!



Above: O-B Feeder Dead End Assembly. Cat. Nos. 15273-15274.



Above: O-B Low Voltage Feeder Dead End Clamp Assembly installed.



New O-B Feeder Clamp Saves Time and Materials Does a Neater, Better Job



Considering that only 1% saved in operating expenses adds nearly 20% to net income, the importance of taking advantage of many possible small savings is readily apparent. O-B Low Voltage Feeder Cable Clamp Assemblies afford another opportunity to cut operating costs.

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All need of serving, soldering and taping cables at dead ends is eliminated. Feeders may be cut off and dead-ended in the clamp. Or, the cable can be carried through for jumper connection to another feeder either below or on either side or above the clamp. Exhibited at the A. E. R. A. Convention, this New O-B Feeder Dead End Clamp Assembly attracted the interest and favorable comments of scores of overhead men.

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761L

Note These Advantages

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2. Cuts installation time 30% or more.
3. Prevents wastage of three to four feet of cable on each dead end.
4. Is compact—ladders are unnecessary for installation.
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The new O-B Strain or Semi-Tension Clamp Assembly makes it possible to turn corners on two or more poles without dead-ending the feeders in both directions. Cat. Nos. 15343-15344.

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WILLIAM L. BUTLER, Vice President
Cincinnati, Hamilton & Dayton Rys.

Railway Trackwork Co.

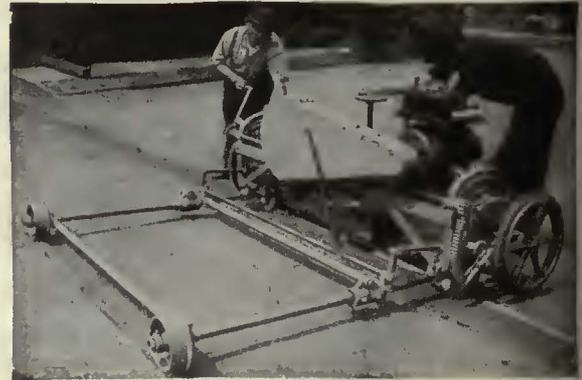
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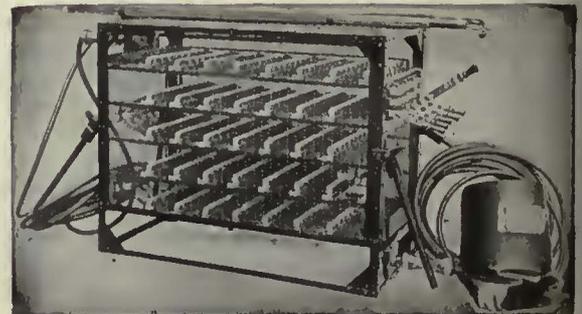
Eureka Radial Rail Grinder



Vulcan Rail Grinder



Reciprocating Track Grinder



“Ajax” Electric Arc Welder

⊕ 2330

BETTER RAIL, BETTER TRANSPORTATION

READ THIS EDITORIAL

One Hundred Men in 1927 Did Work of Four Hundred in 1909

CONVINCING evidence of the great saving in manpower made possible by the use of modern machinery is found in figures compiled by the Boston Elevated Railway concerning a recent track reconstruction job in Somerville. The work involved the reconstruction of 17,566 ft. of single track which had been in service for eighteen years. The old track was built in 1909 with 8-in. T-rail laid partly on wood ties and partly on steel ties. The new track is with 7 1/2-in. T-rail on International twin steel ties. Joints are seam welded. The old concrete base has been removed and the new track laid upon it.

On account of the narrowness of the street it was impossible to use a temporary third track during the course of construction. Work was carried on during regular working hours with a maximum force of 100 men. The entire job was completed in a period of four months without interruption to car traffic on the line. At the time of the original construction a maximum force of 400 men was employed. Curiously enough, the

Modern track-building machinery was responsible for this impressive reduction in the size of the force required to do the work. In 1909 all material was handled by trucks drawn by teams of four or six horses. Loading, unloading and placing of material was done by hand. In 1927 the old granite-block paving was broken up by means of a pavement plow. The blocks were loaded on motor trucks by a Barber Greene snow-loading machine equipped with special buckets. The old rail was cut by acetylene torches to short lengths for easy handling. Fastenings of the steel ties were burned off. The old base was swept clean by means of a tractor sweeper. New rails and ties were handled by a special rail carrying car equipped with an electric crane.

On this recent job one man with modern equipment accomplished a better result than four men with old tools had accomplished eighteen years ago. In the history of the profitable employment of machinery to save manual labor.

Are your track construction methods modern?

Are you using the modern methods of saving old concrete base with Twin Ties?

Are you using modern track building machinery?

Are you using *four* men where *one* will do a better job?

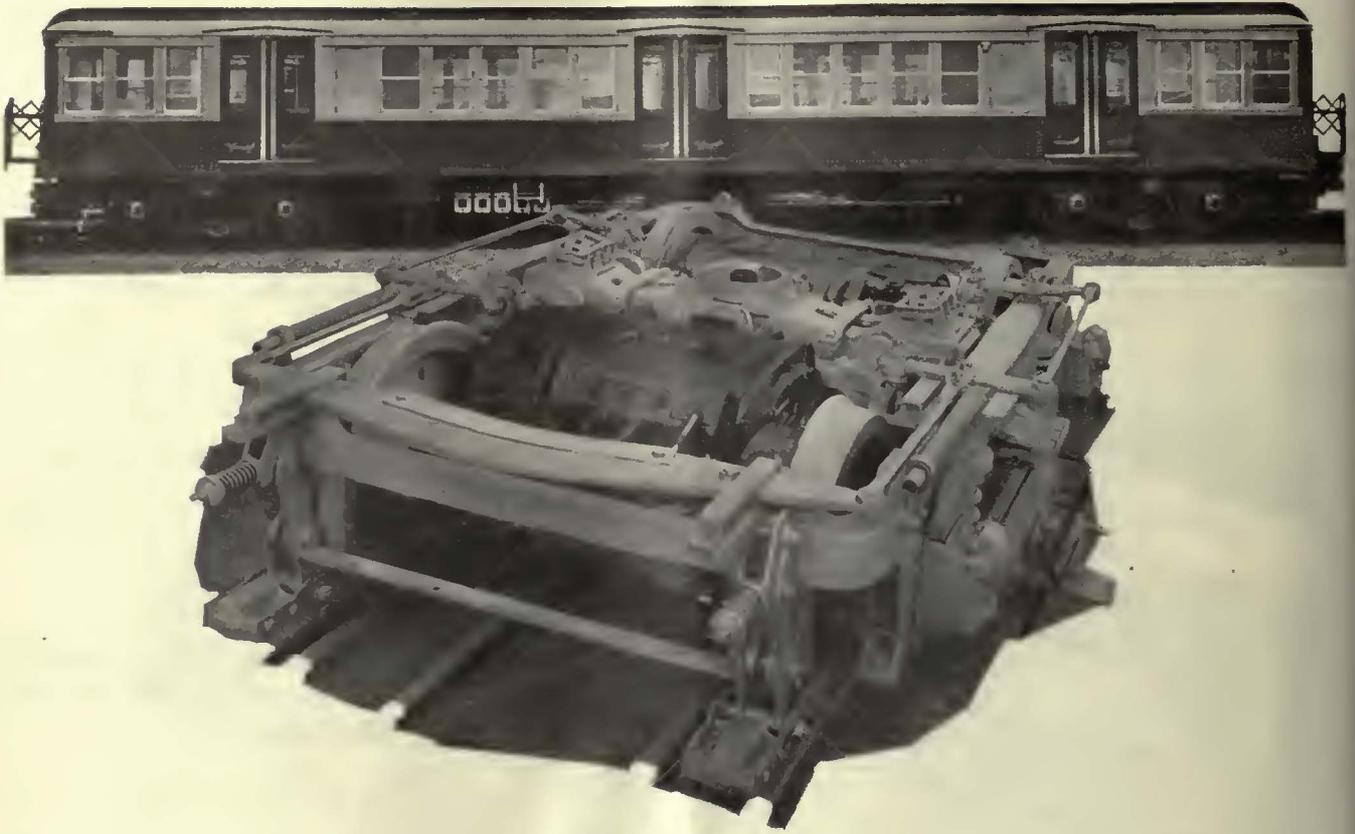
THIS editorial appeared in the May 19th issue of *Electric Railway Journal*. Even if you've already read it, it will be worth your while to read it again.

Write us today for delivered prices for Steel Twin Ties for second or third quarter delivery, and let us tell you about modern track building machinery.

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, OHIO

Steel Twin Tie Track

THE BASE OF MODERNIZATION



Clasp Brakes Speed Subway Operation

In no other service does railroad traffic density approach that of the subways.

Trains accelerate rapidly; they must decelerate the same way. To this end Clasp Brakes are a necessity.

With two brake shoes per wheel instead of one, the Clasp Brake produces the maximum retarding effect, with minimum wear and tear on truck and journal parts.

The Simplex Multiple Unit Clasp Brake affords smoother braking with less heating of brake shoes and reduces the number of "slid flat" wheels. It is an essential part of modern electric railway equipment.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS



Simplex Multiple Unit Clasp Brake
for Motor Trucks



This combination ends many trolley worries

Samson Spot Trolley Cord

Here's a trolley cord that has been made especially to meet *all* the conditions of exposure found in electric railway service. It is smoothly braided, pliable, waterproof, uniform in thickness and guaranteed free from rough places. It will not kink, swell or shrink, is free running and will give years of wear. You'll know it by the colored spots.

Combine this famous trolley cord

—and Keystone Trolley Catchers

and you have an unbeatable combination.

New Type Keystone Trolley catchers have several new and important features to insure long life and positive action. There is a new universal oiling system with a large oil reservoir; larger rope capacity and a larger reel; increased size of openings to allow free movement of the rope and a simpler method of rope attachment. Positive catch when the trolley leaves the wire is assured by a new method of mounting pawls.

Write for further details on the Keystone Trolley Catcher and Samson Spot Cord.

Home office and plant at 17th & Cambria St., PHILADELPHIA; District office at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.



ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY, POWER

AND INDUSTRIAL ELECTRICAL MATERIAL



*It's hard to tell how long
they will last—*



The unretouched photograph above shows a Carnegie Tie, just as it was taken from the road-bed, after eighteen years of service. The chief engineer, in charge of the reconstruction work, stated the ties were in excellent state of preservation after this long time, and both ties and clips were in fit condition for rail renewal.

Service records like this, and we have many others in our files, prove the wisdom and economy of laying track on a permanent foundation. The unit cost (cost per foot of track per year) is less than for wood ties. The use of these ties also insures a smooth-riding, repair-free track that will attract patronage and aid in securing the satisfaction of passengers.

CARNEGIE STEEL COMPANY
PITTSBURGH, PENNA.

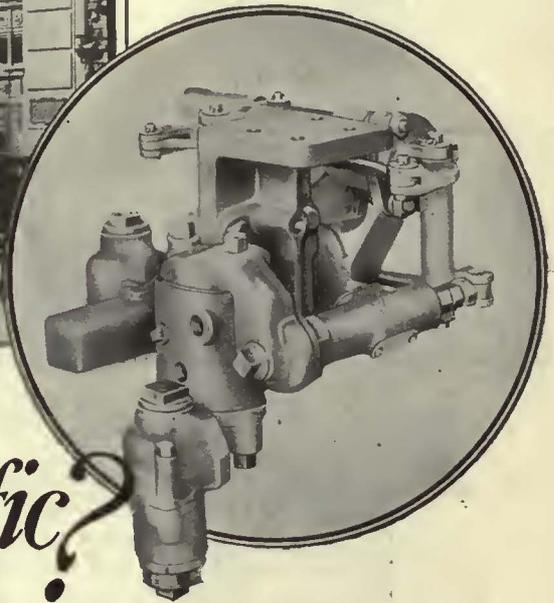
**Carnegie Products
for
Electric Railways**

Steel Cross Ties
Standard Rails
and Rail Joints
Wrought Steel
Wheels
Forged Steel
Axles
Steel Shapes,
Plates and Bars

CARNEGIE
STEEL CROSS TIES



The Westinghouse Variable Load Brake is an attachment for use with straight air or semi-automatic equipments by means of which the brake cylinder pressure is automatically adjusted as the car weight changes, to provide the same retarding effect throughout range of passenger load.



Can your cars lead the traffic?

WHEN thoroughfares are congested . . . when other vehicles are contending for the right of way . . . when traffic demands are greatest . . . are your cars as mobile as other conveyances that use the streets . . . can they lead the traffic rather than lag behind?

They can if equipped with the Westinghouse Variable Load Brake. This modern brake for modern cars is as effective on loaded cars as on empty cars and assures uniformly short stops under all conditions. It furnishes adequate control to enable cars to hold their place in the traffic stream.



Confer with our representative regarding the desirability of Westinghouse Variable Load Brakes for your new cars.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES

TIMKEN *Tapered Roller*



BEARINGS

To Those Who Have TREADLE-IZED

IT WILL develop new riders and please your present riders if you feature your treadles in your public relations work. A treadle, you see, is more than "just a piece of new equipment." It is an advertisement for your property.

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PNEUMATIC
TREADLES



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General Works, Rahway, New Jersey

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518 McCormick Building

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

PHILADELPHIA
1010 Colonial Trust Building



The Charles A. Coffin Medal awarded to the Grand Rapids Railway Company, Grand Rapids, Mich.



CHARLES A. COFFIN FOUNDATION

ESTABLISHED BY GENERAL ELECTRIC COMPANY

FOR THE ADVANCEMENT OF THE ELECTRICAL ART

AWARDS

THE CHARLES A. COFFIN MEDAL

TO

GRAND RAPIDS RAILWAY COMPANY

IN RECOGNITION OF ITS DISTINGUISHED CONTRIBUTION DURING THE PAST YEAR TO THE DEVELOPMENT OF ELECTRIC TRANSPORTATION FOR THE CONVENIENCE OF THE PUBLIC AND THE BENEFIT OF THE INDUSTRY.

CHARLES A. COFFIN PRIZE COMMITTEE OF THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

Charles A. Coffin

CHAIRMAN

CLEVELAND, OHIO, OCTOBER 4, 1927

W. W. Smith
SECRETARY

The Grand Rapids Railway Company

—Another CHARLES A. COFFIN AWARD WINNER that uses TEXACO Lubricants

IT is a big thing for the Grand Rapids Railway Company to have won the coveted Charles A. Coffin medal for its distinguished contribution to the development of electric transportation.

It is also a big thing to us.

The Grand Rapids Railway Company uses TEXACO Lubricants—TEXACO Electric Car Oils,

TEXACO Electric Railway Compressor Oil and TEXACO Crater Compound.

We, of The Texas Company, cannot detract from this Railway's splendid achievement. Indeed, we can only add to its glory (and gladly) by proudly and publicly congratulating the Grand Rapids Railway Company.

This Company is the second Coffin award winner that uses TEXACO Lubricants. The other is the Penn Ohio System.

By far the greatest quantity of lubricants used on Electric Railway Lines throughout the United States are TEXACO Electric Railway lubricants.



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Texaco Petroleum Products

Dept. E6, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES





—the Upholstery
that invites and
holds patronage
—saves and serves
as only this regal
Mohair Velvet can



Chase VELMO— Made by Sanford Mills, Sanford, Me.
L. C. Chase & Co., Selling Agents, Boston
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Carey Elastite System of Track Insulation—a guarantee of easier riding for America's city millions. Recommended by street railway officials everywhere.



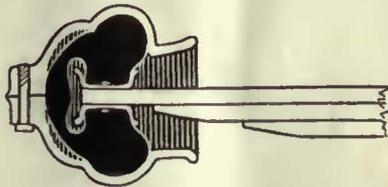
ELECTRIC transit ... a step in advance of the automobile

PASSENGER comfort!
Competition for passenger traffic!

And now the higher priced automobiles come out with rubber-set springs — spring shackles replaced by blocks of solid rubber. Today's improvement, in the automotive field.

But *today's* improvement, for the auto, is *yesterday's*, for the trolley!

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The use of solid rubber blocks to replace spring shackles—today's improvement in the automotive field.

Carey Elastite System of Track Insulation! Easier riding for America's city millions. An un-failing means of maintaining passenger traffic. Smoother, more quiet

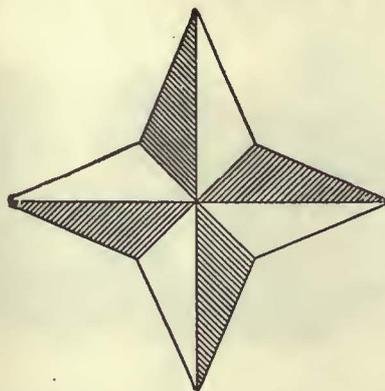
operation—a saving in railway maintenance and a route to faster schedules.

Carey Elastite System of Track Insulation, as you know, consists of a durable, asphaltic compound substantially re-enforced with asphalt-saturated fibre pre-formed under heavy pressure. Its use is recommended by leading street railway officials in more than 150 cities, large and small. Of course you will want full information on this modern traction improvement. Write.

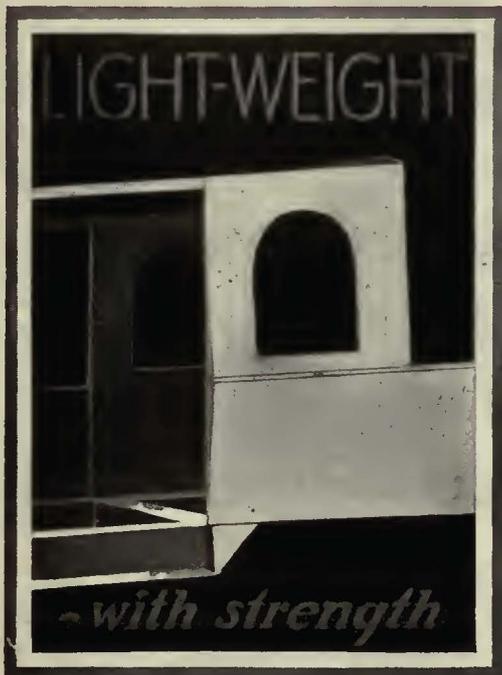
THE PHILIP CAREY COMPANY, Lockland, CINCINNATI, O.

Carey Elastite
SYSTEM OF TRACK INSULATION





It will prove profitable to **KNOW** how we have reduced weight and retained strength



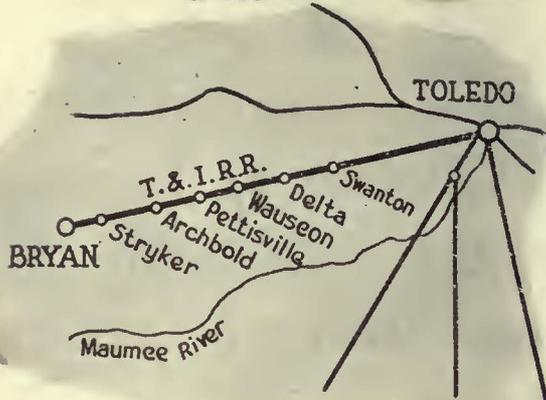
When the time comes that you are close to the subject of purchasing new cars we want you to have all the details of Cincinnati **BALANCED LIGHTWEIGHT** Car construction.

We want you to be intimately informed on the economies we have brought about through modern engineering and modern construction—to know how lightweight steels and the liberal use of aluminum have reduced weight and retained great strength. When may we present the data?

CINCINNATI CAR COMPANY
CINCINNATI, OHIO

CINCINNATI **BALANCED LIGHTWEIGHT** **CARS**

The Four Features of BALANCED DESIGN are the Cardinal Points of Today's Demand



How long can you afford to put off buying equipment that is yielding more than 25 per cent annually? Modern cars are consistently earning this, and more, for progressive properties.

An investment that returned 40 per cent

The Toledo and Indiana Railway in November, 1924, replaced nine old cars weighing 32 tons each with seven modern light-weight one-man cars. In two years these cars have covered approximately 1,050,000 miles.

The new cars reduced maintenance costs 2.01 cents per car-mile, power costs 4.2 cents per car-mile, and platform expense 1.7 cents per car-mile even though there was an 8 cents per hour wage increase on account of one-man operation.

A review of actual operating costs reveals that an investment of \$105,000 is saving annually:

Maintenance of equipment.....	\$10,060
Power.....	23,824
Operators' wages.....	8,784
Total Savings.....	\$42,668



Reliability, so vital in railway operation, is not sacrificed in the equipment which General Electric produces to effect reductions in car weight. The GE-265 motors, K-35 control, and CP compressors on these new cars are daily proving this statement, as the T. & I. will testify.

330-52

GENERAL ELECTRIC

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

Electric Railway Journal

McGraw-Hill Publishing Co., Inc.
JAMES H. MCGRAW, President

Consolidation of
Street Railway Journal and
Electric Railway Review

CHARLES GORDON
Editor

Volume 71

New York, Saturday, June 9, 1928

Number 23

Enlivening the Cold Figures

EXECUTIVES surveying the various phases of their company's activities are called upon to study them principally from cold figures. These figures are almost always accompanied by discussions of the trends but these, too, frequently lack the vital punch. The executive may pore over them for hours and at the end of the period be very much in the dark as to the actual trends. At best, he is likely to gain a conception of the results for the past two weeks or two months only, and does not get a picture of the activities for a sufficiently long period to draw really worthwhile conclusions. As a result, he is handicapped in making recommendations or issuing orders for much-needed improvements.

It is particularly difficult when making a special study to have to resort to plain figures. For example, in analyzing the causes of claims for merchandise damaged in transit, if each claim merely was listed with its cause, no very definite conclusions could be drawn. However, if this same information was summarized in a table with the figures totaled for similar causes for each commodity and for all months over a period of a year or more, and these data presented in a carefully prepared table or even plotted on charts, an extremely valuable analysis could be made. Likewise, it would be difficult to make a train-service check over any extended period of time without actually putting down in table form the data on each train for each day, including the number of cars scheduled, the number actually operated, and how many were in excess of schedule or needed in addition to the number actually run.

Companies that are making use of charts and graphs to study the figures for the various activities are reaping much benefit. An excellent example of what can be done with charts is afforded in the experience of the Chicago, North Shore & Milwaukee Railroad, which makes extensive use of them. An article in this issue describes a few of the many forms of tables, charts and graphs used by this company. The success which the North Shore has had with them indicates that they hold many possibilities for other systems, too. The company has realized much improvement in service and has reduced many of its operating expenses because the charts made it possible for the management to get a true picture of the various trends. Also, the practice of using these charts before the department superintendents and their supervisors and foremen, brings to these leaders the actual facts and causes them to realize that all improvements or shortcomings in their respective departments are being noted.

The energy consumption curves used by the North Shore management were very effective in reducing the power demand. The curves were studied periodically by the general manager, the superintendents of the several divisions and finally by those in charge of the motormen. Records were kept of the performance of each individual motorman, and those who were not showing any improve-

ment, or who were getting careless in handling their trains, were given further instructions. The result was that during the first nine months of 1927 the kilowatt hours per car-mile figure was reduced from 2.92 to 2.63. This saving is typical of others made possible by using charts.

Many forms of graphs and tables can be used to show the widely varying phases of an electric railway's operation. There are, however, certain forms which are more suitable for particular subjects and the management must be careful to select the most effective form. The North Shore employs a great many forms of charts, and much of the success in their use of them can be attributed to their careful selection.

Many other companies are making use of charts in various forms, but hardly any are using them to full advantage. There are many possibilities in connection with their use and managements will profit by investigating them thoroughly.

A New Kind of Transportation Needed

MASS transportation of the kind to which the public has become accustomed and which has been developed by the advent of the street car, will always be in demand. But there is plenty of information available to show that mass transportation is only one of the forms of service that can be rendered for carrying people from one point to another. Bearing on this point J. W. Swaine of the United Railways & Electric Company of Baltimore, in an article in this issue, points out that there are trends in riding irrespective of the fare. In other words, since the rank and file of the urban population have become as prosperous as they are today they will ride the cars, regardless of the fare, if the service provided is the service they want. If not, they will seek some other means of travel and pay for it.

Before regulatory bodies the plea made by the company for a particular rate of fare almost invariably is based on the actual cost of the then existing service. Thus there is no incentive to determine if there is some other kind of service that will appeal to the public and so produce an additional number of riders or a greater income from the individual rider. In other lines of business there is unlimited proof that a change has come in the demands of the public. Economists may rave about extravagance in women's dress, but try, if you will, to buy a pair of cotton stockings in any metropolitan store! Try to find a 10-cent movie in any city! Try to get a 5-cent sandwich! Not only has the price gone up because of higher cost, but the quality has been improved to meet the demands of an ever-insistent public.

In transportation, of course, there have been more radical changes than in many other industries, because of the development of the automobile. But the automobile has not robbed its owner of the ability to buy

other things. Least of all has it deprived him of the desire for more transportation. Rather has it whetted his desire for more transportation. Even with the drive for "two cars to a family" there are many times when it is neither necessary nor desirable to use the auto. In the average family, with its members going to various destinations for the day's work or the evening's pleasure, it is not possible for one vehicle to serve all.

What is needed is not more mass transportation of the type we have known in the past, but development of a type of transportation that people will want to patronize in the future. Whether it will be by street cars or by some other medium is a problem to be worked out, not in the future but now. The modern street cars that are being tried in various places are part of the solution, but even modern cars used in the old-established way will not qualify to fill all the demands of the public. What is needed most is a thorough study to determine what the people will buy in the way of transportation. With that type of transportation to sell, the railway will not have much difficulty in getting the right to furnish it, and at a price that will be remunerative.

Consider the Customer-Owner Carefully in Conversions

BANKERS and utility company executives can ill afford to ignore the bearing which the present disposition to call in high-grade preferred stocks has on the matter of public relations. The theory is correct that in periods of easy money the effort should be made to redeem both high interest bonds and high dividend-bearing preferred stock, but as a writer in the *Electrical World* points out, thousands upon thousands of customers and employees are facing the problem of reinvesting the proceeds of preferred stocks now being redeemed at stated call prices. Probably most of these security owners are reaping a profit on the purchase price of their holdings, but to them the process of conversion or retirement is one with which they are not familiar. A definite reduction in income from the one now being received from preferred issues stares them in the face, and the course for the customer or employee owner to follow needs sympathetic consideration by the investment banker and by the utility man concerned in the distribution of company securities.

The utility company which has conducted vigorous customer-ownership campaigns may well do what it can to send its preferred stock holders financial explanations which will enable them to understand the situation and in the long run to suffer as little as possible from a change due to the working of the unchangeable law of supply and demand. Where the operating or holding company has sought investment money from customers or employees, it now has a real opportunity to perform an important task in public relations by helping its investors to adjust themselves to the new conditions. That all of the companies are not taking advantage of this opportunity is shown by the perfunctory tenor of call notices issued by some of the utilities. True, various incentives to invest in lower-rate preferreds are being offered holders of called stocks, but that has not always been so. In many cases the preferred stock holder need lose little or no income if he "switches" with intelligence, and opportunities still exist, indeed, for actual increase of total income through purchase of listed equities. For others

the possibilities of bond appreciation should not be overlooked. There is no need to embark on a program of responsibility for advice concerning investments, but the opportunity exists for the utilities to build warm business friendships with customer and employee owners during this transition period in security values. Certainly the utilities should be careful not to do anything that will tend to destroy the spirit of good will engendered in the past by their intelligent handling of the customer-ownership plan.

Twenty-five Years of Accomplishment in New Jersey

IT IS no mere flower of speech to say that New Jersey is a diamond mine richer than Kimberley. Comparatively speaking, the state has just begun to grow. In the near future a vast community will exist between the Hudson and the Delaware Rivers. These natural barriers have only recently yielded to the work of man in tunnels and bridges of which the present evidences are merely the beginning. All this means obligation for the Public Service Corporation of New Jersey and its personnel, but that corporation, through its officials, is fully conscious of the responsibility imposed by the growth of the territory served.

As Owen D. Young said at the dinner to President McCarter which marked the high point in the celebration of the 25th anniversary of the founding of the corporation, in imagination is the leadership of the world. The founder of the New Jersey company certainly had imagination. But a corporation can be no more articulate than is its personnel, and it is the accomplishment of the Public Service personnel, from the president down, that marks the corporation as worthy of the trust a whole state has reposed in it. Among the many things which illustrate this is the loyalty of all the employees, best evidenced perhaps by the 750 of all ranks eligible for the 10 per cent salary bonus which Mr. McCarter himself announced as a slight token of appreciation to all employees who have been with the company since its inception.

There have been trials and tribulations in New Jersey, many of them, but through prosperity and adversity the officers and employees have been dominated by the purpose to make the vision of the founder of the company a reality. That is a never-ending task, since the vision of the founder is a vision that constantly sees ahead. As tangible evidence of that vision there is the \$293,000,000 expended by the corporation on its system since the company was founded in 1903. But even that amount will seem small by comparison with the sum that will undoubtedly go into the property in the next 25 years.

In the past the transportation problem has caused the company concern, but with the co-ordination of trolley, bus and de luxe bus on a statewide scale and the more recently indicated disposition even to go into the taxicab business, the solution of that problem appears to be at hand. The New Jersey company is a striking instance of the fact that public utilities have assumed a place in the social structure second in importance only to that of the government. That the officers and the rank and file of the Public Service Corporation recognize fully that the interdependence of the people and the utilities becomes greater as the extent of the service grows and its uses multiply is proved by the record of their accomplishment.

Opinions Differed in Key System Fare Case

JUST how much nearer is a solution of the fare problem on the Key System Transit Company than it was last fall remains to be seen. An advance has been allowed in commutation rates, but the so-called local fares have been kept by the commission at 7 cents, and the single-trip ferry fare at 21 cents. The plea of the company was for a 10-cent local fare and a 25-cent single ferry fare. Apparently the commissioners were reluctant to throw an added burden on ferry riders and they appear to have agreed that the company would not benefit by a 10-cent local fare. In fact, one of the commissioners expressed the opinion that the company would probably have been better off had it retained the 6-cent fare, since there were more than 4,000,000 fewer riders in the first seven months after the increase to 7 cents. This very result appears to have been the determining factor in the recommendation of the commission last November that the company experiment with a 5-cent zone plan. To this proposal the company demurred. Coupled with the suggestion of the commission at that time was a 10-cent cash fare, a \$1 weekly pass, and an off-peak 5-cent cash fare between the hours of 9 a.m. and 4:30 p.m. A \$1.50 weekly pass good in two or three zones also was part of this plan. The disposition of the commission in its latest ruling was to criticize the company for its unwillingness to adopt the experimental fare suggested by the commission.

It must, of course, be acknowledged that fare experiments are fraught with danger, particularly since the opportunity for the carrier to recoup any losses is always so remote. On the other hand, it would be priceless to know in any particular situation just what had better be done. And that cannot be determined without recourse to experiment. According to Mr. Swaine's article elsewhere in this issue, fare is not the chief factor affecting travel. Even the doctors disagreed in the recent Key System case. As one of the commissioners put the matter, "competition and economic conditions have become far more potent than the order of any regulatory body such as the Railroad Commission." The further point made by one of the commissioners also is admissible, that to a very large extent the riding public, by its disposition to use or reject service, fixes and determines the rate of fare. Certainly the variety of the service rendered by the company and the disposition of the residents of the territory to constitute themselves into units tend to complicate the situation on the Key System.

Widening Horizons

WHEN a group of railway accountants held a committee meeting the other day in a central western city it presaged little out of the ordinary. It was supposedly just one of the necessary business sessions devoted to preparing a program for a forthcoming convention.

With their immediate business dispatched promptly, these men chose to linger for discussion; chose to abandon for the moment consideration of matters strictly within their profession and to view instead the broad problems of the transportation industry in which they were engaged. And as sometimes happens when men pause to take stock of themselves and of their immediate activities, this group soon became inspired with the idea that they might

be of greatest usefulness to the industry by disregarding for the nonce the details of their profession and devoting themselves to a search for new and untried methods of securing business for their companies.

While several very promising ideas were born of that meeting and arrangements are already under way to adopt at least one of them, the outstanding thing remains that these men gained a broader vision of the part they might play in improving the affairs of their companies. Beyond the existing boundaries of their present program of work they envisioned a broadening horizon of usefulness for the accountant through the application of accounting experience to the outstanding problem of the industry—that of building revenue in the face of a constantly increasing swarm of private automobiles. Let us hope that other groups in the industry will take it upon themselves to match these accountants in spirit and viewpoint.

Successful Selling Requires a Constant Search for Buyers

WHEN electric railways undertake to employ advertising for the several purposes to which it may be adapted, they accept the obligation to produce as advertised. Although the ride, whether by car or bus, is a salable product, its character varies widely on different properties. Advertising becomes impotent when its promise outreaches performance. Nor can advertising used to inform the public regarding transportation matters be expected to work miracles in changing public opinion overnight on a question in controversy.

Advertising, to be effective, must be sincere and it must stay within the facts. When used to sell a product it puts upon management and employees the obligation to produce as advertised. When employed to disseminate information, ample time must be allowed for the public to absorb the message; the various facts of the railway story must be told and retold, regularly and persistently.

Speaking before the Illinois Electric Railway Association several weeks ago, E. E. Soules, publicity manager Illinois Power & Light Corporation, said that the modern manager has learned that it is futile to rush into print and to expect the public to join in the mourning after his company is in trouble. Co-operation and understanding can be expected only if he has been telling the public all along his hopes and ideals and the facts of his business.

In this merchandising age electric railways, like other industries, must recognize that the advertising specialist can do his work effectively only when given the opportunity to plan a consistent campaign over a period of years. It is true that advertising tends to bring about improvement of the product. It does so through the effect the promise of good service has upon the attitude of the company's own employees. But, to repeat, the promise must not over-reach the actual performance—otherwise the advertising becomes not only dishonest but ridiculous as well.

Granted a really worth-while product, the creation of new customers is dependent on constant and compelling reiteration. The qualities of the Gold Dust Twins or Palmolive Soap are well known only because they have been far more than twice-told tales. The same principles apply in the merchandising of railway rides. The search for buyers must be constant, consistent and cumulative.

Graphs Assist in Lowering Costs and Improving Service

North Shore management uses charts to study work of its several departments. Merchandise handled, wages, passenger service delays, equipment costs and energy consumption are some of the items charted

By J. R. Blackhall

General Manager Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

EXTENSIVE use of graphs is made by the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., to check the work of its several departments and the activities of the company as a whole. Their use has enabled the management to analyze the regular reports more closely, with the result that many economies have been effected and several service improvements made.

In the merchandising dispatch department the tonnage has been increased, station labor reduced, more efficient methods of handling adopted, the cost per ton for handling reduced and the general movement of freight accelerated. In addition, tables showing the causes of damage to commodities and the kind of commodities for which claims were entered, have enabled the company to reduce its total amount of claims an appreciable amount. Passenger train delays have been reduced to a minimum and revenue built up because of the improved service. Electrical energy has been saved not only on the short runs but also on the long runs of both the passenger and freight trains. Other accounts also have been reduced and budgets have been planned more closely. In many other ways the charts have aided in effecting economies.

Figures for plotting the graphs are secured from regular reports submitted by the department heads and from the records of the company. These graphs, especially those dealing with budget control, are presented to the budget and expense committee, which meets every second Tuesday. Here, before all the department heads, the general manager reads from the tables and graphs the record, by accounts, of each department for the month and the period to date.

Any account showing an unexpected fluctuation is questioned and if the department head cannot at once explain this, he finds and reports later the reason for the deviation from the budget. After a careful analysis by this committee the information is distributed among the department chiefs or used to illustrate talks given before the superintendents as a group. Department heads, in turn, use them in talking before their supervisors and foremen. Many phases of the work, such as freight handling, train delays, passenger revenue and energy consumption, are discussed before the groups at regular intervals.

Numerous forms of charts are prepared to illustrate the data. Among these are straight line graphs, horizontal straight line graphs, tables and ledger sheets with colored squares to indicate important figures, as amounts

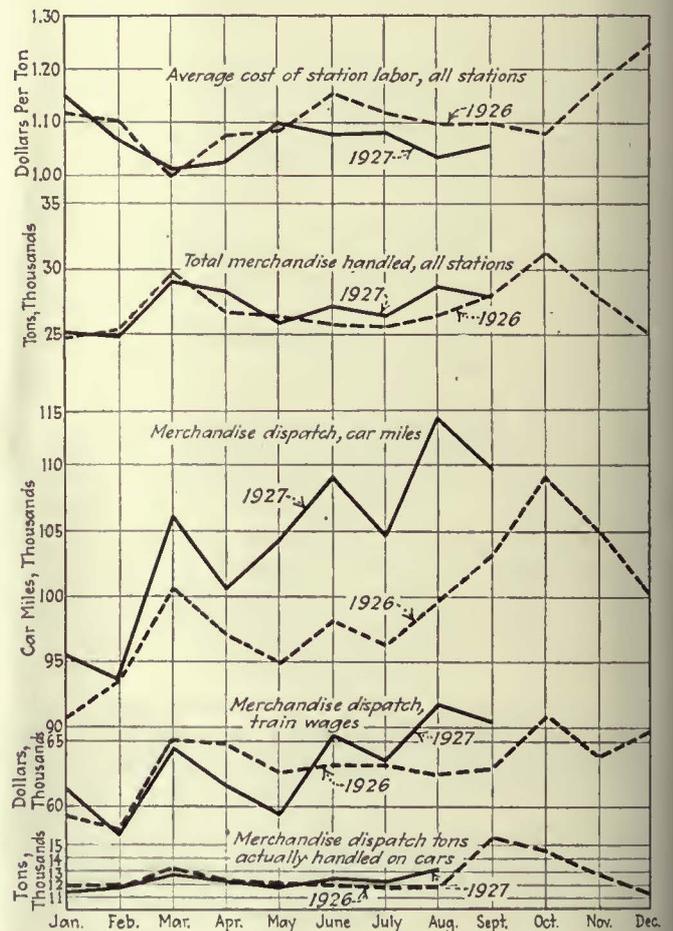


Fig. 1—Curves showing total tons of merchandise handled at all stations of the system, average cost per ton for station labor, merchandise dispatch car-miles and train wages

overspent and cars used in excess. Combinations of other conventional forms are used for special illustrations. Some of the graphs compare actual figures for a certain year with those of the preceding year, while others compare the data by months. Still others present the actual amounts with the budgeted amounts for a definite period. Separate graphs are plotted for the individual items of certain accounts, permitting a more thorough analysis.

Several charts are prepared each month showing the figures for the merchandise dispatch department. In addition to monthly comparisons of tonnage, cost per ton

and the number of warehouse and office men employed, curves are plotted showing the figures for the past year and the year previous for total tons of merchandise handled at all stations, the tonnage handled at each station, the average cost per ton for station labor, train wages and the merchandise dispatch per mile. A typical group of merchandise curves is shown in Fig. 1. A similar group of charts is made up for each freight station of the system and these charts are used in meetings with the freight agents for the respective stations. Tables listing the claims by commodities and by causes are prepared and used also in meetings with the freight agents. These have proved very helpful in reducing the claims for the department. In the accompanying table is a typical classification of claims by causes.

TRAIN SCHEDULING SIMPLIFIED BY SERVICE CHECKS

Service checks are made of all trains and the data plotted on charts for use in scheduling the trains on future runs. The system schedules an average of 360 trains of one to six cars through a densely-populated territory in which the traffic is different each day of the week. Because of these reasons it is a difficult task to assign the proper number of cars to the various trains. The company wishes to furnish sufficient cars to satisfy the customers, yet must not because of the excessive cost provide cars in excess of what are needed. Economical scheduling requires a uniformly distributed load on the trains, so the company makes very close checks of the trains in the following manner:

Every conductor prepares a traffic card, indicating the number of passengers on his train and listing the stations of the particular division on which he is serving. These traffic cards are turned in to the transportation department, where they are compiled and entered on a sheet giving the train number, the number of cars and the

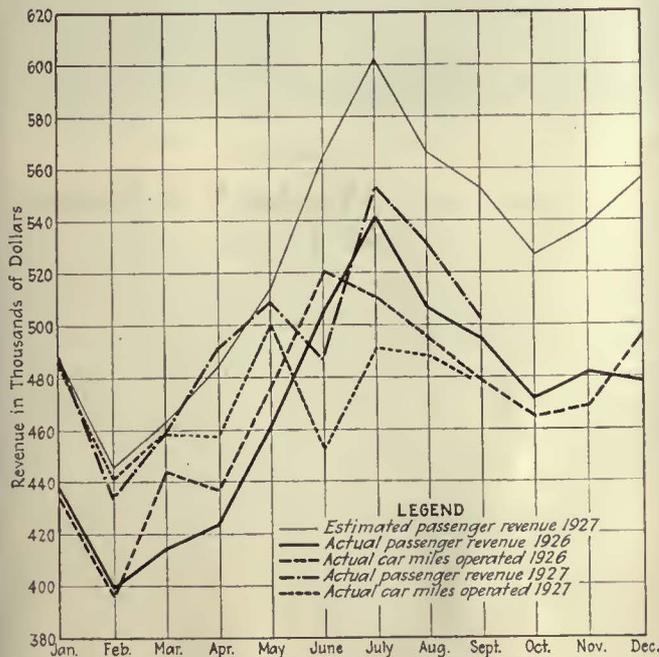


Fig. 3—Comparison of passenger revenue and car-miles for 1926 and 1927. Estimated passenger revenue for 1927 is plotted also

		OCTOBER												
Train No.		17	18	19	20	21	22	23	24	25	26	27	28	29
		M	T	W	T	F	S	S	M	T	W	T	F	S
401	B	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
403	B	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
405	B	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
407	D	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
409	P	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
411	B	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
413	P	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
415	DB	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E
417	D	3 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E	2 1/E

LEGEND
 2 1/E Two cars scheduled, 5 run, 3 extra deadheaded
 2 2 1/E Two cars scheduled, 2 run, 2 were allright
 3 1/E Three cars scheduled, 2 run, 1 short, needed three
 3 4 1/E Three cars scheduled, 4 run, 1 car extra, not deadheaded

Fig. 2—Service check of nine trains for an eight-day period. The scheduled cars for five days in advance also are given

passengers at the various stations. A chart is prepared showing for each day of the month and for each train the number of cars scheduled for that particular run, the number actually run, the number that were dead-headed and whether the train as operated had enough or an excess of equipment. This chart also shows the number of cars the transportation department proposes to run for each train, the number being checked by data of previous runs. For example, if the company on Tuesday was deciding what number of cars to schedule for the coming Thursday, it would check back three Thursdays to see what equipment had been used and whether it was sufficient or not. Use of this method has saved the company a considerable number of car-miles in its interurban service.

MERCHANDISE DISPATCH CLAIMS BY CAUSES, SHOWING AMOUNTS PAID FOR ALL STATIONS

Causes	1927					
	January	February	March	April	May	June
Rough handling.....	\$177	\$352	\$150	\$189	\$134	\$168
Concealed damage.....	196	126	327	244	158	66
Shortage entire package.....	98	195	149	128	159	137
Pilferage.....	8	..	2	9	..	2
Concealed loss.....	..	3	12	..	1	5
Freezing.....	2	23	..	..	..	..
Fire.....	..	..	..	..	..	..
Wreck.....	..	..	..	..	..	..
Damage by water.....	..	5	..	..	6	20
Unlocated loss.....	..	41	..	..	..	..
Delay.....	..	..	..	6	..	50
Improper loading.....	..	..	..	..	6	..
Improper refrigeration.....	..	9	..	..	..	5
Unlocated damage.....	..	..	57	..	15	19
Error in delivery.....	..	..	10	97	..	6
Total.....	\$481	\$754	\$707	\$673	\$478	\$480

Fig. 2 shows a train service check of nine trains for eight days and the number of cars scheduled for five days in advance. In addition to the car scheduling checks, passenger revenue and car-miles, both actual and estimated, are plotted. Figures, by months, for the past year and the year previous are used.

MUCH HAS BEEN DONE TO REDUCE CAR DELAYS

Car delays have been reduced to a minimum on the North Shore by classified checks of the causes of delays and constant effort on the part of both management and employees to eliminate them. Each month a report is prepared which lists all delays for the period and gives the date, number of the train, the time lost and the cause for each delay. The delays are allocated to the following departments according to the responsibility for their occurrence: Trolley, equipment, transportation, power and way. Copies of the monthly reports are furnished to all supervisors and the delays are discussed at their meetings. Because the delays are charged to the various

EQUIPMENT		JAN.	FEB.	MAR.	APR.	MAY
29 Superintendence of Equipment						
Legend	2901 Salaries	137	25	471	437	147
	2902 Supplies and Expenses		22	6	18	77
Amounts overspent, shaded.	30 Passenger and Combination Cars					
More than \$500 909	3001 Painting and Varnishing	2045	1797	1714	1627	1607
	3002 Car Bodies	560	18	352	567	227
	3003 Draw Bars and Draft Rigging	469	0	176	163	457
Less than \$500 145	3004 Trucks	2051	1294	747	1512	119
	3005 Brake Shoes	20	38	113	750	17
Amounts underspent, unshaded.	3006 Air Brake Equipment	12	52	245	10	85
	3007 Air Compressors and Governors	19	42	11	20	1
	3008 Heaters	116	54	65	172	111
	3009 Repairs Due to Accidents	2856	1058	183	758	731
	3010 Wiring, except for Electrical Equipment of Cars	79	143	433	120	15
	3011 Wheels and Axles	909	280	853	1370	587
	31 Freight, Express and Mail Cars					
	3101 Express Cars	21	558	433	1156	81
	3102 Freight and Mail Cars	392	847	164	159	142
37 Shop Expense						
	3701 Heating and Lighting Shops	312	188	412	105	210
	3702 Misc. Supplies and Expenses, incl. small hand tools, etc.	203	214	66	1	26
Actual Expenses - No Depreciation		56175	55320	51616	50321	32473
Budget Allowed - Depreciation Deducted		54220	54220	53170	52220	51920
Difference in actual and budgeted amounts for total equipment		1955	1100	1554	1989	559

Fig. 4—Section of an equipment account showing for five months the amounts under-spent and over-spent for each particular item

departments, a rivalry exists among them and every employee makes an effort to keep down the delays in his department.

Closer and more accurate budgeting is made possible by using budget control sheets. One of the sheets prepared for equipment is shown in part as Fig. 4. The complete sheet gives the amount that each individual account was over-expended or under-expended with respect to the budget. Similar sheets are kept for power, conducting transportation, way and structures, traffic, advertising and miscellaneous. The equipment report shows that the mechanical department was able to perform its work with little more than the amount allowed it on the budget. Those directly responsible for the work of the departments, the various supervisors and foremen, are conferred with in regard to the charts, so that these men as well as the management know the costs. This results in a much better esprit de corps among the men at all times.

Checks are made of energy consumption on every branch of service of the company, and the data on a kilowatt-hour per car-mile basis plotted on charts. Because of the extremely high speed of the trains and the

rigid schedules, a number of the motormen did not consider it possible to effect any energy saving. However, the preparation of charts showing the energy consumed and the further instruction of motormen who were careless and unmindful, resulted in huge savings. During the nine months in 1927 from January to September, inclusive, the kilowatt-hours per car-mile were reduced from 2.92 to 2.63. Additional charts are kept which record the performance of each motorman in the various classes of service. This information is furnished the division superintendents and the power inspector, so that an immediate check can be made of each individual motorman. If a motorman is using more than the average, he is given additional instruction in energy saving. Some of the motormen who previously have operated their trains economically become lax and waste energy. The system enables the inspectors to check these men also.

Only a few of the large number of charts used successfully by the company have been described. Others are playing equally as important parts in lowering operating costs and improving the company's service to the public.

Electrically Welded Car Bodies and Trucks

SUCCESS following the substitution of electric welding for rivets in building construction, has suggested to some European electric railway managers that electric welding might be used to advantage to car body and truck construction. The Liège Consolidated Tramway has actually built a car in which the members of the steel framework were joined by welding rather than by rivets. The saving in weight is estimated as between 9 and 10 per cent. The reduction in energy consumption thus gained is not the only advantage, in the opinion of the company, as there is thought to be also a saving in car maintenance and also a reduction in noise. The use of the same system for car body construction is proposed by the Turin Tramways, and the Lausanne Tramways has built truck frames by the same system.

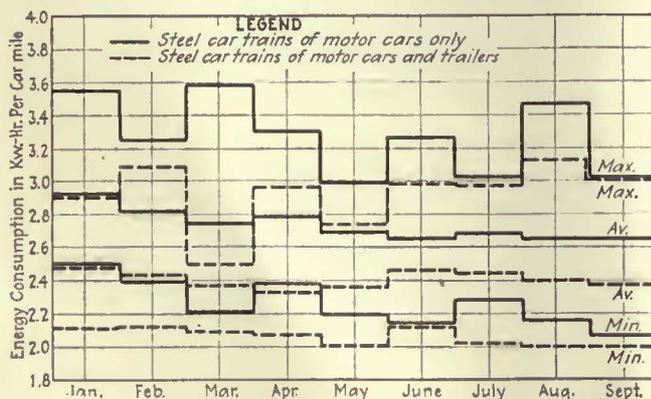


Fig. 5—Maximum, minimum and average kilowatt-hours per car-mile for steel car trains composed of motor cars and for trains of motor cars and trailers in Milwaukee limited service

What Happens to an Anti-Climber

In a severe collision between two trains in a station on the Hamburg Elevated Railway, the anti-climber on one car was bent and a coupler support broke. Otherwise, the damage was slight and there was no overriding of one car by the other

By Dr. W. Mattersdorf

Manager Elevated Division Hamburg Elevated Railway, Hamburg, Germany



At left, end of Hamburg elevated car before addition of automatic coupling and anti-climber. At right, after their addition

CARS of the Hamburg elevated railway were equipped last year with an automatic universal coupler and also with an anti-climber, consisting of horizontal projecting ribs. The first two illustrations show the front of the car before and after this remodeling. The new coupler served very well during normal operation, but until recently experience as to how it would behave during a wreck was lacking. A collision which occurred on March 30 of this year, however, has now provided remarkable testimony of the excellent properties of this equipment.

The collision occurred at the Brückenstrasse station on the Elevated line, and its cause was that the station attendant by mistake gave a clear signal for the entrance into the station, although the train ahead was still standing there. Consequently the second train entered and hit the solidly braked train ahead of it at the consider-

able speed of 30 km. (19 miles) per hour. The effect of the impact upon the standing train was great. In fact, it was pushed bodily along the tracks, while the incoming train, losing its inertia, stopped almost immediately after giving its blow. Before the second train stopped the distance between it and the colliding train was 8 m. (26 ft.). The following describes what happened during the collision.

The colliding trains coupled automatically without damage to the couplers. This provided a rigid connection between the two trains and, with the anti-climber, helped to keep the platform of the first car of the incoming train from climbing over the platform of the rear car of the stationary train. However, the draft gear guide directly behind the coupler head of the incoming train broke, causing the coupler to drop down. It hung onto the struck car, as shown in the third illus-



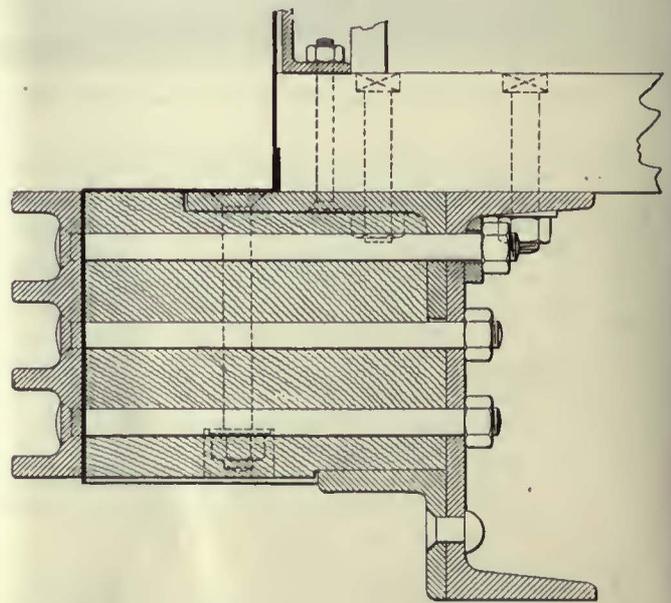
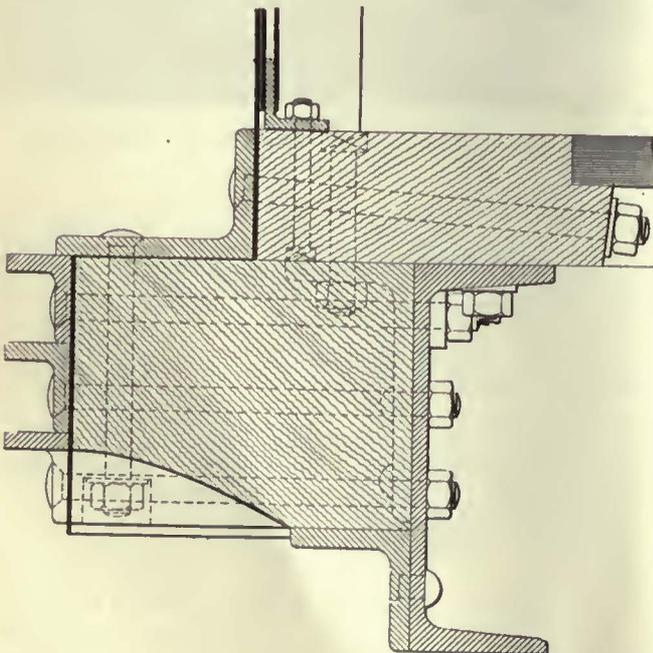
The cars became coupled at the time of the collision, but the impact broke the coupler support of the colliding car. As the stationary car went forward from the blow, it took both couplers with it, as shown in the left-hand view. The right-hand view shows the end of the colliding car with the damage done to the anti-climber. Except for broken glass, there was practically no other injury to the cars

tration, falling upon the roadbed. The two colliding cars were undamaged, aside from broken glass panes from the heavy shock.

How well the anti-climber took up the shock can be seen from the fourth illustration. It was the first type of this device installed made up of three angle irons, as illustrated in the first line drawing. From the view

given of the anti-climber after the collision, it is evident that the round faces of the coupler heads bent down the lower angle iron and that the rivet heads fastening the angle irons on the stationary car left their marks on the horizontal rib of the oncoming car.

This accident, for the first time on the Hamburg system, demonstrated the great value of the anti-climber in



Anti-climbers in Hamburg were formerly built up from several angles (see left-hand section). Now they are made in one piece, as shown at the right

a serious collision. When it is considered that telescoping of the cars causes most of the injuries, the safety afforded by the anti-climber in such accidents cannot be too highly stressed.

In the latest anti-climber used on the Hamburg Elevated division, the ribbing no longer is provided by riveting angle irons together, but the anti-climber is rolled in one piece, as shown in the second line drawing. How slight the damage was to the cars is best indicated by the statement that both trains proceeded to the repair shop under their own power. Since the electric coupling cables between the cars were ruptured, it was, of course, first necessary to make the needed electrical reconnections.

A detailed account of the coupling with which the cars are equipped was published in the issue of ELECTRIC RAILWAY JOURNAL for Sept. 10, 1927, page 435. It was patterned after one of a somewhat similar type used by the Philadelphia elevated railway but is of somewhat lighter design.

The mechanical and pneumatic parts were supplied by the Scharfenberts-Kupp'ung, A.G., and the electrical parts by the railway department of the Allgemeine Electricitäts Gesellschaft of Berlin.

Has The Economic Limit in Car Fare Been Reached?

Records by months since 1920 of passengers carried in Baltimore, Cleveland, Brooklyn, Pittsburgh, St. Louis and Boston show no definite connection between changes in traffic and changes in fares, and indicate that a charge of 10 cents a ride is not the economic limit in street railway fares

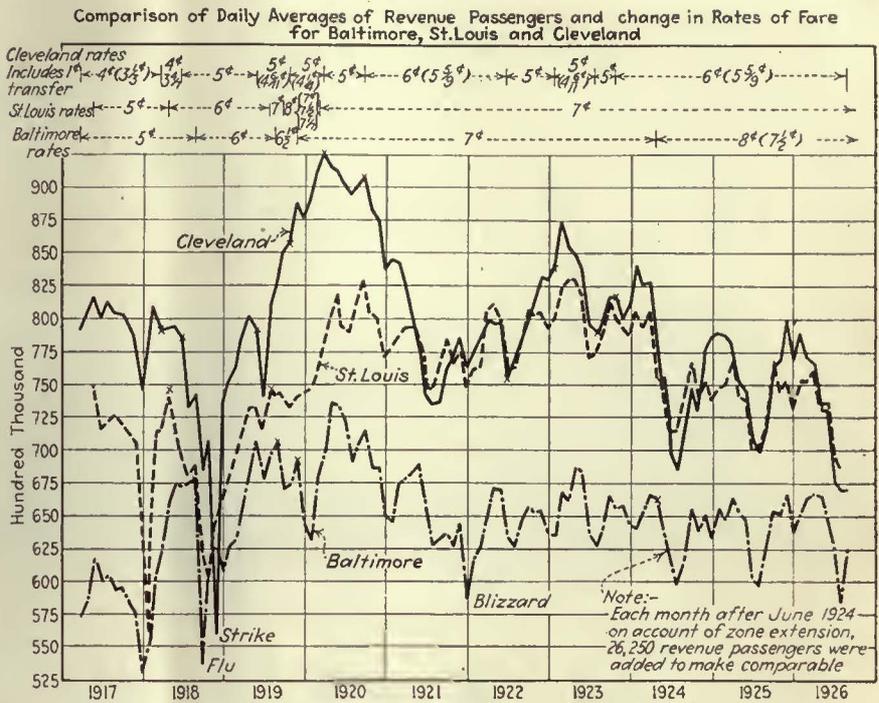
By JAMES W. SWAINE

Statistician United Railways & Electric Company, Baltimore, Md.

SOMETIMES it is claimed that the economic limit in car fares is reached when a fare of 7½ cents is charged, and that any higher rate will greatly discourage travel. This assertion is made without due consideration of all of the facts. To determine them, the writer has compiled the accompanying charts to find what effect, if any, changes in fares have had on the riding habits in several cities where a number of fare changes have been made.

The problem is admittedly not the same in small cities as in large cities. As information was wanted for cities about the size of Baltimore, those cities selected for comparison with it were Boston, Brooklyn, Cleveland, Pittsburgh and St. Louis. In these cities the present rates of car fare vary from 5 cents flat to 10 cents flat.

The chart on page 936 shows the number of passen-



Daily averages of revenue passengers compared for Baltimore, St. Louis and Cleveland

It will be noticed that from 1920, on the right hand side of the chart, there is a striking similarity in the graphs of the three properties. During the period

shown there was no change in fare in St. Louis, but there were a number of changes in fare on each of the other two properties.

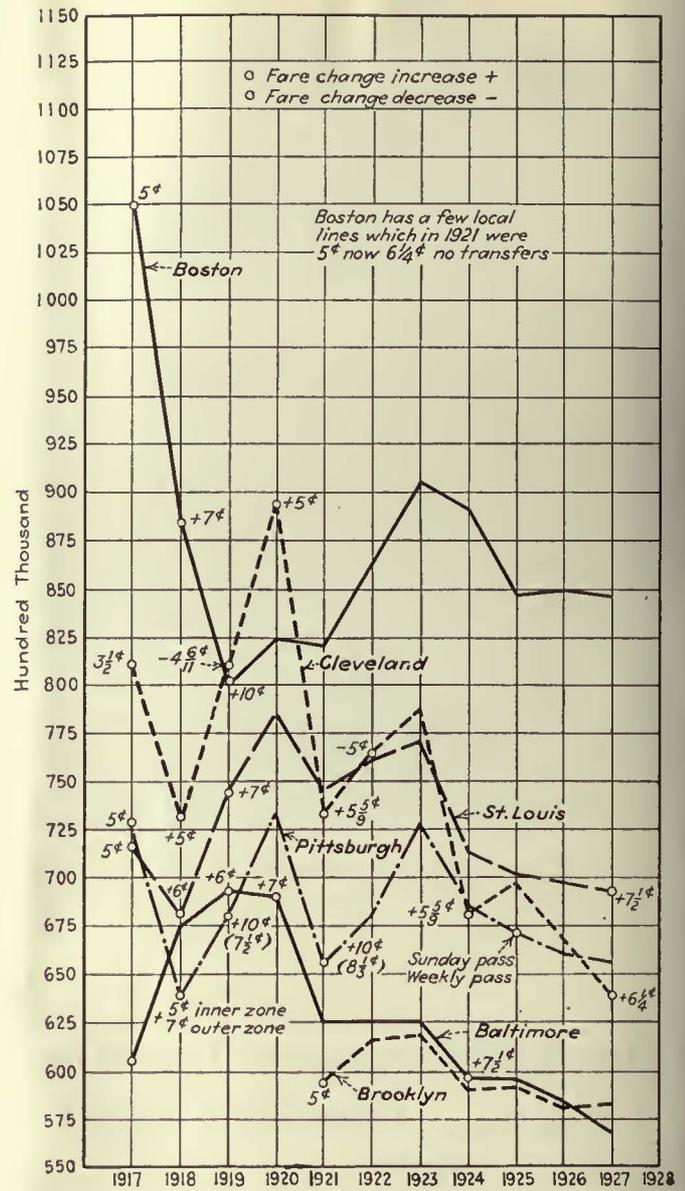
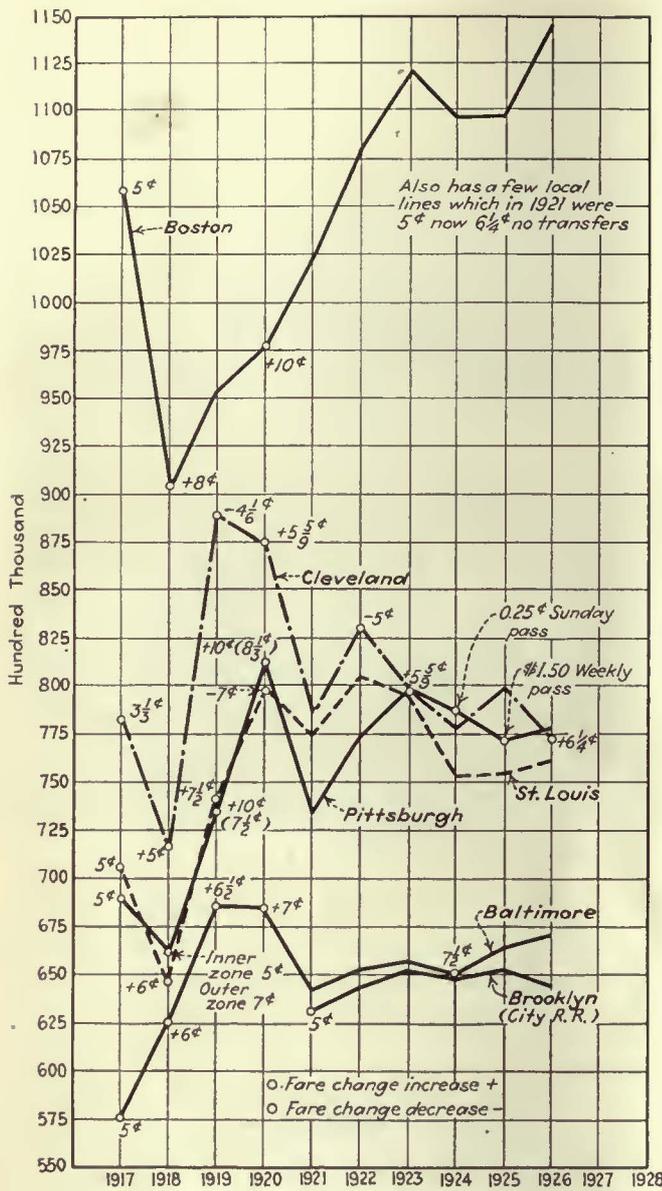
gers carried during December for several years by the electric railways in the cities named, together with the dates of the changes in fares on those properties. The second chart shows similar data for the month of August.

In the first chart it will be seen that in Boston, where a 10-cent flat fare is in effect (except on a few local lines, on which the fare in 1921 was 5 cents and is now 6½ cents), there has been a constant increase in revenue passengers carried since 1919 except in one year. In the other cities whose records are charted, varying figures for passengers carried are shown, but in general the traffic is somewhat more than in 1917 and has been fairly constant since 1920. The fact stands out clearly, however, that the variations in passengers carried bear little, if any, relation to the changes in fares.

Attention will now be directed to the second chart of passengers carried during the same years but in the month of August. Here the trend since 1920, in all cities except Boston, has been steadily downward. It will also be seen that this chart, like the other, shows the striking fact that this trend has occurred irrespective of the changes in fares, whether they have been up or down. Thus in both charts, the line for Brooklyn, (Brooklyn City Railroad) has about the same direction as those for Baltimore, Cleveland, Pittsburgh and St. Louis, although in Brooklyn the fares were kept at 5 cents flat, whereas the fares in the other cities were increased. The one exception in both of these charts is Boston, the one city of the six charging a 10 cent flat fare. Here revenue passengers have steadily increased during the winter months ever since the 10 cent flat fare was inaugurated, and the summer months have held their own.

REASONS FOR LESS TRAFFIC IN THE SUMMER

The reasons for this falling off of traffic in the summer time as compared with winter must be sought in other causes than changes in fares, as the trend is so



These charts show the daily average of revenue passengers during a typical winter and a typical summer month in five American cities of approximately the same size. The chart at the left is for the month of December for eleven years; that at the right is for the month of August during the same years

uniform and general. The chief reason is undoubtedly the growth of automobile riding, which has brought about a substitution of the automobile for the street car, especially in the summer, whereas during the inclement days in the winter, automobiles are more likely to remain in the garage. This same theory probably explains the marked difference in trend for winter travel in Boston, as compared with the other five cities. The cold winters with their heavy snows in the narrow streets of that city undoubtedly discourage winter automobile travel to a greater extent than in any of the other five cities mentioned.

Another cause for the falling off of travel in summer, though probably of less importance than the influence of the automobile, is the growing tendency in summer for stores and offices to suspend work on all or part of Saturday. This custom permits many people to make weekend trips from Friday night or Saturday noon to Monday morning and takes out of the city many who would otherwise patronize the street railway. In Baltimore, for example, where the figures are available, while week-

day riding during the summer has remained fairly constant, heavy losses have occurred in revenue passengers on Saturdays and Sundays.

To resume, then, these charts indicate that fares as high as 10 cents flat are not responsible for losses in revenue passengers. For this reason it cannot fairly be said that a flat rate of 10 cents even approaches the economic fare limit.

MONTHLY RECORDS FROM THREE CITIES

The chart reproduced on page 935 compares the daily averages of revenue passengers (with change in rates of fare) for Cleveland, St. Louis, and Baltimore, from 1917 to the middle of 1926. It will be noted that the fluctuations in almost every case occur independently of a change in the rate of fare. This is particularly striking, as St. Louis had no change in fare from early in 1920 to the end of the chart, yet its trend is almost identical with Cleveland and very similar to Baltimore. Both of these two cities had fare changes during the period shown in the chart.



Latest type yard construction in Bavaria, with simple insulation, grounded cross-spans and track isolation

Many German Railroads Are Electrified

Expansion of electric lines has been steady. Distribution systems, locomotives and other equipment differ on various units of the German Federal Railroad

By *Kent T. Healy*

Research Associate Yale University, New Haven, Conn.

PROGRESS in the electrification of the German main-line railroads has been rapid since the formation of the new operating company pursuant to the reorganization of railroads in that country under the Dawes plan. The mileage of electrified track has gone up from 382 in 1924 to 773 at the end of 1927. More than that, there are 201 additional miles of track on which the installation of electrical equipment is under way at present. The number of electric locomotives went up from 114 in the earlier year to 316 at the close of the last year, and 98 more locomotives are on order. Corresponding increases in multiple-unit cars have been made. From 1924 to 1926 the ton-miles hauled went up from 1,236,000,000 to 4,000,000,000, an increase of 225 per cent. More complete figures are given in an accompanying table.

The change in the situation is the more marked in that electrification of the German railroads was begun many years ago. The first installation was in 1903, when two suburban lines in the Berlin district were equipped, one for direct current and the other for single-phase alternating current. The latter was installed for experimental purposes, but was followed with a commercial single-

phase road in 1907, when the Hamburg suburban lines were equipped with this system utilizing 3,300 volts at 25 cycles.

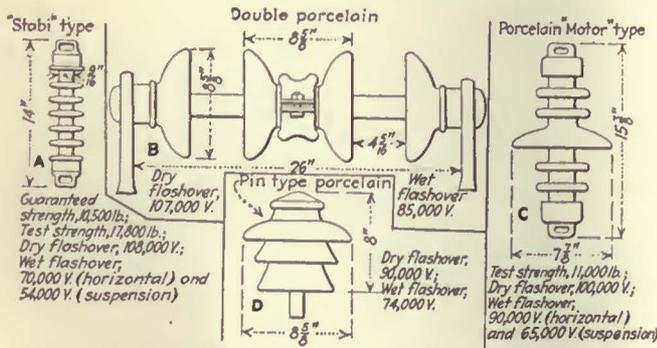
In 1910 the heavy traffic lines north of Leipzig were electrified, also for single-phase alternating current but at a pressure of 15,000 volts and a frequency of 16 $\frac{2}{3}$ cycles. The Mittenwald Railroad on the Austrian frontier was constructed for electric operation in 1913. This served as the beginning of the Bavarian electrification, which has become the largest unit in Germany. The lines in the mountainous territory in Silesia, equipped for electric operation in 1919, have become the second largest group. Electrification of all the suburban lines out of Berlin was started in 1924, when a preliminary line to Oranienburg was equipped with a third-rail system for 800 volts direct current. The electrification of the Berlin lines is the outstanding feature of the German Federal Railroad Company's electric traction program at the present time. Articles appearing in the Nov. 5 and Nov. 26, 1927, issues of this paper described in detail the Berlin electrification and the cars to be used on the line.

In general, the policy of the various railroad units



Five principal regions are served by the electrified lines of the German Federal Railroad Company

has been to generate their electrical energy individually, rather than to buy from independent power companies. The power plant which supplied the Silesian group was first privately owned, but the arrangement proved so unsatisfactory that it was later purchased by the railroad company. Proponents of the two plans again advanced arguments when the decision to electrify the Berlin suburban lines was made. The situation was particularly tense, since three-phase current at commercial frequencies was to be used for transmission instead of the single-phase, low-frequency system adopted on the trunk lines. The railroad company argued that it would be cheaper to produce the electrical energy than to buy it, that the com-



Four types of insulators for 15 kv. overhead construction

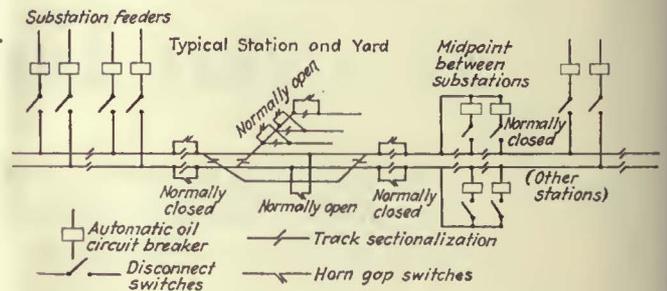
- A: "Stabi" type—Guaranteed strength, 10,500 lb.; test strength, 17,800 lb.; dry flashover, 108,000 volts; wet flashover, 70,000 volts (horizontal), and 54,000 volts (suspension).
- B: Double porcelain—Dry flashover, 107,000 volts; wet flashover, 85,000 volts.
- C: Porcelain "motor" type—Test strength, 11,000 lb.; dry flashover, 100,000 volts; wet flashover, 90,000 volts (horizontal) and 65,000 volts (suspension).
- D: Pin type porcelain—Dry flashover, 90,000 volts; wet flashover, 74,000 volts.

pany did not wish to be electrically connected with a net that would spread the damage of other failures to its own service, and that it seemed better from an organization point of view to have so important an element in the production of transportation under its own wing. Representatives of the power companies replied that the railroad was not fairly nor soundly figuring its costs as to freight and depreciation, that modern switching and protective equipment prevented the spread of failures in the network, and that the advantage of several power sources was considerable. Only recently, and after much pressure, did the railroad give up the plan to build its own power plant.

Most of the power plants are steam operated. Both the Silesian and Leipzig plants are in coal fields, the former using hard coal and the latter the so-called brown coal. The Bavarian group is supplied by energy from one main hydro-electric plant at the headwaters of the Isar River and several smaller plants lower down on the same river. Coal is expensive in this region, so that a considerable saving is being effected in the use of water power.

SUBSTATIONS CHIEFLY OF INDOOR TYPE

Electrical energy for the railroad is transmitted at potentials varying from 60 kv. to 100 kv. All lines are designed for single-phase a.c. at low frequency, so that no phase or frequency conversion is necessary at the



Distribution of switching system for a typical station and yard

substations, which supply an unusually large area, causing high load factors. In the Leipzig section the substations are from 3,600 to 6,000 kva. capacity, each supplying approximately 37 route-miles. In the Silesian section the capacity of two substations is 6,400 kva. and of a third 4,800 kva. with an average mileage of 54 for each. Three substations, two with 10,000 kva. capacity and one with 15,000 kva. capacity, supply 273 miles of road in the Bavarian territory, an average of 91 miles each.

Most of these substations are of the indoor type. The high-tension switching arrangement is standard, though the switches themselves open through resistances incorporated in the tanks. The transformers are placed in isolated compartments with frail doors, a safety measure in case of blowouts. The transformers are rated at 130 per cent load for two hours, 150 per cent for 30 minutes, and 200 per cent for ten minutes. The impedance permits about 9 per cent normal voltage on short circuit.

The 15-kv. switching in the modern substations is handled by resistance breakers, with a rupturing capacity of 200,000 kva. in each feeder circuit. These open on overload with a definite time limit. They are connected to either of two buses by disconnect switches. In conjunction with these buses is a high resistance that can be connected between either bus and the full voltage terminal of the transformers, so that a given feeder can be ener-

gized at full voltage from the spare bus with a minimum of 10 amp. flowing. This is used for testing a given circuit, having the advantage that full potential is applied at the fault with a low current that is not destructive.

For over-voltage protection fairly satisfactory results are obtained by a sphere gap to ground, shunted by an oil switch and resistance, which automatically shorts the gap when it discharges. The switch immediately opens following the discharge.

BAVARIAN DISTRIBUTION SYSTEM HAS NOTABLE FEATURES

The distribution system of the most recent electrification in Bavaria is of particular interest because of its effectiveness in isolating faults, its simplicity and its low cost. Each main-line track is fed separately from the substations at both ends through oil circuit breakers. Midway between the two substations is another automatic oil switch separating the two halves. This switch is normally closed, but it opens instantaneously on about 350 amp. overload. It thus divides the track section in halves, allowing operation on the unaffected portion to continue with energy from the corresponding substation. This intermediate oil switch is also arranged to close automatically if the voltages on the two sides are in proper phase relation. The main-line tracks are sectionalized at all stations with motor or manually-operated horn-gap switches. There are ties between tracks which are normally open. Sidings and yards are fed off either track through other horn-gap switches which are kept open when the tracks are not in use.

This distribution system is under the control of the substation operators in the districts. With the opening



Single-track line showing use of concrete poles

of a breaker on a feeder, the circuit is first tested through the current limiting resistance. If 8 to 10 amp. flows there is a serious short on the line, not merely a flashover.

The operator gets in touch with the station-masters and signal men who operate the various sectionalizing switches, and asks them to cut off the track section by section, starting from the point where the middle breaker has sectionalized the line. As each section is cut off a test is made with the low current circuit, and if it does not show clear other sections are opened in turn until the faulty section is found. The maintenance men are then sent out to repair the fault.

The maintenance groups usually are furnished with small rail motor cars for maintenance requiring only light ladders. For heavier work tower cars are handled by steam locomotives drafted from some other

MILES OF ELECTRIFIED TRACK AT ENDS OF YEARS 1924-1927, GERMAN FEDERAL RAILROADS

	1923	1924	1925	1926	1927	Building
Miles electrified....	382	405	582	652	773	201
Electric locomotives	114	152	246	301	316	98
Multiple-unit cars..	191	250	287	343	341	699
Ton-miles hauled....	1,236,000,000	1,730,000,000	3,080,000,000	4,000,000,000	...	...
Kilowatt-hours used	64,000,000	84,000,000	148,000,000	192,000,000	...	...

CHARACTERISTICS OF GERMAN ELECTRIFIED SECTIONS

Section	Service	End of 1927					Year 1926			
		Miles of Electrified Lines	Locomotives	Multiple Units	Power Plant, Kw.	Millions of Kw.-Hr.	Load Factor in Per Cent			
Silesia....	Heavy grade, general..	158	56	71	21	21	24,000	46	1,170	38
Leipzig....	Heavy local, passenger.	113	..	75	29	3	26,500	34	1,087	42
Bavaria....	Some grades, general..	378	50	49	47	25	79,600	51	1,130	31 to 37
Baden....	Miscellaneous.....	30	..	16	..	..	..	7	73	..
Berlin....	Suburban.....	70	95	..	1	140	341	25	102	..
Hamburg....	Suburban.....	20	..	..	..	150	..	28,500	29	436
Others....	Miscellaneous.....	4	..	5	..	2	..	..	..	..



Old type yard construction with crossbeams in Silesia. Note absence of deflectors and use of intermediate wire

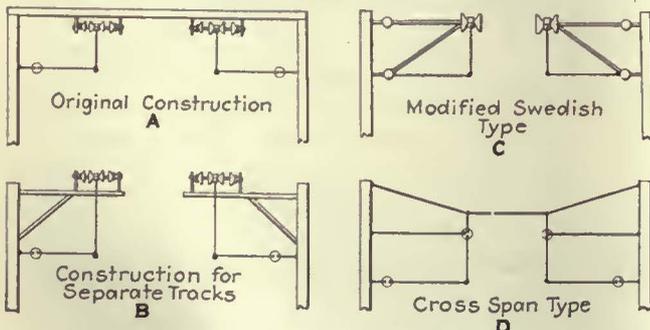


Yard section breakers with simple insulation. Messenger insulator removed from arcing region for protection

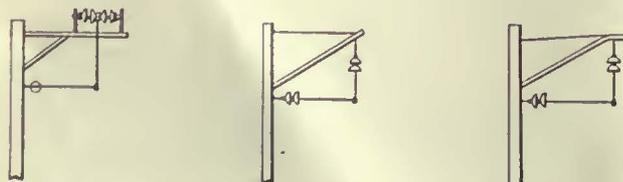
service when needed. The latest equipment for the heavy work is a self-propelled car, with a collecting pantograph for operating a motor-generator set off the 15-kv. contact wire when in live sections. The car is driven by d.c. motors, which are supplied from either the motor-generator set or storage batteries charged by it. A second pantograph is used when in a dead section for grounding the contact wire readily and for gaging its alignment at the same time. The size of maintenance crew varies. A typical group, however, is one of seventeen men which takes care of 62 route-miles, of which 12 miles have four tracks and the remainder double-track.

MANY TYPES OF OVERHEAD IN USE

The overhead construction of the various groups has been through many stages of development, and nearly every type of design has been given a trial. In the Silesian section, for instance, the types as shown below have been installed. The original 328-ft. spans were found to be too long because the wind blew the contact out of line. Also, the two tracks were not mechanically separate. A modified Swedish Z construction was tried but the longitudinal strength was not considered sufficient. Cross-spans were also tried, but the possibilities of breakage were considered too great to permit their use on the main line. In the yards, crossbeam supports were used at first, but the visibility through the structures was found too low, so various forms of cross-span design have been installed. Concrete poles made by the centrifugal method are in service in some places. Their expense is too great to justify their use. The construction contemplated for line extensions in Silesia is for use with mechanically separated tracks and normally makes use of bracket poles. Two-track brackets will be used for some distance at



Types of overhead used on Silesian main lines



Bavarian single pole construction for mechanical separation of tracks

each signal to permit an unobscured view of the signal for the enginemen. Pin insulators are to be used at the points of support because of their cheapness and the need for shorter poles. Spans 460 ft. long will be used with intermediate steady braces on the shorter poles. In the last few years the Bavarian group has expanded more than any of the other groups and has done considerable developmental work. Originally heavy yard construction of the cross-span type, with double insulators throughout, was used. With the advent of the so-called "stabi" and suspension type insulators much lighter yard and main-line designs have been possible. Mechanical separation of tracks has been retained in all designs and the separation is considered most essential to safety. Grounding of steady spans in all yard construction has been insisted on as a safety measure for linemen and to keep all insulators under voltage continually.

General details of the catenary design have been standardized for all groups. A copper contact wire of 198,000 circ.mil cross-section is used on the main-line sections and of 158,000 circ.mil on branch and yard lines. Weight devices hold the contact wire in constant tension. On the Silesian system tensions of 2,600 lb. are used.

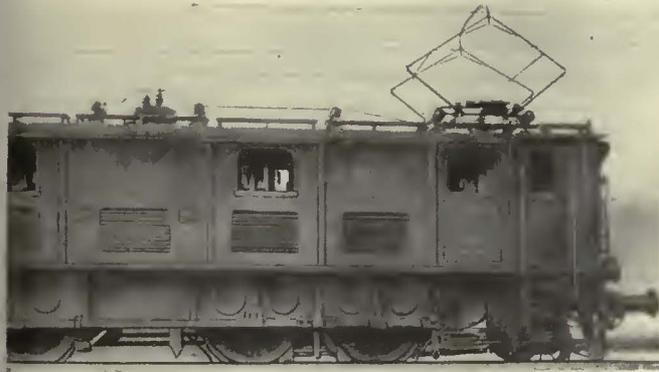
A messenger cable of bronze or galvanized steel is used, having a cross-section of 0.078 sq.in. and a diameter of nearly 3/8 in. The hangers are made of stranded bronze cable spaced every 41 ft. Fittings are all of non-corrosive material. The catenary design allows for wind loads of 14.3 lb. per square foot and ice loads of about 0.5 lb. per running foot of catenary at 18 deg. F. The minimum temperature allowed for is -4 deg. F. The first catenary design was based on the use of an intermediate strand to give flexibility to the contact, but experience has shown that this is unnecessary if flexible hangers and "soft" steady devices are used. In the earlier designs many pantograph failures were caused by the wind swinging the catenary to the side on the long spans. A study has shown that with the simple catenary 246 ft. is the maximum distance between lateral supports that can be used with a maximum wind velocity of 69 m.p.h. and an allowed displacement of 29 1/2 in. from the center line of the track.

PANTOGRAPHS EMPLOY AUXILIARY BOWS

The pantograph used is typically European, with a main frame and an auxiliary bow. The shoe itself is usually of aluminum, greased or not, as local practice dictates. Some experiments have been made recently with carbon shoes. If these shoes are used on sections along with others they are worn down in a short time, but if the carbon shoes alone are used a hardened surface is formed on the copper contact on which the shoe glides with practically no wear and with almost perfect collection. The wear of the contact wire is slight with the aluminum shoes and eliminated with the carbon. The pressure on the wire averages about 8 to 10 lb. per shoe. The wire is arranged to zigzag from one side of the center line to the other at each pole with a maximum displacement of 23 1/2 in. The usual practice is to run with two pantographs up, which eliminates the sparking. The pantographs are built the full width of the shoe so there are no horns on the ends of the shoe under which the contact might catch if it should drop off the shoe.

The various groups of the German Federal Railroad which have used electric traction have experimented extensively with electric locomotives. There has been little attempt at standardization because of the different man-

agements, the different requirements and the lack of sufficient experience with any one type to justify adopting it as a standard. The recent development of the Buchli and quill drives in Europe has made the situation all the more uncertain in passenger locomotive design. The side-rod type with a single large motor and two rods connecting to jackshafts in line with the driving wheels seems to retain its popularity, particularly in Silesia. Light weight and cheapness are points in favor of this type. In Bavaria, the Buchli drive has been tried with success. The easy riding qualities of this locomotive are noticeable. More recently the quill drive has become prominent and bids fair to be the main type for passenger service. The wide range of gear ratios possible



Brown Boveri passenger locomotive using Buchli drive. The pantographs are of light construction with auxiliary bows

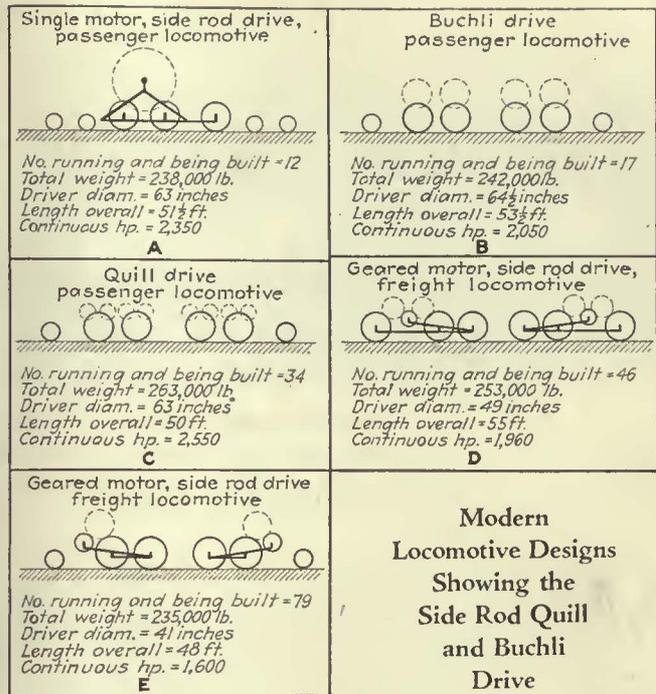
and the use of higher twin motors, together with the ease of handling the running gear and motors seem to give it an advantage over the Buchli drive, in the opinion of the engineers. For freight service the geared side-rod drive is still standard.

Electric control equipment for the locomotives shows many new developments. In some types a contact slides over the transformer taps on top or alongside of the transformer, with an arrangement to prevent short-circuiting of the winding. An ingenious commutator device has been constructed to give continuous voltage variation between taps so there is no arcing. In other types contactors are used as in American practice.

Resistance braking is to be tried on some of the locomotives used in mountainous territory, with a view both to decreasing brakeshoe wear and reducing the motor troubles caused by metal particles from the shoes.

INVESTMENT FIGURES ARE IMPORTANT

The capital invested in the various electrifications was given in the Reparation Commissioner's fifth report for the year ending Dec. 31, 1926. The Silesian work represents some \$7,800,000, about \$27,000 per route-mile for roadway accounts, and an average of \$42,000 per locomotive. The route figures include both single and double-track lines. The Leipzig territory has an investment of about \$7,700,000, with \$39,000 per route-mile for roadway accounts and an average of \$44,000 per locomotive. The roadway average in this case is higher because of the extensive four-track and two-track operation. The Bavarian electrification is by far the largest, with about \$15,800,000 invested. Of this, \$7,700,000 is in roadway accounts, an average of \$28,000 per route-mile with both double and single-track operation. The equipment accounts show an average of about \$60,000 per locomotive. The general cost of the overhead system averages about



A: Single motor, side rod drive passenger locomotive—Number running and being built, 12; total weight, 238,000 lb.; driver diameter, 63 in.; length over all, 51½ ft.; continuous horsepower, 2,350.
 B: Buchli drive, passenger locomotive—Number running and being built, 17; total weight, 242,000 lb.; driver diameter, 64½ in.; length over all, 53½ ft.; continuous horsepower, 2,050.
 C: Quill drive, passenger locomotive—Number running and being built, 34; total weight, 263,000 lb.; driver diameter, 63 in.; length over all, 50 ft.; continuous horsepower, 2,550.
 D: Geared motor, side-rod drive, freight locomotive—Number running and being built, 46; total weight, 253,000 lb.; driver diameter, 49 in.; length over all, 55 ft.; continuous horsepower, 1,960.
 E: Geared motor, side-rod drive, freight locomotive—Number running and being built, 79; total weight, 235,000 lb.; driver diameter, 41 in.; length over all, 48 ft.; continuous horsepower, 1,600.

\$5,000 per track-mile for main lines and \$3,500 for branch lines, not including yards. The electrification of the suburban lines about Berlin will call for an investment of \$40,000,000, more than the combined totals of all the others. One estimate allows \$14,000,000 for cars; more than \$2,000,000 for the third rail distribution system for 90 route-miles; about \$12,000,000 for transmission cable and the 44 substations; more than \$2,000,000 for signals, telephone changes and the electrolysis prevention, and more than \$5,000,000 for shops, inspection facilities and right-of-way changes.



Two-track main line with long span in the Silesian territory

Electrical Equipment for Broad Street Subway Cars

Has Interesting Features

Cars for Philadelphia's new rapid transit system will be powered with 420 hp. each. The control makes it possible to accelerate any number of cars in a train automatically and provides for high-speed schedules

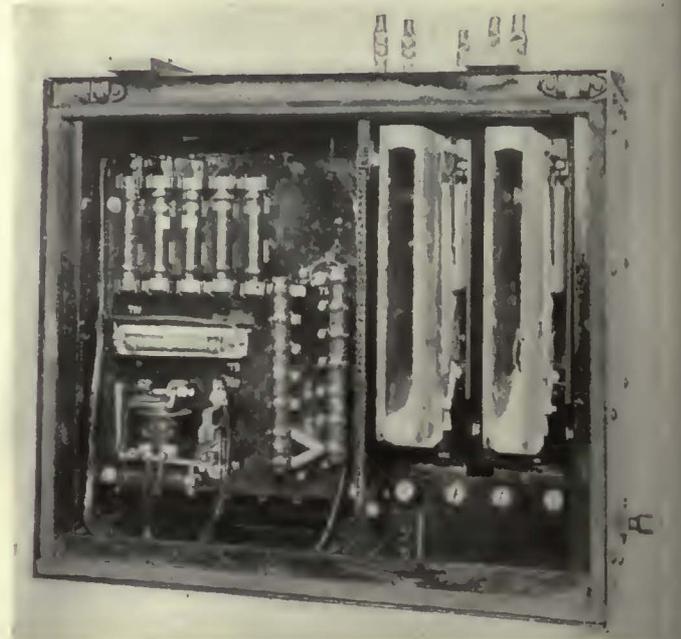
MOTIVE power of the 150 all-steel cars for the new Broad Street subway to be operated by the Philadelphia Rapid Transit Company will consist of two Westinghouse No. 581-A-1 motors for each car. These motors will have a one-hour rating of 210 hp. at 600 volts, and as there will be two of them mounted on one of the two trucks of each car, the total power will be 420 hp. Both motors will be axle-mounted with nose suspension. The armature coils are in one piece, with "double-deck" construction. This minimizes the joints and gives mechanical strength and low losses. The dual ventilation system used affords protection to the brushes and commutator from brake dust, and makes possible a high motor rating for the weight. Heat treated helical gears of forged steel are pressed on the axle. The gears have 63 teeth and the motor pinions 20 teeth. The complete weight of the motor with gears and gear case, is 5,710 lb.

Westinghouse type ABF multiple-unit automatic control is arranged for series-parallel connections of the motors, with automatic acceleration and provision for tapped field on the last running notch in parallel. Current to actuate the control apparatus is taken from a 32-volt type B-2-H Edison storage battery. Trains will consist normally of from one to eight cars, and can be run from any one of the master controllers.

Twelve electro-pneumatic switches establish the motor circuit connections, transfer the motors from series to parallel and commutate the motor circuit resistance. The control circuit gives six steps with the motors in series and four steps in parallel. The tapped field connection is effective only on the last parallel step. Transition from series to parallel is by the bridging method.

Automatic acceleration is accomplished by a current limit relay actuated by the current through one of the motors. It is adjusted for an average acceleration of 1.9 m.p.h.p.s. with an unloaded car. A supplementary relay will advance the control notch by notch under emergency conditions with excessive loads. The air for actuating the control devices is taken from the brake system through a reducing valve adjusted to maintain a relatively constant pressure of 70 lb. per square inch.

An important feature of the control equipment is the use of integral, interchangeable switches. Each switch is a complete unit, including contacts, blowout coil, arc chute, magnet valve and operating cylinder. Two units mounted in a separate frame act as a line switch. The



Front view of line switch showing arc chutes, adjustable resistance in operating coil circuit and interlocking relay

other ten are included in the control box. The units in the line switch and control box differ only in the size of the magnet valve exhaust port and in the length of the arc chute. Any switch may be removed as a unit from either the control box or the line switch by breaking the air and electric connections and removing three mounting bolts.

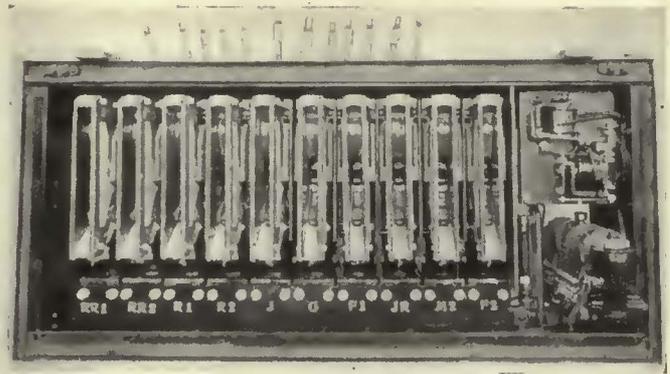
The control box is an assembly of ten of the unit switches, a sequence drum and an advance relay in a structural steel box. A skeleton frame on which the apparatus is mounted, is built up of angles between two end plates. Two side covers are latched in place and are easily removable, while the bottom cover has a fixed hinge and is bolted in place. The only parts requiring attention from the front are the arcing contacts of the switches and the advance relay. By opening the rear cover the air connections, interlocks, valve magnets and switch shunts are exposed for inspection. The main wiring connections are made at the rear of the group at the cable terminals located on a vertical panel on the back of each switch. All main circuit leads are brought out

through treated maple bushings and extend 12 in. beyond the limits of the box. The extended leads permit the semi-conduit type of car wiring which allows the box to be disconnected from the car cables.

The sequence drum is essentially an auxiliary, remote-controlled master controller. A set of contact fingers mounted on a base make contact with copper plates on a drum, which is rotated through a rack and bevel gears by a balanced pressure air engine. This drum is directly under control of the current limit relay, and it stops and starts on each notch in direct response to the lifting and dropping of this relay at a pre-determined value of motor current.

When abnormal loads or grades would prevent normal automatic acceleration, pressure on the advance button in the motorman's cab causes the advance relay to short-circuit the contacts of the limit relay and the sequence drum will move to the next notch. As it moves, an additional coil of the advance relay is energized, opening the short-circuit across the limit relay contacts and again leaving the progression of the sequence drum under the control of the current limit relay. This action can only be repeated by first releasing the advance button located in the cab.

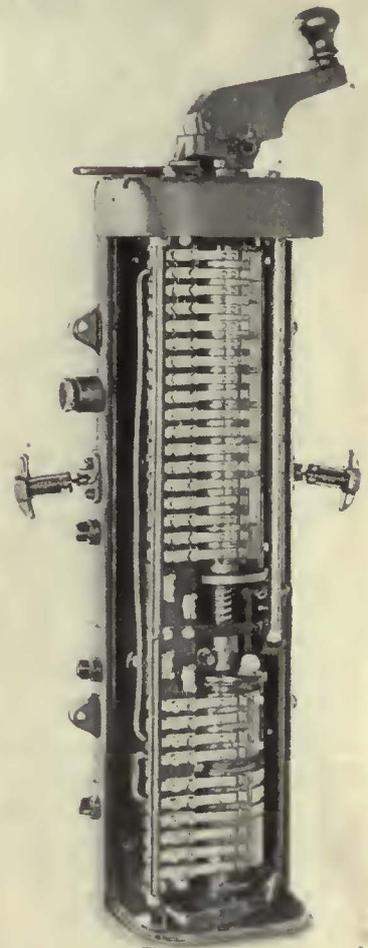
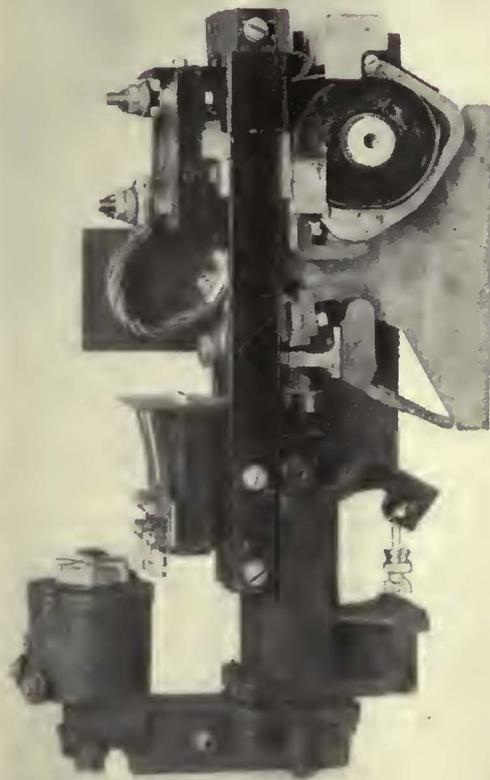
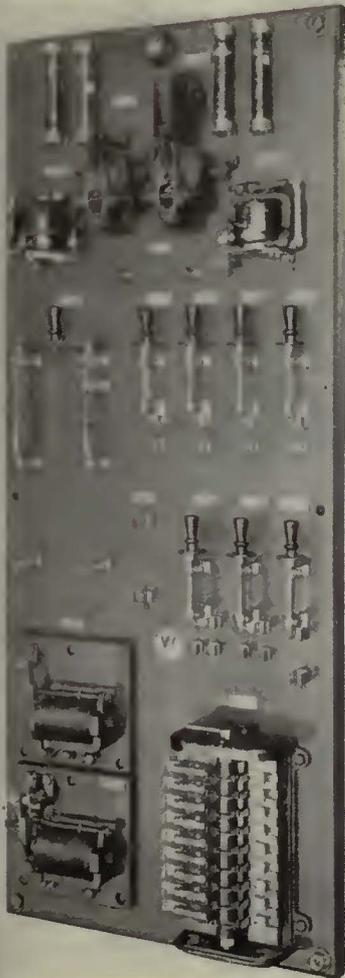
Two unit switches, practically duplicates of these in the control box, two overload relays, a line switch interlocking relay and the necessary resistor tubes and a fuse all assembled in a box of similar construction to the control box, constitute the line switch. Both of these units



Control box with cover removed

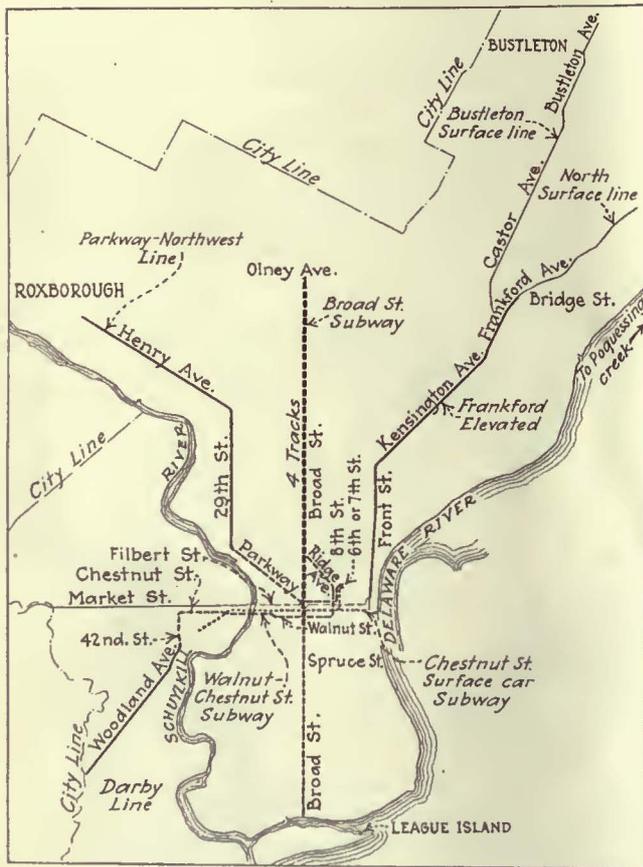
are connected in series, with the first series resistance for the switching position connected across one switch. The latter, therefore, also acts as a resistance switch to short-circuit this resistance on the second and succeeding notches. This series connection of the line switches is of particular importance with a short-circuit, the introduction of resistance reducing the maximum current taken from the line and also lessening the severity of the arc rupturing duty.

The operating coils of the line switches are energized directly from the third rail circuit so that the main motor circuit is opened immediately upon loss of power for any reason. This direct control of the line switch oper-



At left, low-voltage auxiliary panel. In center, unit switch with sides removed. At right, master controller with cover removed

ating coils from the line without the intervening time element of a line relay, and the use of magnet valves with unusually large exhaust ports makes it particularly effective in protecting the main motors against flashing when crossing gaps in the third rail. The line switch is so interlocked that if it is opened for any cause, the control returns to the first position before power can again be applied, and advances automatically after line voltage is restored to the position indicated by the master controller. Since the line switches are quick opening, the arcing duty is removed largely from the switches in the control box, either while the equipment is operating normally or with overload.



Map of Philadelphia Rapid Transit Lines showing extent of Broad Street subway

Two overload relays are used, one in each motor circuit. Each relay may be set to trip at a value slightly above the peak current drawn by one motor in regular service. Both relays have a common reset coil, which further is interlocked so that in a train only the reset coil of that relay, or relays, which is in the tripped position is energized when the reset button is pushed in the motorman's cab. This minimizes the current in the reset wire, insuring adequate voltage for operating the reset coil, even in the rear car of a long train.

The interlocking relay in the line switch is used only for interlocking the reverser, which is controlled from the battery circuits, with the line switch, which is controlled from the trolley circuit, so that the line switch cannot close until the reverser is fully thrown. The reverser, which is of the drum type, is completely isolated from the other main current-carrying parts.

The master controller has a main or accelerating drum, a reverse drum and an emergency drum. On the main

drum are four positions, namely, off, switching, series and parallel. In the switching position, a circuit is established from the power supply through the two motors of the car and all of the accelerating resistance in series, to ground.

In the series position control circuits are progressively established until the motors are connected directly in series. In the parallel position the control is advanced to connect the motors in full parallel. The main handle performs two functions; first that of accelerating or shutting off power; and second, that of stopping the train in emergency by applying the air brakes, both by energizing the emergency brake valve in the electro-pneumatic brake system through contacts on the emergency drum and by operation of a pilot valve which in turn actuates an application valve connected directly in the emergency brake pipe line. The first function is performed by rotation of the handle, the second by vertical spring action which is initiated if the operator's hand is removed with the controller in an operative position. This "dead-man's" feature can only be cut out when both the main and reverse drums are in the "off" position. A separate reverse drum controls the direction of motion of the train and also operates several auxiliary circuits as required.

A push-button box adjacent to the master controller provides a means for energizing the main control circuit and the overload reset and advance relays when required. At the front of each car arranged conveniently for the motorman, are two control panel boards. On the low-voltage panel are the battery charging relays, main motor control cutout switch, door control and signal lamp relays and the disconnecting switches for the various low voltage auxiliary circuits. On the high-voltage panel are the disconnecting switches for the high-voltage auxiliary circuits, including car and cab heaters, door-engine heaters, lamps, fans and air compressor, and also the emergency lamp relay, main motor limit relay and heater circuit relays.

Relays on the upper part of the low-voltage panel provide for keeping the storage battery fully charged. Current for charging the battery is taken both from the compressor circuit and direct from the line. When the compressor is running, a contactor closes, shunting a part of the current through the battery. To supplement the charge from this source a pilot relay, connected across the battery and adjusted to the required range, controls a second contactor which closes or opens the circuit from the line through a current-limiting resistor and the battery in series. Line relay protection prevents draining the battery if the line voltage fails.

Door control, heater, fan, lighting and other auxiliary details in general, follow established practice. A feature of the heater control is the use of a peak load relay which automatically cuts off the heaters at current peaks during acceleration to decrease the total drain on the system. Five Westinghouse fans are provided as a part of the equipment for each car.

Normal lighting of the car is provided by 22 lamps connected in series. Both the sockets and the lamps are short-circuiting, so that if a lamp is removed, or burns out, the circuit is not opened. In series with the lamp circuit is the operating coil of an emergency lamp relay, located on the upper portion of one of the panels, which closes the circuit to emergency lamps operated from the storage battery in case of failure of the main lighting circuit or of loss of contact rail voltage.

Maintenance Methods and Devices

Connections on Bell Box Saves Time*

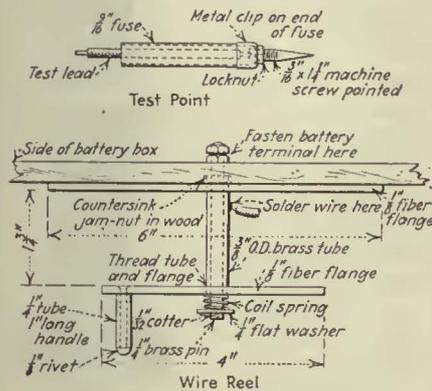
By CHARLES HERMS
General Foreman, San Diego Electric Railway, San Diego, Cal.

BELL BOXES used in the shops of the San Diego Electric Railway have a particular feature in the provision of reels for the leads, which are made of No. 20 flexible rubber-covered wire. Each lead is 50 ft.

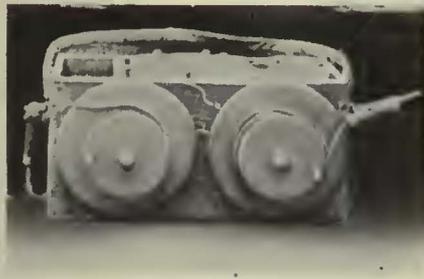
the circuit thus being completed through the shaft to the brass reel core. This type of construction has proved a great time saver, for any length of lead can be drawn out quickly and independently. The annoyance of having to untangle leads is prevented; due to the method of mounting on the reels and fastening them to the test points, there is little danger of broken leads. Each test point is mounted on a standard fuse clip, one on each side of the box. This provides for instant use and eliminates the necessity for having to hunt for the ends of the leads.



These booms were not expensive to construct and have been satisfactory for truck overhauling



Details of wire reel and test points used on bell boxes



Type of bell box used in the shop of the San Diego Electric Railway

long. To keep the wire from un-reeling at random a friction spring is placed on the reel shaft.

The ends of the test leads are fitted with test points made of discarded $\frac{1}{8}$ -in. cartridge fuses. One end of the fuse is cut off and a hole drilled through the brass clip on the opposite end to permit the insertion of a $\frac{1}{8}$ -in. pointed machine screw. The end of the test lead is looped around the head of the screw and a long nut draws this tight.

Positive and negative leads are fastened respectively, one to each reel shaft as indicated in the sketch,

"T" Rail Swinging Boom

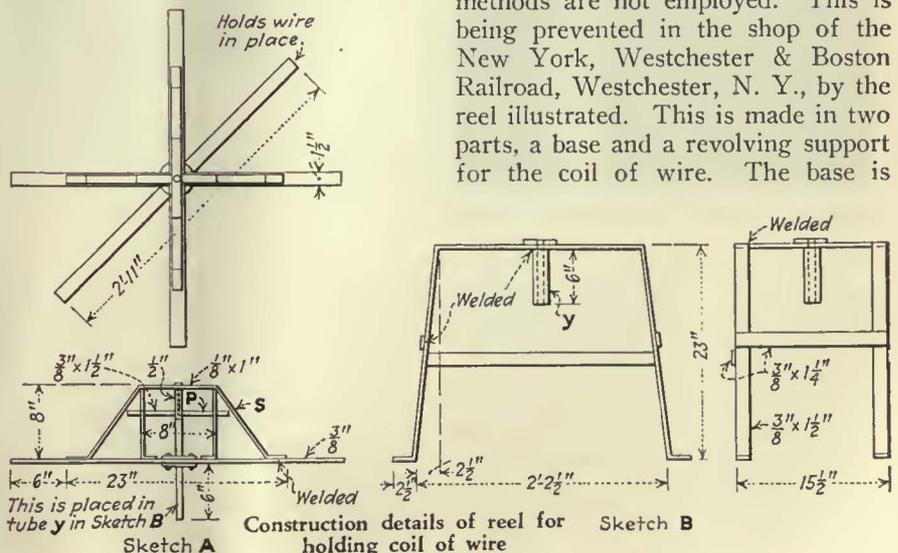
WHEN traveling cranes are not available some other provision must be made in the shop for lifting heavy parts undergoing overhaul. This has been done in the shop of the Jamaica Central Railways, Jamaica, N. Y., by the installation of swinging booms fastened to the wall or other support. These are located in various parts of the shop where needed. The horizontal member is an 80-lb. T-rail inverted. A chain hoist is suspended on a trolley, which runs on the base of the rail. A solid forging drilled for a 1-in. pin, bolted to one end of the rail, fits into a $\frac{5}{8}$ x4-in. "U"-shaped bracket fastened to a $\frac{5}{8}$ x4-in. plate bolted to the wall. The other end of the rail is fitted with two $\frac{1}{2}$ x2-in. "L" brackets bolted to either side of the web. The tension

member is a 1-in. round rod fastened to these brackets with a 1-in. bolt. Its other end is held by a $\frac{5}{8}$ x4-in. "U" bracket fastened to a $\frac{5}{8}$ x4-in. plate bolted to the wall. This rod is installed at about a 45-deg. angle with the T-rail.

The chain hoist trolley is made from 1x3-in. stock and the rollers, spaced at 9-in. centers, have 3 in. diameter and rotate on 1-in. axles. The lifting hook is fastened to a bracket made from 1x3-in. stock. Guide plates secured to the inside of the bracket prevent tipping.

Adjustable Wire Reel

DIFFICULTY always is experienced in keeping the turns of a reel of wire from becoming entangled when being unrolled if precautionary methods are not employed. This is being prevented in the shop of the New York, Westchester & Boston Railroad, Westchester, N. Y., by the reel illustrated. This is made in two parts, a base and a revolving support for the coil of wire. The base is



*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

New Equipment Available

made of $\frac{3}{8} \times 1\frac{1}{2}$ -in. bar braced with $\frac{3}{8} \times 1\frac{1}{4}$ -in. straps. All parts are welded. In the center is a tube 6 in. long and $\frac{5}{8}$ -in. inside diameter. This acts as a centering device and bearing for the revolving element, which is made with two $\frac{3}{8} \times 1\frac{1}{2}$ -in. crossbars 35 in. long, welded at their centers at right angles.

A conical framework support made of $\frac{1}{8} \times 1$ -in. material and 8 in. high is welded to these cross bars. Additional strength is provided by vertical straps of the same material. A $\frac{1}{2}$ -in. rod, 6 in. long, welded to the center of the crossbars, drops into the $\frac{5}{8}$ -in. tube installed in the center of the base. The coil of wire is placed on the surface S. A $\frac{3}{8} \times 1\frac{1}{2}$ -in. bar, P, 35 in. long, suspended on a $\frac{3}{8}$ -in. bolt fastened to the center of the conical frame, rests upon the top of the coil and prevents entanglement of its turns.

Support Prevents Breaking of Sand Hopper Bases*

By R. T. CHILES

Master Mechanic Cumberland County Power & Light Company, Portland, Me.

Due to the design of the sand hoppers used on the safety cars of the Cumberland County Power & Light Company, the weight of the sand is not directly over the base. This resulted in breaking the base of some



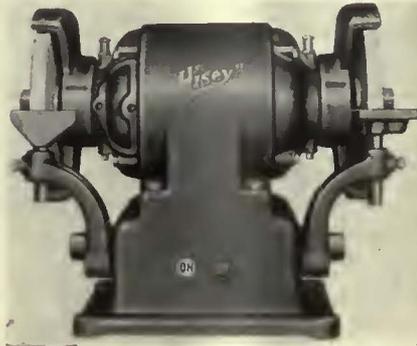
Additional support installed on sand hopper

of the sand hoppers and increased maintenance. To overcome the trouble, a support has been added with one end fastened to the car floor and the other to the top side of the sand hopper. The support is made of 2-in. x $\frac{1}{4}$ -in. soft steel. This corrected the fault and prevented the breaking.

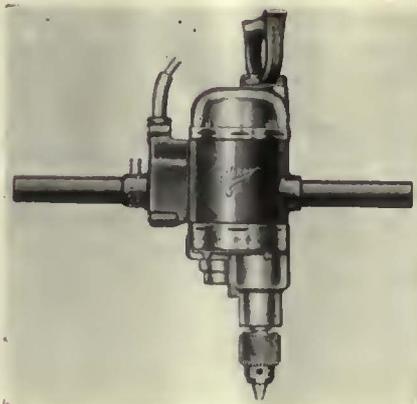
*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Grinder and Portable Electric Drills

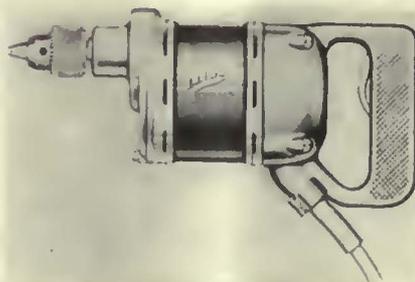
ELECTRIC tools of interest, three in number, are announced by the Hisey-Wolf Machine Company, Cincinnati, Ohio. These include a $\frac{1}{4}$ -in. drill, a $\frac{1}{2}$ -in. drill and a 6-in.



6-in., $\frac{1}{4}$ -hp. grinder



$\frac{1}{4}$ -in. electric drill



$\frac{1}{2}$ -in. electric drill

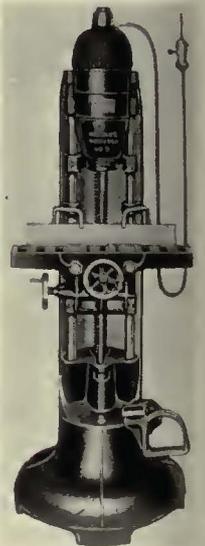
$\frac{1}{4}$ -hp. grinder. Noteworthy features include motors mounted with ball bearings which are fitted so as to eliminate the slip and creeping action. Spindles are of liberal dimensions and are hardened and ground where necessary. Brush-holders are mounted as a separate unit on a Bakelite yoke and have adjustable spring tension. These small tools are

of the same general construction as are incorporated in larger machines by the company.

"Safety first" — "tram your trucks" — don't ram them.

Portable Hollow Chisel Mortiser

BORING of square holes in wood has been common for years and improved equipment for this work is being made frequently. Now a portable hollow chisel mortiser has been announced by J. D. Wallace & Company, Chicago, Ill. Three easy rolling casters in the round cast-iron base make it easy to move the machine. Mounted on the upper carriage is a General Electric vertical motor designed to meet the requirements of this machine. A current of air drawn through a screen at the top is forced downward by a fan on the armature shaft and cools the chisel and bit and also blows chips away.



New electrically driven portable hollow chisel mortiser

The chisel holder is built into the lower motor end flange which completely incloses the bit chuck mounted on the motor shaft. Normal speed is 3,450 r.p.m. This has been found correct for all work falling within the capacity of this machine, which bores square holes up to $\frac{1}{2}$ in. and round holes up to $\frac{3}{16}$ in. diameter. The motor is inclosed and dustproof.

The motor head is depressed for mortising by means of a treadle with an iron stirrup which always hangs vertically. The head may be limited to any desired lower position by a set-screw in the rear of the base and is carried back automatically to the upper position by an adjustable tension spring. Vertical and horizontal adjustments are made through hand wheels, the tables sliding on machined rods.

Association Activities

Transportation and Engineering Topics Receive Attention at Rome

Technical sessions with several neighboring trips extend over a week. Later the delegates visit Turin and Milan. Attendants at the convention represented 28 countries

THE Rome convention of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles began informally on Sunday, May 6, when there was a reception to the delegates and their friends in attendance at the meeting.

The first official session of the Congress was held the next morning at the National Capitol. The Salon of the Palace of Senators was put at the disposal of the association by the Italian government. Here the session was called to order at 9:30 a.m. About 28 countries were represented. This was also attended by a large number of ladies. The delegates were welcomed to Rome by the governor of Rome and also by the Italian Minister of Communications, Mr. Ciano. The latter brought greetings from the King and also from Premier Mussolini, saying that the latter expected to be presented at the opening session but was unavoidably detained. Mr. Ciano declared that the government was pleased that Rome had been selected for this meeting and emphasized the importance of transportation in the social and economic life of every country.

President De Lancker expressed the appreciation of the association for the hospitality shown to the delegates and asked Mr. Ciano to express its gratitude to Premier Mussolini for his interest in its work. He referred to the fact that the present convention of the association was the first since the war representing all the countries in Europe. It now has more than 1,000 members. He gave his address, successively, in French, Italian and German.

ONE-MAN CARS

The first technical question taken up was the report on "One-Man Cars" by Mr. Bacqueyrise, general manager S.T.C.R.P. (Paris Surface and Bus Lines). An abstract was published on page 910 of the issue of June 2.

The discussion was animated, the delegates expressing their interest in the advantages of one-man operation, brought out in the report. An Italian delegate declared it especially important for roads with a slight margin between receipts and expenses. He said popular approval and permission from the authorities would be more easily secured



F. de Lancker

President Union Internationale de Tramways, de Chemins de fer d'Intérêt Local et de Transports Publics Automobiles and general manager Brussels Tramways.

if the association should formally endorse one-man operation as desirable. President de Lancker said he would appoint a committee to consider such action and report.

In the afternoon, by invitation, the delegates were received in a special audience at the Vatican. In his talk to them, the Pope spoke about the means of transportation as one of the most important factors in the civilization of the world. He gave to all his Apostolic blessing.

AIR VS. ELECTRIC BRAKES

A large part of the session on Tuesday, which was held in the Doria Palace, Rome, was given up to a consideration of street railway brakes. Three reports were presented on this subject, namely, by Mr. Vente, chief engineer Marseilles Tramways; Mr. Allard, chief operating engineer Société Nationale de Chemins de fer Vicinaux of Brussels, and Mr. Cuccoli, engineer Milan Tramways.

The report of Mr. Vente related to the braking of city cars and comprised seven chapters, relating respectively to: Brake rigging acting through shoes on the wheels, mechanical and axle brakes, vacuum brakes, compressed air brakes, compressors and vacuum pumps, electric braking with resistance and with magnetic shoes, special types of brakes. There were also appendices on auto-

matic adjusters for brake rigging, the speed of modern compressors and magnetic brakeshoes. In discussing the choice of brakes the speaker pointed out that for heavy cars, the compressed air brake dominates in America whereas the rheostatic or electromagnetic brake is the most popular in Germany. In recent years, he said, the design of electric braking equipment has been considerably improved. In Germany 84 per cent of the motor cars and 76 per cent of the trailers have been equipped with electric brakes.

Mr. Allard, while mentioning all types of brakes which are used on electric tramway rolling stock, devoted his discussion primarily to recent improvements in braking equipment for suburban railways, both steam or electric. In this connection he outlined the characteristics of the Pieper system, as manufactured by the International Automatic Brake Company of Liège, Belgium, i.e., an automatic continuous brake with vacuum release, particularly suitable for steam trains, and a quick-acting electropneumatic brake and with automatic adjustment of clearance between shoes and wheels. In both systems there is a supply of compressed air, at constant pressure, the transmission being made by means of oil. In the first system the release is made with a vacuum and the control is either through vacuum or electricity (battery). In the second system, which is suitable for electric cars, the release and the application are electric. The two systems are continuous and automatic. The second dispenses with adjustment of the rigging; it permits its reduction to very simple terms, and through its action it maintains between two oil cylinders a difference of pressure which may be utilized for the operation of auxiliary apparatus, such as collecting current, closing doors, etc. Mr. Allard also pointed out the extent of use, chiefly in Germany, of the rheostatic brake, sometimes combined with an electromagnetic brake on the rail or with the solenoid brake. He also referred to the drum brake on the axle or on the armature shaft and mentioned tests which have been made with shoes filled with abrasive material acting against the rails.

Mr. Cuccoli's report related principally to the regenerative braking equipment of the Somajni type which has been installed on several motor cars of the Milan Tramways. He said that on one level line the saving of energy with regeneration, compared with the ordinary equipment, has been found to be about 24 per cent. The economy so found was measured on the same cars before and after they were so equipped. At the substations the saving in energy consumption was increased to 30 per

cent. The cost of maintenance of motors, controllers and motor-generators has not been higher than with ordinary equipments. Mr. Cuccoli, in closing, gave a description of the Della Riccia recuperative system as well as a review of the tests which have been made with that system.

In the discussion, Mr. Castaing, engineer S.T.C.R.P. (Paris Surface Railway and Bus Lines), gave some details of the braking system used by his company's Type L car which is equipped with Cardan drive. Brakes are applied to the motor driving shaft and not to the wheels. A delegate from the Warsaw Tramways declared electric brakes superior to air brakes for emergency braking. Mr. Pforr, Berlin Surface Lines, said that tests with different types of brakes were being conducted in Germany. The results will be available to the members of the association after their completion.

The presentation of the paper by Mr. Allard led to a discussion between him and Mr. Castaing on the effect of the motors and gears when the braking is applied to drums or disks on the motor shaft and when it is applied directly to the wheels.

The paper by Mr. Cuccoli on recuperation was followed by an extended and somewhat involved discussion on the economies to be gained by the Della Riccia and the Somajni systems. This discussion, in which Messrs. Della Riccia and Cuccoli took a prominent part, occupied a good part of the session, but no definite conclusions were reached.

Mr. Bacqueyrisse said that the Paris Surface Lines had obtained very satisfactory results with standard (or non-recuperative) equipment. He believed that the expenses of installation and maintenance of the equipment necessary for recuperation would absorb all of the gains from the saving of energy which would be obtained.

The discussion showing no signs of abating, the president asked the speakers to be as brief as possible. He added that they were at liberty to submit any further conclusions in writing.

Mr. Cuccoli, in commenting on the remark of Mr. Bacqueyrisse, said that the cost of the supplementary equipment used with recuperation was not great. According to him the rating of the car motors, when recuperation was used, would not exceed that of equipment ordinarily employed with electric braking in which the current is passed through a rheostat. On the other hand, the application of recuperation decreased the power capacity necessary in the substations as well as the size for the outgoing and return feeders.

Mr. Somajni said that the matter ought not to be regarded so much from the standpoint of economy in energy as from that ease of control as regards the operator.

A delegate from the Rome Tramways submitted a communication giving the results from two cars, one of which was equipped with recuperative equipment; the other in the ordinary way. The

latter showed an average current consumption of 116 watts per ton-mile, while the car equipped with recuperative equipment used only 90 watts.

Another delegate spoke of the existence of a line, 9 miles in length, near Lake Maggiore in Italy, possessing a difference of elevation of nearly 2,000 ft. between the termini, on which recuperation permitted the car to go from the higher to the lower terminus without the application of any other brakes.

The conclusion reached as the result of the discussion may be expressed by the statement that the question is not yet settled. The association will receive communications on the subject from those interested.

At the close of the morning session on Tuesday, the president of the asso-

ciation and a large number of delegates visited the tomb of the Unknown Soldier at the Piazza Venezia, where they laid a floral wreath on the tomb in the name of the association.

TRACK CONSTRUCTION

The report on track construction was presented by Mr. Noorbeeck, chief engineer, Société Nationale des Chemins de fer Vicinaux of Belgium. It was published in abstract on page 912 of last week's issue.

Mr. Level, general manager Compagnie des Voies ferrées d'Intérêt local in Paris, said that the purpose of the employment by his company of wooden rail braces on short radius curves in exposed track, mentioned in the report, was to insure the maintenance of the track gage when the cars went around these curves at a fairly high speed. He described the use of reinforced concrete ties for interurban construction. Mr. Garnier, Paris, referred to the increasing use of chrome and nickel alloy for special work. He approved the use of reinforced concrete ties. Mr. Ramy of Brussels described an equipment of clips for attaching rails to any kind of tie; wood, steel or concrete. Mr. Michel, representing a Brussels company interested in electric welding, gave details of methods advocated by his concern, for the electric welding of rail joints.

RAIL CARS

The report on rail cars with internal combustion motors was presented by Mr. Mellini, member of the Upper Council of Public Works, Rome, and Mr. La Valle, chief inspecting engineer of railways, tramways and bus lines in Italy. It contained a great deal of data on equipment used and results obtained. Their conclusions, briefly, were as follows: Gasoline cars are best adapted for light fast service on level track or with light grades and favorable curves. As compared with steam locomotives, they permit a reduction in labor and in the cost of fuel, for they consume no fuel at stops. In general, their performance has been satisfactory. Diesel motors, when applied to this work, are of a different design than those used in stationary service or in ship propulsion. Results up to the present indicate a favorable solution in the near future of the application of the Diesel engine to this class of service. Its great advantage is that it reduces the cost of fuel. At present the type of transmission which seems most advantageous for Diesel equipment is the electric. Internal combustion engine rail cars, either gasoline or Diesel, seem especially well adapted for colonial railways which cover vast territories, which are lacking in water and where the traffic does not justify electrification.

In his oral discussion, Mr. Mellini, besides giving a summary of the conclusions of his report, told about a novel combination of bus and rail car on a mountain line having grades as high as 8.3 per cent. The tracks are in reinforced concrete with a very light T rail, weighing only 6 kg. per meter (12 lb.

COMING MEETINGS OF

Electric Railway and Allied Associations

June 12-13—American Wood Preservers' Association, Chattanooga, Tenn.

June 14-15—New York Electric Railway Association, Half Moon Hotel, Coney Island, N. Y.

June 20-27—American Railway Association, Div. 5—Mechanical, annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 21-22—Wisconsin Utilities Association, Accounting Section, Hotel Pfister, Milwaukee, Wis.

June 25-29—American Institute of Electrical Engineers, summer convention, Cosmopolitan Hotel, Denver, Colo.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 12—New York Railroad Club, annual outing, Indian Point, N. Y.

July 13—A.E.R.A. Executive Committee on yacht "Florida," New York, N. Y.

July 18-20—American Society of Civil Engineers, annual convention, Buffalo, N. Y.

July 19-21—Pacific Claim Agents' Association, annual convention, San Diego, Cal.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17—Wisconsin Utilities Association, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

per yard). The wheels of the cars are equipped with rubber tires which roll over the concrete, and are furnished with steel flanges to keep the car on the track. The adhesion thus obtained is in the neighborhood of one-sixth. Operating results are satisfactory. Mr. Mellini declared that the employment of rail cars was warranted on lines of light traffic where trail cars were not needed, and where the grades are not too severe.

Mr. Level thought that the use of rail cars under the conditions mentioned is always justified, whatever the profile of the line.

Many speakers urged the desirability of the use of rail cars on many rural lines, notably in Italy. A good many of these systems could have service only by the employment of this method of traction. The light rail car, in certain cases, is particularly well suited for such work.

The association voted to continue the subject on the next convention program.

ELECTRIC TRACK SWITCHES

Improvement in electric track switches was considered in the report of Mr. Riedel of Essen on Wednesday morning. It will be published in abstract in an early issue. Mr. Riedel enumerated several advantages of such equipment, when operated by electricity, among them the time saved over hand operation, economy in labor and reduction of danger to conductors who with ordinary switches are obliged to operate them by hand on the street. According to statistics compiled by him, the number of troubles in switch and solenoid equipment have amounted to only ten per year on the average. The apparatus which he recommended particularly was that in which the switch movement was made by motor.

Mr. Fischer of Budapest described a track switch of which 60 had been installed in that city and 120 more would soon be put in operation. A delegate from Paris gave particulars of track-switch apparatus employed in France. Normally they were operated by the motorman, but the switch could also be turned by hand.

Mr. Schmidt emphasized the importance of making the track switches conspicuous. In Dortmund, at a congested center, he had built a switch tower for operating the electric switches there. A similar tower exists in Paris at the Place de l'Etoile, according to a delegate from that city.

At the conclusion of the discussion, Mr. Bouton, Paris, suggested the appointment of a permanent committee to take up the subject of the study of track in general.

During the latter part of the session the subject of the employment of high-pressure steam in central power stations was considered.

TRIP TO NAPLES AND POMPEII

The serious side of the convention was pleasantly interrupted from Wednesday noon until Friday morning by an excursion of the delegates to Naples.

On Wednesday afternoon they made a rapid circular tour of Naples and its environs, and on the following day they visited the ruins of Pompeii. This trip was necessarily made hastily, but the delegates will always retain a pleasant memory of it.

CAR SCHEDULES

On Friday morning the meetings were begun anew at the Doria Palace in Rome. The report on methods and apparatus for improving car schedules was presented by Mr. Barquin, engineer Brussels Tramways. An abstract will appear in a later issue.

Mr. Autin, Marseilles Tramways, gave a résumé of the practice in that city. It did not differ greatly from that outlined in the paper.

After an exchange of views, in which a number took part, notably Mr. Thonet and Mr. Noirfalise, the delegates expressed their belief that the authorities as well as private organizations should do what they could in large cities to establish staggered hours for employees in offices and shops, so as to extend the length and reduce the intensity of peak hour loading. Mr. Noirfalise pointed out that such hours were helpful not only for large cities but even in the cases of cities of medium size and of small cities.

TRACK CONSTRUCTION ON RESERVATIONS

The report on "Electric Railway Construction on City Reservations" was presented by Mr. Lenartowicz of Warsaw. An abstract was published on page 858 of the issue of May 26, 1928.

Mr. Gagné, Paris, expressed himself as in accord with the conclusions of the report but declared that the reservation should be in the middle of the street with the highways on each side. That arrangement was by far the most advantageous. Mr. Schmidt of Dortmund, Mr. Kramer of Berlin, Mr. Level of Paris, and Mr. Callot of Nancy indorsed the idea. One German delegate pointed out that the need for the establishment of tracks on right-of-way in reservations was a consequence of the development of automobile traffic. He was of the opinion that the public authorities, to whom the streets belong, should assess on the automobile users a part of the cost of constructing reservations for street railway tracks. The association voted that the construction of track on reservations and its separation from the street were advisable, whenever the circumstances permitted it.

BUS MOTOR DESIGN

The report on bus motor design by Mr. Guiffard, manager Compagnie Générale Française de Tramways, of Paris, divided bus motors into three classes as follows: Motors using liquid fuel; motors using various kinds of gas, such as acetylene, illuminating gas and producer gas; and motors using electrical energy. The latter may further be divided into storage-battery cars and trackless trolleys. The greater part of the replies received from the questionnaire indicates that gasoline buses are

in the great majority. The speaker said that, at least up to the present, they seem the most generally applicable. As to the other methods, numerous trials have been made with various degrees of success. Among the cars other than gasoline, experience shows the following may be used with confidence under conditions for which they are suitable: Cars with internal combustion engines using kerosene, alcohol, or mixtures of these ingredients with gasoline; cars using producer gas; storage battery cars, and trackless trolleys. Where there is a scarcity of gasoline or even under conditions of free competition, these methods offer an alternative to the gasoline motor bus.

In the discussion an Italian delegate said that in view of the high cost of gasoline in his country the question of a substitute fuel was of very great importance. He mentioned tests which had been made with heavy oils, ethyl alcohol and oil gas.

Mr. Castaing, engineer S.T.C.R.P. (Paris Surface Railway and Bus Lines), gave the results of tests made in Paris with different mixtures of gasoline, alcohol and kerosene. Several of these mixtures, with different proportions of the three ingredients mentioned, have given good results. The practical result is that one or another of these mixtures is employed, according to the relative price of the several components at the time. Alcohol and kerosene have the advantage of being non-detonating, which permits, when they are employed, of increasing the compression, and, as a result, a reduction in the consumption of fuel. Contrary to the general belief, the speaker said, alcohol is not a corrosive so far as the motors are concerned and has not caused any damage by its employment. The Paris bus company has also experimented with both ordinary city illuminating gas and charcoal gas for fuel. The latter, when generated on the bus, has at least certain theoretical disadvantages in any vehicle for the transportation of passengers, among them the disposition of the heat radiated. When employed in bus propulsion, the illuminating gas is compressed to 175 kg. per square centimeter. The trials that have been conducted up to date indicate that an illuminating gas which does not contain more than 10 per cent of oxygen can be compressed without danger to 200 kg. pressure. The reservoirs used for the transportation of this compressed gas are light in weight. Interesting trials are being conducted also with methane gas, and even with storage batteries. The field of the latter is for lines that do not have many grades.

The association voted to continue next year a discussion of the same subject of fuels for motor buses as well as the effect of their employment on maintenance, lubrication and first cost.

RADIAL AXLES

The session on May 12 was given up largely to a discussion of the report on "Radial Axles," as presented by Messrs. Castaing and Harmel. Abstracts of

these reports were published in the issue of May 26.

The presiding officer, Mr. Mariage of Paris, asked the speakers to give briefly the conclusions reached by them, and this was done.

Mr. Castaing was clearly an advocate of fixed axles, even with a long wheel-base and cars with a length of 11 m. (36 ft.). He advocated double trucks for cars of still greater length. Mr. Harmel of Liège was not in entire agreement with the conclusions of Mr. Castaing. He quoted the results of some tests that were being conducted in Liège and advocated the use of radial axles under certain circumstances, notably when the system had many curves of short radius.

Mr. Vente, of the Marseilles Tramways, cited several examples of the use of differential axles in America and Europe. Mr. Seiber of Nuremberg was in accord with Mr. Castaing. He praised the experiments which had been conducted on this problem to determine the degree of wheel and rail wear after a certain time with radial and rigid axles. A delegate from Poland, in referring to the differences in view between the speakers, suggested that the subject be put on the program for the next meeting.

The presiding officer, Mr. Mariage, expressed this same view and suggested to the speakers on the subject to make their tests together, so that the results would be comparable.

RAIL CORRUGATION AND STANDARDIZATION OF RAILWAY MOTORS

The report of the sub-committee on rail corrugation of the standing international committee on the standardization of street railway rails and track equipment was then presented by Messrs. Thonet and Bacqueyrisse. It will appear in abstract in a later issue. The speakers explained that at the Barcelona convention the committee had recommended the employment for rails of semi-hard steel. In the meantime, it has been discovered that hard steel which has a high elongation gives better results. Now the committee recommends the use of hard steel. According to Mr. Bacqueyrisse, the principal question which remains to be investigated relates to methods of manufacture and these can best be solved by the makers of rails. These problems did not seem difficult of solution.

Mr. Hallet of the Ougree Marihaye Steel Company, Belgium, was not of this opinion, but Mr. Bacqueyrisse replied that the French steel makers had agreed to furnish steel according to the specifications in the report.

In connection with the conclusion of the committee that for steel destined for the manufacture of rails, the quantity $R \div 6A$, (in which R equals resistance and A equals elongation), ought to be higher than 175, an American delegate, Mr. Fleming, requested the elongation be measured on the French standard test piece of 100 mm. of length.

A Polish delegate thought that the conclusions lacked precision in some

places and suggested that the committee issue a series of rail specifications.

Mr. Bouton replied that the international committee on rail standards had already authorized a sub-committee to do this.

Mr. Peridier presented a résumé of a communication relative to the standardization of railway motors. This communication had for its purpose familiarizing the delegates with what had occurred since the Barcelona convention. The subject had been taken up with the International Electrotechnical Commission. Standardization is being studied by this commission and a report will probably be available for consideration at the 1930 convention of the association.

After the meeting on Saturday, as

well as after the meeting on Friday, the delegates made trips to various points of interest near Rome. On Friday they visited Tivoli, and on Saturday they visited Ostia.

CONCLUDING BUSINESS

Sunday morning was devoted to a discussion of the subject raised by the consulting committee on long distance telephonic communication, relative to the protection of telephonic cables against corrosion due to electrolysis and other chemical action. This was the conclusion of the technical sessions.

That evening the delegates left for Turin, and on Tuesday they visited at Milan, where they inspected the new cars and rehabilitated street railway system in that city.

Midwest Association Considers Ways to Improve Service

INTENSE interest in whatever promises improvement to existing railway equipment and operating methods was the tenor of the simultaneous sessions of more than 300 members of the Midwest Electric Railway Association and the Service Betterment Committee of the A.E.R.A., at a three-day meeting held in Kansas City this week.

The word speed was heard frequently with speculation active concerning what new cars and equipment the forthcoming convention in Cleveland would bring to light. Speeding up of street cars, while specifically discussed in only one paper, was touched upon by speaker after speaker, indicating the consideration it is commanding on many properties. The association was welcomed to Kansas City by Mayor Albert I. Beach, who assured the delegates of the city's pleasure at their presence. Powell C. Groner, president of the Kansas City Public Service Company, replying to the Mayor, emphasized the necessity for a "cards on the table" policy of fair dealing with both city officials and the public in general.

DISCUSSION LIVELY AT LUNCHEONS

The two round-table luncheons held on Monday were devoted to the general subjects of transportation and maintenance. J. L. Adams, superintendent of transportation Denver Tramway, acted as chairman of the transportation group. Speakers included C. H. Evenson, Chicago; Del A. Smith, Detroit; Jeff Alexander, Houston; C. W. Wilson, Pittsburgh; D. L. Fennell, Kansas City; and Joe Ong, transportation engineer, Cincinnati. Mr. Evenson outlined the methods used for speeding up Chicago street car service. He declared that there is no panacea for slow operation and attributed the success achieved by his property to a combination of suitable equipment and an organization on the alert by constant pressure for better operating performance. Mr. Smith described the express car and local bus service on Jefferson

Avenue in Detroit and said that a schedule speed of 18 m.p.h. is easily maintained in the 4-mile express area on this line. Houston's progress in the development of a 10-cent express bus service was outlined by Mr. Alexander. Mr. Wilson explained the functions of the Pittsburgh research department, which was organized to provide a group of engineers unburdened with operating routine to make special studies directed toward the improvement of operating methods and the formulation of plans for the future. Mr. Fennell discussed the steps leading to the new bus permit in Kansas City under which a charge of 15 cents is made for trunk-line bus service. Although there was some drop in riding during the first few days following the increase from 10 to 15 cents in the trunk-line fare, he predicted a rapid recovery from this initial reaction. Mr. Ong presented a brief summary of the rehabilitation program being carried out in Cincinnati, where improvements in physical plant and service have produced increased patronage and a favorable outlook for the property.

The maintenance section luncheon was in charge of R. W. Bailey, general superintendent of maintenance Kansas City Public Service Company. Noise reduction, as viewed from the track construction angle, was the subject of a lively interchange of opinions. Contributing to the discussion were N. R. Love, Denver Tramway, who with A. E. Harvey, Kansas City Public Service Company, presented the pros and cons of the much-mooted question of resilient versus rigid track construction. Others who joined in the general discussion were W. J. Martin, Miami, Okla., and D. E. Druen, Kansas City. A summary of the latest operating and cost data on the gas-electric type buses in test operation in a number of cities in this country was presented by Mr. Cox of the General Electric Company.

Pointing out that the first requirement of a street railway is a sound roadway upon which the cars can operate

smoothly, that is paved in a way satisfactory to the public, and that can be maintained at the minimum cost, A. E. Harvey, superintendent of construction Kansas City Public Service Company, described what constituted good track. He urged that there were three important points for consideration, a foundation capable of carrying the heaviest cars and trucks, a track of long life, and finally a pavement of material satisfactory for use in track areas. Concluding his paper, Mr. Harvey gave details of the track construction in progress in Kansas City.

COURAGE AND BRAINS NEEDED

Declaring that there has never been a time when the future of the electric railway was more shrouded with uncertainty than at the present, J. N. Shannahan, president Omaha & Council Bluffs Street Railway, in a paper which in his own unavoidable absence was presented by C. D. Porter, general manager of the Omaha property, called upon electric railway men to combine courage with brains to solve the difficulties confronting the industry.

"The cities of this country must be served by a system of local transportation," said Mr. Shannahan, "and in my judgment the backbone of it will continue to be the car on rails." He continued: "Except in certain outstanding instances it seems to me that we ourselves have not met the fast changing situation with as much courage as we should have, and certainly not with far-sighted vision of our opportunities, to say nothing of our duty."

In a paper on present day conditions and tendencies in the industry, R. P. Woods, president Kansas City, Clay County & St. Joseph Railway, cited statistics compiled by the A.E.R.A. to show the operating experiences of 206 electric railways for 1926 and 1927. Mr. Woods reviewed some of the more pertinent factors showing the trend of last year's business. Outlining what he considers the factors involved in the status of the Midwest Association group of electric lines, he pointed out that the city lines during the four years ending with last year lost by gradual decline an average per line of 14.8 per cent of the number of passengers carried in 1923, and with it suffered a decrease in passenger revenue of 13 per cent. Hard study by the railway operators is needed, said Mr. Wood, to fit their properties into the new scheme of transportation economically and remuneratively. The management and personnel are as good as the best of other organized businesses, he continued, as is attested by the way the railways have survived the competition from private automobiles, buses and trucks, and retained the patronage they now possess.

Treadle operation and its effect on one-man service was discussed by R. L. Frehse, sales engineer National Pneumatic Company, who illustrated his remarks with a moving picture depicting the operation of treadle equipped street cars and buses in a score of United States and Canadian cities. L. E. Gould, president Economy Electric Devices

Company, discussed the possible savings to railway properties where changes in physical equipment will reduce the characteristic energy consumption of individual cars and where opportunities for increasing the individual car operating efficiency of the platform man are watched. Reference was made to the experiments carried on in Baltimore and in Chicago analyzing frictional losses in street cars. This paper will be abstracted in a forthcoming issue of the JOURNAL.

R. L. Hermann, transportation manager, Southwestern District, Westinghouse Electric & Manufacturing Company, discussed the progress being made in the improving of cars and car equipment. Declaring that safety, speed, comfort, and ease of passenger interchange are the primary considerations which will influence design of future street cars, Mr. Hermann outlined some of the accomplishments in new motors, control equipment which can be remotely operated, edgewound type resistors, the use of inductances to smooth the braking cycle, and the development of dynamic braking as a means of securing more rapid retardation rates and utilizing part of the energy ordinarily wasted in braking for car heating.

E. E. Soules, manager publicity department Illinois Traction system, which will be known in the future as the Illinois Terminal Railroad System, presented a number of slides illustrating a variety of advertising which is being carried on by electric railway companies throughout the country, more particularly referring to the material which is being released for local consumption. Mr. Soules stressed the importance of telling the public the story of electric railway facilities and advantages.

Summarizing the progress which has been made by his company in the development of a worm drive truck for street cars, William Bonn, railway representative of the Timken-Detroit Axle Company, pointed out that the problems encountered up to the present have been confined almost entirely to the brakes. He described how the brakes have been redesigned in a few essentials to meet the required conditions. A new shoe using a single brake block has been built and cams and leverages have been changed to use a higher air pressure. A center plate has been constructed which many operators, according to Mr. Bonn, believe has the advantages of a floating bolster and lacks its disadvantages.

The functioning of the safety council as organized in Kansas City and elsewhere was discussed in a paper by F. C. Lynch, director Kansas City Safety Council. Mr. Lynch outlined in some detail specific examples where the character of personnel on an organization so representative of strictly community interests has made it possible to secure co-operation in matters of civic welfare that could not have been obtained by more direct methods of approach on the part of the organizations concerned. Mr. Lynch divided his discussion of safety council work into two general

phases, the application to the organization itself and the participation of the organization in organized safety which has to do with the public safety. This paper will be published in abstracted form in a subsequent issue of the JOURNAL.

G. H. Roosevelt, General Electric Company, Chicago district, analyzed briefly some of the problems confronting the electric railways which must be met in effecting a substantial betterment of service. Airplanes will encourage greater speed in transportation, said Mr. Roosevelt, and the electric railways of the country must be prepared to capitalize on the advantages expected to accrue from co-operative rail and air lines. At the Monday evening banquet W. H. Manss, industrial expert Chamber of Commerce of Kansas City, was the speaker.

Election of the following officers concluded the business of the three-day meeting: President, F. G. Buffe, Kansas City Public Service; first vice-president, R. J. Lockwood, assistant general manager St. Louis Public Service Company; second vice-president, H. S. Robertson, president Denver Tramway; secretary-treasurer, J. A. Weimer, superintendent transportation Kansas City, Clay County & St. Joseph Railway; F. S. Welty, Robert P. Woods, A. R. Koonce and H. B. Cobban were elected to the executive committee, which now consists of eight men. The other four whose terms did not expire are: D. L. Fennell, B. W. Fraunthal, J. L. Adams, and A. E. Reynolds.

The program of entertainment provided by the Kansas City Public Service Company quite eclipsed all previous accomplishments in this respect and was notable for its exceptional caliber, the smoothly functioning efficiency with which it was executed, and the success with which interest and enjoyment was sustained to the very end.

Program for Coney Island Meeting

INTERESTING subjects have been selected for discussion at the annual meeting of the New York Electric Railway Association, to be held at the Half Moon Hotel, Coney Island, N. Y., June 14 and 15. The following program has just been announced:

THURSDAY, JUNE 14
10:30 a.m.

Address of the President.
Report of Executive Committee.
Report of the Treasurer.
Report of Special Committees.
"Increasing the Efficiency of Passenger Transportation in City Streets," by John A. Miller, Jr., editor *Aera*, associate editor, ELECTRIC RAILWAY JOURNAL.
Discussion, by Hawley S. Simpson, traffic engineer Essex County, N. J., and I. C. Fox, secretary A. I. Namum & Son, Brooklyn, N. Y.
"Selection of Men as it Affects Service," by Dr. C. P. Segard, assistant secretary Third Avenue Railway System, New York, N. Y.
Discussion, by A. L. Hodges, assistant

general manager Brooklyn City Railroad, and R. R. Hadsell, general superintendent of transportation New York State Railways, Rochester, N. Y.

AFTERNOON SESSION

"How the International Railway Company is Building Up Good Will," by B. J. Yungbluth, president International Railway, Buffalo, N. Y.

"Lack of Progress in Car Cleaning Methods," by Hugh Savage, superintendent of equipment Brooklyn City Railroad, Brooklyn, N. Y.

Informal discussion.

"Shops and Maintenance of Equipment," by Niles Persons, superintendent surface line shops, Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

Informal discussion.

"Shops and Maintenance of Equipment from a Manufacturer's Viewpoint," by E. C. Brandt, assistant works manager, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Appointment of Committee on Nominations.

Report of Committee on Nominations.

Election of Officers.

Extensive arrangements have been made for entertainment, including special luncheons, bridge, dancing and a beach party for the ladies. There will also be an 18 hole, medal play, golf tournament at the Fox Hills Golf Club, Staten Island, on Friday, June 15. Prizes will be awarded at dinner at the Club House.

Arrangements have been made for inspection of the Coney Island Shops of the Brooklyn-Manhattan Transit Corporation at any time during the day on Friday.

Indiana Utilities Association Meets

AT THE annual general session of the Indiana Public Utilities Association, held in Indianapolis, Ind., on May 23, John B. Maling of Hammond, Ind., condemned government ownership proposals and attributed most of the agitation in Congress to representatives and senators from Western states. His subject was "Legislating the Government into Business."

Factors tending to increase popular distrust of state regulation were enumerated by Harvey Harmon, a member of the Indiana Public Service Commission, in a talk on "What Is Wrong with Regulation in Indiana?" Some of the declining confidence results, he said, from the practice of certain companies and speculative promoters in the state, the latter being particularly prominent in recent months. As evidence of the continuing attack on the commission, Mr. Harmon told how eight of the seventeen candidates for Governor in the primary campaign of the two major parties this year declared in favor either of abolishing or of radical amendment of the commission's powers. In discussing the abolition of the commission he ventured the opinion that with regulation abandoned, the financial position of interurbans and street railways would be so gravely impaired that every one would be thrown

into receivership. Federal control, for which the demand is increasingly insistent, would make utilities the football of national politics, he said.

Increasing costs of rate hearings which are sustained by consumers and the failure of some companies to allocate their value to the cities they serve were mentioned by Mr. Harmon. Some phases of expert valuation by utility engineers also came under his censure.

STATE REGULATION DISAPPOINTING

Outlining some of the functions of the association, Arthur Brady, receiver and president of the Union Traction Company of Indiana, Anderson, Ind., declared in his address that state regulation had been a disappointment to the consumers from the day of its inception in Indiana, because part of the people had been led to believe that it would result in radical rate reductions. Such a hope could not have been realized even in the normal economic conditions prevailing before the World War, and after the war began reduction was more impossible than ever because of rising price levels, he said.

Mr. Brady called attention to the increasing tax burden of state utilities and said he thought the association should study the subject. Discussing the Fed-

eral Trade Commission's present investigation of the work of public utility information bureaus, he said that he had seen "nothing to indicate that such inquiry has developed facts not entirely creditable to these bureaus."

"Training of Supervisory Forces" was the subject of an address by Morse Dell Plain, vice-president of the Northern Indiana Public Service Company, Hammond, Ind. The value of organized instruction in the management of personnel was emphasized by him. "It is the object of supervisory training courses today to show executives how to be leaders rather than drivers," he said. "Every employee has the right to be well managed, and unless he is, the company and the employee both are sufferers."

At the annual banquet those at the speakers' table were Mr. Brady; W. H. Onken, Jr., editor of *Electrical World*; Charles W. Chase, president Gary Railways; Robert I. Todd, president Indianapolis Street Railway; S. E. Mulholland, vice-president Northern Indiana Public Service Company; E. Van Arsdell, president Interstate Public Service Company; C. H. Rottger, president Indiana Bell Telephone Company, and Emmett G. Ralston, vice-president Indianapolis Power & Light Company.

American Association News

Rolling Stock

THE presentation of preliminary reports by the various special committees of the rolling stock division and suggestions for additions or changes occupied the attention of the general rolling stock committee at a meeting held at association headquarters New York City, on May 4 and 5. Those present were: A. T. Clark, chairman; W. S. Adams, V. W. Berry, C. Bethel, R. S. Bull, R. W. Cost, R. A. Hutchins, J. S. McWhirter, A. D. McWhorter, H. Savage, C. W. Squier and W. T. Vivian.

To promote a broader discussion of topics of interest to rolling stock men and also perhaps to interchange maintenance and operating data the committee favored having a general meeting of the rolling stock division at least once each year. Recommendations will be made regarding this so that some plan for a proper arrangement of the meeting may be provided. The question of giving further study to paint practice, methods of painting and various color combinations was discussed. The general opinion was that this might prove a desirable subject for assignment to a special committee next year, particularly regarding methods of spray painting.

Under revision of Manual sections the question of introducing a limit for carbon content in the specifications for quenched and tempered gears was discussed. Also there appears to be a demand for an axle larger than present association standards. The design of a

thicker type of brakeshoe and some questions regarding doors and end connections of freight cars were further subjects that are being considered in the revision.

Special committee No. 2 on motor coaches outlined the work being done by the committee in co-operation with other associations and committees. Special committee No. 3 on car design expects to have some information of interest on the tests of various drives for presentation in its report of progress.

A very complete report on lighting was presented by Special committee No. 4. The various subjects assigned for study were reported on and various comments and suggestions for additions and corrections were made. In discussing the use of twenty in series lamps it developed that some difficulty had been experienced from shopmen trying to interchange these lamps with standard five in series type. Those present suggested that manufacturers should contribute some means of making the new type of lamp so that it would not be interchangeable with the standard five in series type. Special committee No. 5 on bearings is obtaining information from a questionnaire. This will be analyzed for the progress report this committee will make. Committee No. 6 on lubrication will also present a progress report. Special committee No. 7 on automatic couplers has a meeting scheduled at which various points to be decided will be taken up and a preliminary report made.

Data are being collected by special committee No. 8 on motor brushes and tests are being conducted. Special committee No. 9 on noise reduction has also been conducting tests on wheel noise and a report of the investigation will be made. Wheel welding, assigned to special committee No. 10, is receiving much attention. A large amount of data have been collected and the work is progressing but it is too soon to make definite recommendations. Special committee No. 11 on current-collecting devices presented a report and analysis of information obtained from a questionnaire, together with recommendations for trolley bases and poles. The analysis also includes information on trolley wheels. Special committee No. 13 on limits of wear is collecting information for analysis.

Education

CONVENTION activities proposed by the committee on education, as well as the final draft of the annual report, were submitted and approved at a well attended meeting of the committee in New York on June 5. This year two series of training meetings for conference leaders will be held. One will be for non-transportation men, and will be under the leadership of Frank Cushman, of the Federal Board of Vocational Training. This series of meetings will be an amplification of a similar set of meetings held during the 1927 convention under Mr. Cushman.

The second series of meetings will be conducted to develop leaders for groups in the transportation departments. William A. Durgin, Director of Public Relations of the Commonwealth Edison Company, has agreed to conduct this series of meetings. This is the first attempt to develop conference leaders of transportation men conducted on a national basis by the association.

The conference periods will be shortened and will be held only from Monday to Friday, inclusive, and will not attempt to cover the extra day, as last year.

A. J. Rowland will act as sponsor for the non-transportation group, and J. S. Hyatt in a similar capacity for the transportation men. Outlines of the two programs submitted to the committee were approved subject to such modifications as might be suggested by the conference leader.

There will be an educational luncheon conference similar to that held last year, which is being organized by C. D. Smith, of the Cleveland Railway. This luncheon conference will be open to company executives who are interested in the general question of employee education.

H. H. Fenton has written and developed a two-act playlet that dramatizes the old and the new method of dealing with accidents. An actual demonstration was given the committee during the afternoon of the meeting by employees of the Public Service Co-ordinated Transport. This dramatized so clearly the advantage of reinstruction and the different attitude of the men with the two different meth-

ods of handling serious accidents that the committee voted to have this playlet presented before the T. & T. Association. It is expected that arrangements will be made so that the same group of Public Service employees will go to Cleveland to give this demonstration.

Starting only three years ago, the progress that has taken place in developing interest in employee education has been remarkable. The committee on education, under the leadership of Edward Dana and H. H. Norris, of the Boston Elevated has been largely responsible for this accelerated progress.

An attractive series of exhibits are being arranged by several companies, actively engaged in educational work and will be displayed at the convention in an appropriate booth. The only exhibit of this kind heretofore was made in 1926. The exhibit of 1928 will contrast the work and the expansion of educational activities in the past two years.

Those in attendance at the meeting were Edward Dana, chairman; H. H. Norris, H. H. Fenton, A. J. Rowland, J. S. Hyatt, J. A. Dewhurst, A. B. Gibson, C. D. Smith, L. P. Baurhenn, Guy H. Hecker, and H. B. Potter. Managing Director L. S. Storrs attended the sessions for a short time.

Rolling Stock Committee No. 4

PRESENTATION of preliminary reports and outlining material to go into the final report constituted the business at a meeting of rolling stock committee No. 4 on lighting, held at association headquarters, New York City, May 21. Those present were: R. W. Cost, chairman, A. L. Broe, W. W. Brown, H. S. Deininger, E. E. Dorting, and H. G. Lewis.

The special committee appointed to investigate the subject of head and tail lighting requirements presented a preliminary report covering a discussion of double headlights, illumination of front dashers of cars, and a list of standard headlight lamps for electric railway service. A brief treatise on the application of stoplights to cars will be included.

A revised report on the subject of tail lights, classification lights and illuminated signs was presented. Marker lights, where operated from rail or trolley voltage, are to be included in this report. A report will be prepared on signal and emergency lights for cars and those present considered the use of signal lights desirable for one-man car operation to indicate when rear doors have been closed properly, and also for heavy traction where cars are used in train service.

Investigation as to the illumination of electric railway properties from trolley voltage has been made. Additional material is to be presented in the study of car lighting with a view to presenting improvements and economies due principally to standardization of uniform practices. A recommended practice is being developed in lamp inspection and

specifications for lamps for different systems will be given. The committee is considering the advisability of having certain features on lighting exhibited at the Cleveland Convention.

Publications

MATTERS of policy pertaining to *Aera* were the principal subjects of discussion at a meeting of the committee on publications held at association headquarters on June 1. J. W. Welsh, general secretary, presented a financial statement showing that the paper is at present well within its budget allowance and may be expected to finish the current year in the same condition. Mr. Welsh also gave figures concerning circulation showing that the number of subscribers is now substantially the same as at the beginning of the year.

Careful consideration was given to a suggestion that *Aera* be mailed flat in envelopes rather than folded in wrappers as at present. It was brought out that the additional cost of mailing in envelopes would be considerable, and it was therefore decided to continue the present method.

J. H. Hanna, chairman, stated that the progress made thus far in shaping the publication to the policy decided upon by the executive committee last year had exceeded his expectations. He spoke also of the dual functions of discussing the activities of the association and of presenting material of interest and value to the rank and file of the electric railway industry. Mr. Sawyer expressed the opinion that each issue was coming nearer to the accomplishment of this purpose.

Consideration was then given to a number of specific suggestions from readers. Some of these were considered to be impracticable and were disapproved by the committee. It was decided, however, to endeavor to publish a series of inspirational articles telling about noteworthy achievements of individuals in the industry.

The possibility of making a substantial increase in the circulation of the publication was then discussed. It was the consensus of opinion that particular attention should be paid to company section activities with a view to increasing the number of company section members of the association.

The remainder of the meeting was taken up by discussion of matters pertaining to the collection and publication of statistics by the association. Generous praise was given by all the members of the committee to E. J. Murphy, chief statistician, for his work.

Those present at the meeting were: J. H. Hanna, chairman; H. V. Bozell, vice-chairman on *Aera*; F. W. Doolittle, vice-chairman on statistics; T. R. Langan, H. H. Norris, A. S. Richey, W. H. Sawyer, R. S. Tompkins, E. P. Waller, L. F. Stoll, representing Charles Gordon, L. S. Storrs, J. W. Welsh, G. C. Hecker, E. J. Murphy and J. A. Miller, Jr.

News of the Industry

No Referendum on Eastern Massachusetts Public Control

An attempt to obtain a referendum on the bill signed by Governor Fuller of Massachusetts a short time ago to extend for five years the public control of the Eastern Massachusetts Street Railway has resulted in failure as a consequence of a ruling by Acting Attorney General F. Delano Putnam that it is an excluded matter under the initiative and referendum amendment to the Constitution. An original referendum petition, signed by ten citizens, was filed with Secretary of State Frederic W. Cook, who referred it to the attorney general's department for a ruling. In his opinion, Mr. Putnam states, it is not a proper matter for referendum, in that section 12 of the act deals with the powers of the courts, matters which are specifically excluded from the operation of the initiative and referendum.

More Moves in New York City Fare Case

Permission to bring before it additional papers and records in the New York subway fare appeal was granted by the Supreme Court of the United States on June 4. The decision was in connection with New York City's application to file further documents.

The court also definitely set Oct. 1 as the date for hearing on the appeal. The court announced that originally the case had been set tentatively for hearing on Oct. 1, ahead of seventeen other cases advanced for hearing at the beginning of the fall term.

The court's action grants the writ of certiorari filed by New York City agents to compel the Federal Statutory Court of New York to send up to the Supreme Court all the papers, documents and records in the case involving the city and the Interborough Rapid Transit Company.

Good Safety on Chicago Rapid Transit Lines

New records for safety of employees were established by the Chicago Rapid Transit Company in 1927, according to Melvin W. Bridges, safety engineer.

Employees of the Loop division led the transportation department of the "L" lines with an almost perfect record of 99.51 per cent as their safety operation average for the twelve months. During this time there was only one disabling injury to an employee and only nine days of lost time due to employee accidents. The Metropolitan division employees of this department came second with a record of 97.31 per cent safe,

and the South Side division was third with a percentage of 97.30.

Mr. Bridges said that in carrying on safety work during 1927 a total of 358 meetings were held among the employees; that suggestions for raising the standard of safety on the "L" are offered and discussed by the employees, and those found worth while are used.

Wage Contract Still Under Negotiation in Toronto

After negotiations extending over a period of two weeks the Toronto Transportation Commission, Toronto, Ont. has offered to continue the contract with union platform men which expired on March 31 after being in existence for two years. The feature of the agreement presented by the union was a demand for two weeks' vacation with pay. The union took the stand that its members were civic employees and should receive a vacation without loss of wages. The offer of the commission was rejected and the union committee instructed to continue its negotiations.

Fare Question Up in Columbus

When the Council of Columbus, Ohio, considers the proposed 25-year franchise of the Columbus Railway, Power & Light Company, the fare problem may be complicated by the fact that the power franchise is held by the company as assignee of the Indianola Heating & Light Company. That grant was made on Aug. 14, 1903, and expires on Aug. 14 this year.

Hints of the need for an increase in fare first came during the franchise negotiations of the summer of 1926. An attempt was made by members of the Council at that time to combine the power rate with the railway rate in the proposed franchise. C. C. Slater, president of the company, declared at that time that if the power rate question were injected into the franchise, and the price of power lowered, it would certainly be necessary to increase fares and hinted at a 7-cent car fare. The franchise intended to apply to the railway, passed by the City Council on Sept 25, 1926, but rejected by the company, contained a provision for a 5-cent fare.

Parade of Progress in Baltimore

400 members of local Chamber of Commerce inspect railway plant and witness progress in car design, with horse car in vanguard of interesting procession

A HORSE CAR, the only relic of early transportation days now in the company's possession, trundled its way through a few Baltimore streets on April 25 in connection with a display made at Carroll Park shops for the edification of about 400 members of the Baltimore Association of Commerce, guests for the afternoon of President C. D. Emmons and the United Railways & Electric Company.

First there was a luncheon to the visiting group, members of which were carried to the shops in buses. Then came a thorough inspection of the shops and storeroom. As a finale there was a parade of street cars of various types, from the first crude conveyances to the finished products of today. The horse car served as the vanguard of this interesting procession. One of the first electric cars followed the horse-drawn vehicle after which came a series of cars showing gradual development to the day and generation of the articulated car.

When the guests reached Carroll Park they were individually greeted by A. T. Clark, superintendent of rolling stock and shops, who was aided in the reception by his assistant, H. A. Leonhauser, and other members of the shops'

staff. As they entered the buildings they were welcomed by President Emmons and General Manager Potter.

A tempting luncheon was served in the carpenter shop and the inspection was then started. Special points of interest to which attention was called were all numbered, and were explained in a brochure handed to each visitor. The parade of the street cars consisted of:

- Horse-drawn car, built about 1860.
- Single-truck 15-ft. closed car (early electric car), built about 1890.
- Single-truck 18-ft. closed car (early electric car), built about 1895.
- Single-truck nine-bench open car, built about 1895.
- Single-truck 20 ft. 9 in. closed car, built about 1898.
- Single-truck 23 ft. closed car, built in year 1904.
- Double-truck convertible car, built in year 1900.
- Double-truck 28-ft. closed car, built in year 1902.
- Double-truck twelve-bench open car, built in 1902.
- Double-truck semi-convertible car, built in 1915.
- Three car train, built in 1919.
- Motor car and trailer, built in 1920.
- Single-truck safety car, built in year 1920.
- Single-truck safety car, reconstructed in company's shop in 1923.

Double-truck Peter Witt car, built in 1919.

Three-truck articulated car, built in 1924.

This exhibit of car types from the beginning of railway transportation in Baltimore to the present day was presented as a climax to the inspection. In a description of the parade which he read Robert B. Varnum said there was a great deal of difficulty in getting the first car line started. The applicants for railway franchises encountered legislative opposition and opposition from merchants who contended that street cars would drive business away from their doors. Finally the needed authority was obtained. The first Baltimore horse car ran on Broadway and Baltimore Street.

The horse car in the exhibit, almost identically as it was 69 years ago, ran on Pennsylvania Avenue, from North Avenue to Baltimore Street, and thence to old President Street Station of the Pennsylvania Railroad. At hills it was met by a "hill-boy"

in 1893. It was more commodious than its predecessor, about 3 ft. longer, and with correspondingly more generous space. This car was built by the Brownell Car Company, St. Louis, and operated on lines of the Baltimore Traction Company. In the same year this company began operation of a Brownell open car—a nine-bench conveyance designed for summer comfort, and one of a type that proved highly popular with riders.

Still another progressive step in car

Our little extemporaneous "parade of the electric pony," as a newspaper man has chosen to call it, has passed. We trust it has been interesting to you. The miniature pageant has gone by with its lesson of development of car service, but the development of the car is not complete. The very best thought of the ablest engineers obtainable by this company is constantly directed toward improvements—improvements to meet traffic conditions; improvements to keep pace with the times; improvements to effect economies; but first and foremost, improvements to afford the people who ride the cars greater comfort, greater convenience, greater safety, greater satisfaction, and an altogether better service.

Parking in Downtown Philadelphia

The Philadelphia Rapid Transit Company, Philadelphia, Pa., has opened its public parking area on the south side of Locust Street, east of Fifteenth, to enable the clearing of Locust Street in the vicinity of the Mitten Building and the Mitten



There was no lack of contrast in the things shown members of the Chamber of Commerce at the Baltimore inspection



who attached an extra horse to the vehicle to help draw it up the grade.

Before the horse car was a dozen years old many experiments had been made to find a means of quicker propulsion of the cars. A steam dummy was tied on an East Baltimore line, but it made a great deal of noise and a great deal of smoke and it was found to have operating defects that doomed it to abandonment within a short time.

An experiment was made on the Hampden line with a third-rail electric car in 1885. The cable cars came on the scene soon after this. A dozen cable lines were built, and work was still proceeding on other lines when the overhead trolley began to demonstrate its usefulness. So at this point Mr. Varnum referred to the very earliest electric car run on a line of the Baltimore City Passenger Railway in 1891. Immediately the overhead trolley was recognized and established as practical, the attention of the railway world was concentrated upon the development of the car, the track, the overhead lines and all the accessories of service. The next car appeared on the streets of Baltimore

development was the introduction of the 23 ft. Brill car in 1904. In discussing this model Mr. Varnum emphasized the fact that much of the improvement in car models has been in the mechanism of the vehicles. He said it was not always possible to distinguish models by outward appearance except through the most careful scrutiny, but that motors had been constantly the object of improvement, and all else of the car that makes for smoother and more comfortable running, for speed, for acceleration, for braking, for safety, has undergone a transformation for the better.

In 1900 the Baltimore company put in operation a double-truck convertible car, possessing features which represented a great advance over previously operated cars, and destined to become the basis of a standard car that was to thrive for some time. So Mr. Varnum went down the line of cars explaining each one briefly and adding a touch of local color here and there, until finally he came to the three-truck articulated car, pronounced by many as superior to any other style car in its fundamental features. In conclusion he said:

tours intercity terminal. Later a combined bus terminal and garage will be erected on the site.

An announcement issued by the company said:

The parking plan will not be operated for profit, since a parking fee of only 25 cents a day will be charged. Rather it will be another link in the chain of parking fields, including those at the Sixty-ninth Street and Bridge Street elevated terminals which are operated by Philadelphia Rapid Transit, as an inducement to the motorists to leave their cars outside the congested downtown areas.

R. T. Senter, president of the Philadelphia Rapid Transit Company, in discussing the parking evil, is quoted as follows:

Just as Philadelphia Rapid Transit is pointing a way to the proper method of handling the problem of bus parking by maintaining terminals on private property for its intercity buses, so we are now establishing the parking space at our expense in an effort to show the way by which the motorist who now occupies very valuable street space can be accommodated at small cost to the city as compared with the frequently suggested alternative of widening or double-decking the streets.

Wage Agreement in Cincinnati to Go Unchanged

The wage agreement between the Cincinnati Street Railway, Cincinnati, Ohio, and its employees will not be changed this year. There is provision in the basic agreement for an adjustment every two years, to be made on July 1. In 1926 the men won a small pay increase, but this year, it is said, they do not intend to ask for any advance. The only changes to be sought will be in split runs. It is said that the men desire that when working split runs, the entire days work be completed within twelve hours. It is said that at present this spread is sometimes exceeded.

Tram Home Rule Proposed in Kansas City, Kan.

An ordinance giving Kansas City, Kan., home rule over cars operated within its limits was placed on first reading on June 4 at a meeting of the City Commissioners of Kansas City, Kan. The proposed new ordinance provides that no changes shall be made in connection with the operation of street cars without the permission and authorization of the City Commissioners. Penalty for violation of the ordinance will be a fine of not less than \$5 and not more than \$500.

Agreement Unchanged in East St. Louis

The wage scale and working agreement of the East St. Louis & Suburban Railway, East St. Louis, Ill., have been extended for one year. Under the contract motormen and conductors of two-man cars are paid a maximum of 59 cents and one-man car operators 64 cents an hour. The former contract with the Amalgamated expired on May 1. The men at first sought increases ranging from 11 to 21 cents an hour. Approximately 485 motormen, conductors and shopmen are employed by the company.

Survey Under Way in Louisville

J. W. Burke, traffic expert of New York formerly with J. G. White & Company, will aid the Louisville Railway and the Public Utilities Bureau, Louisville, Ky., in a survey intended to furnish suggestions for improving car and bus service. New bus routes, changes in car line routing and other matters intended to improve service will all be incorporated by Mr. Burke in his report along with the recommendations to be made by him at the conclusion of his investigations.

Among Recent Moves in Suburban New York

Supreme Court Justice Morschauer on June 1 denied the Merchants' Community Bus Transportation Company's application for an injunction against the

North Street Transportation Company, a subsidiary of the Third Avenue Railway, restraining it from operating buses between Yonkers and White Plains. The Merchants' Company alleged the North Street line was infringing on an exclusive franchise.

The purchase of the Sound View Bus Transportation Company by the New

York, Westchester & Boston Railway has been announced. The Sound View Company had operated 18 miles of line in Westchester. The railway, a subsidiary of the New York, New Haven & Hartford Railroad, announced it would assume control as soon as the Public Service Commission approves the purchase.

New Jersey Company's Celebration

Dinner to President McCarter one of many events in connection with corporation's 25th anniversary. Loyalty of employees fittingly recognized. Buildings decorated

MEN prominent in the public, civic, professional, business and industrial life joined in celebration of the 25th anniversary of the Public Service Corporation at the dinner at the Robert Treat Hotel, Newark, on June 1 to which reference was made in the JOURNAL for June 2, page 914.

The keynote of the speeches was co-operation between Public Service and the public, a note sounded in particular by Thomas N. McCarter, the organizer of the corporation and its president since formation. Among other things Mr. McCarter said:

Our banner has been public service, and never have the navigators of the ship taken their eyes from that banner. Never has the banner been lowered.

My enjoyment of this occasion is tempered by the mistakes we have made, for which I assume all responsibility. I have no objection to criticism. We are open to it. But our purpose has been, and always will be, to better serve the public.

While it is pleasant to look back over our accomplishments, yet our eyes are fixed upon the future, not on the past. New Jersey is not in the twilight of its life. It is, rather, at its sunrise. New Jersey has just commenced to grow.

We here pledge ourselves to furnish all the power needed in the state for its great future expansion, to furnish gas for all industrial and other purposes.

We are doing the best we can with the local transportation problem. We have been carrying on the business below cost, lower than any place else in the country, with the unfortunate exception of New York, where the city has millions invested in transportation, with no return upon that investment.

He gave it as his belief that the transportation problem will be solved only by unified operation.

BONUS TO EMPLOYEES ANNOUNCED

Early in his address Mr. McCarter announced that the board of directors had authorized the payment of a bonus of 10 per cent of their annual salary to all employees who have been with the corporation and its subsidiary companies 25 years. There are 750 such employees.

Governor Moore, introduced as a "graduate of Public Service," paid high tribute to the genius of Mr. McCarter for his work in organizing and carrying on the corporation, for his vision and his devotion to the task he had set before him. He said:

We in New Jersey are proud of Public

Service. It is more than a corporation. It is an institution. Sometimes I think that Public Service doesn't believe we are proud of it, judging by some of the legislation and the remarks made in Trenton. To that I can only quote the Biblical line. "Whom the Lord loveth, He chasteneth."

THE NEED FOR IMAGINATION

Owen D. Young of the General Electric Company emphasized the vital part played always by imagination in the progress of mankind. "After all," he said, "imagination is the leadership of the world." And he went on to tell how every accomplishment of man, every "line drawn in the map of the world," first lived in imagination, then became reality through the courage and self-sacrifice of man.

Arthur W. Thompson, president of the United Gas Improvement Company, stressed the theme that the 25th anniversary of the company was more than a celebration of a mile post in the life of a corporation. He said:

Behind the corporation are the men and I believe it is to them that we here tonight pay tribute. We are celebrating their accomplishment, not merely a corporation anniversary.

In landing the work of the early builders of the corporation E. W. Wakelee paid particular tribute to Mr. McCarter. Mr. Wakelee said:

I believe Mr. McCarter will go down in history as one of the greatest builders New Jersey has ever had.

He emphasized the need for still greater co-operation between the corporation and the public and officials.

Some interesting sidelights on public utility operation in the early eighties developed during the evening. It was recalled that it was in New Jersey that Thomas A. Edison achieved a great deal of his success and as early as 1880 was operating a commercial electric railway at Menlo Park, though it was not until some few years later that electric cars began to displace the horse and cable cars. On May 9, 1881, the Common Council of Newark authorized the expenditure of "not less than \$300 for the purpose of erecting five suitable posts in Military Park and running a wire upon the same, provided the Weston Electric Lighting Company will burn five lights until midnight without charge for lighting, furnishing attendance, electricity, etc., at their own expense." Since the organization of Public Service the cor-

poration has spent \$162,000,000 for electric properties and improvements, while total expenditure for all properties amounted to \$295,000,000.

Among those who attended the dinner were:

P. S. Arkwright, E. A. Armstrong, Joseph F. Autenrieth.

A. E. Bauhan, Louis P. Baurhenn, H. F. Bell, H. A. Benedict, John Bentley, R. O. Bentley, Frank Bergen, Colonel Charles N. Black, Samuel T. Bodine, William W. Bodine, Newton W. Bolen, M. R. Boylan, Luke C. Bradley, W. J. Brennan, Emmett A. Bristor, H. W. Buck.

N. A. Carle, Ralph S. Child, Paul S. Clapp, Harlow C. Clark, S. H. Cleland, Jr., B. C. Cobb, William I. Cooper.

Richard E. Danforth, Harry V. Drown, Edward H. Earnshaw, Senator Edward I. Edwards, VanHorn Ely.

B. C. Forbes, Harry K. Ford, Carl T. Freggens.

Gen. Frederick Gilkyson, A. S. Grenier, J. Horace Harding, W. B. Hartshorne, William C. Heppenheimer, H. T. Herr, Garret A. Hobart, J. H. Hanna.

T. A. Kenney, Col. Anthony R. Kuser, John L. Kuser.

Horatio G. Lloyd, James P. Logan, F. A. Lydecker, Adrian Lyon.

Thomas N. McCarter, Thomas N. McCarter, Jr., Uzal H. McCarter, Uzal H. McCarter II, James H. McGraw, William H. Meadowcroft, A. C. Middleton, J. F. Mitchell, Governor A. Harry Moore, Clinton E. Morgan, John F. Murray, Jr.

Arthur E. Newbold.

Matthew L. O'Brien, W. H. Onken, Jr., F. S. Osborne, Farley Osgood, J. L. O'Toole.

John H. Pardee, Arthur N. Pierson, P. W. Pierson.

J. S. Rippel, David B. Robb, Dwight P. Robinson.

W. H. Sawyer, Martin Schreiber, George S. Silzer, George T. Smith, William R. Smith, Frank H. Sommer, Thomas Sproule, L. S. Storrs, Edward T. Stotesbury.

William H. Taylor, Arthur W. Thompson, Paul Thompson, C. L. S. Tingley, R. S. Tomkins.

T. W. VanMiddlesworth.

Edmund W. Wakelee, John I. Waterbury, E. F. Weston, Arthur Williams.

Owen D. Young, Percy S. Young.

John E. Zimmerman.

The dinner was, of course, the culminating feature of the celebration. But it was, after all, only one event in a series which marked the anniversary. A new motion picture entitled, "The Public Servant of a Great State," setting forth the activities of Public Service companies, is being shown in several cities in Public Service territory.

The growth and development of the Public Service transportation system, especially in the field of the bus, has been graphically illustrated by pictures of deluxe bus operation, as well as the plant and equipment necessary to maintain and operate the fleet of more than 1,200 buses.

In honor of the anniversary many of the Public Service buildings will be decorated, for the entire month. The commercial office windows will contain appropriate displays for about two weeks. The decorations will include flags and bunting, and six of the commercial office buildings will have an electric sign reading "1903-1928." Floodlights will be used to illuminate

the exteriors of some of the buildings at night.

The story of the growth of the company is told in the 60-page illustrated booklet "Public Service Review 1928—25 Years of Public Service."

N.E.L.A. Meeting

Industry moving forward rapidly. Market development effort bearing fruit. Puget Sound wins Coffin award

WITH customary enthusiasm and purpose the 51st convention of the National Electric Light Association was held at Atlantic City, N. J., June 4 to June 8 with 8,000 utility representatives at the meetings. From the speeches and papers it was generally conceded that the electric light and power industry was moving forward rapidly; that market development efforts were bearing fruit; that closer co-operation was evident between the national associations in the industry; that public understanding was a big problem and that undivided executive attention was necessary for successful public relations. An announcement that the industry had contributed \$3,000,000 to the National Research Council program was evidence of the co-operation given for the public benefit.

P. S. Arkwright succeeds H. T. Sands as president and J. F. Owens and A. W. Thompson were elected vice-presidents. M. S. Sloan and W. A. Jones continue as vice-presidents and P. S. Young continues as treasurer.

An address by James H. McGraw entitled "The Power Industry in the Marketplace" referred to the new competition which is teaching the public to discriminate, not necessarily as to what may be best in the absolute sense, but as to what is most desirable. He stressed the need of direct appeal and of advertising messages that would arouse the general public.

An enlightening message on "Railroad Electrification" was given by Britton I. Budd, chairman of the committee on electrification of steam railroads. He summarized conditions in Europe and America, referring to the accomplishments and plans of such properties as the Chicago, Milwaukee & St. Paul, the Illinois Central, the Virginian Railway, the Pennsylvania Railroad, the Great Northern, the Philadelphia & Reading and the Delaware, Lackawanna & Western. These plans were all projected to increase capacity, to improve service and to promote general economy.

A high spot in the speech of J. F. Owens, chairman of the public relations committee, National Section, was touched when he said that rendering a service was only half the job; that it was necessary to disseminate information so as to enable the recipient of the service to use that service wisely and well. He stressed the necessity for the use of paid advertising columns in the press to give to the public "a straightforward, well thought-out and carefully prepared account of stewardship."

The Coffin Award for 1928 went to the Puget Sound Power & Light Company.

Would Prepare Sound Program for Chicago

Expressing impatience with the long delays and with the obstructions placed in the path of settlement of the Chicago railway problem by various political interests, members of the local transportation committee of the City Council have adopted a resolution which calls for the immediate preparation of a sound railway program regardless of the attitude or opinions of the transportation companies or of interested political factions. Alderman D. S. McKinlay, author of the resolution, held that the prospect of obtaining the legislation necessary to put in effect the five recent railway bills seemed indefinitely lost as a result of the failure of the special legislative session held last month to take action, and urged that a definite plan be formulated by the committee and submitted to the voters without further appeal to the Legislature. The following program is suggested:

That the committee take up with the Chicago Surface Lines the matter of renewing the 1907 ordinance with such changes, including unification of service with the Chicago Rapid Transit Lines, and if possible, an amortization provision, as may be deemed desirable.

That the committee negotiate with the Rapid Transit Company for the granting of a definite term franchise, not to exceed 40 years, such franchise also to include unification of service with the surface lines, and if possible, an amortization provision. Finally, in the event the companies fail to agree on terms for unification of service, then the attorneys for the committee shall be directed to proceed before such regulatory commission, local or state, as then shall have jurisdiction, to compel the transportation utilities to provide unified service to Chicago on such terms as such commission may determine are just.

Should the railways persist in their unwillingness to accept a settlement as devised by the committee, the aldermen intimated that they would turn to the alternative Lisman plan, which has been pending in Council for nearly eighteen months. It is believed that action by the State Legislature would not be required to put this plan into effect.

Skip-Stop Plan in Indianapolis Postponed

Action on the proposed skip-stop system for one of the principal city car lines of the Indianapolis Street Railway has been postponed by the Indianapolis, Ind., Board of Public Works pending completion by the city legal department of a formal opinion that the works board has jurisdiction to regulate the schedule. The proposed schedule, drafted by attorneys for patrons, provides that cars stop at every third intersection. Cars would be marked with a red diamond, a green oblong, and a black circle to indicate stopping corners. It is contended that during the busy hours, a considerable saving of time would result if this plan were followed.

Milwaukee Program Being Expedited

Operation will be begun soon by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., over new tracks from Soldiers' Home to 68th Street, on the west side of Milwaukee. At this point the company is relocating slightly more than a mile of track, moving it from Fairview Avenue to private right-of-way free from grade crossings. Four tracks are to be provided, two for rapid transit trains operating to Watertown, Burlington and East Troy, and the other two for Wells-West Allis suburban cars.

Later in June the company expects to begin operation of its Racine-Kenosha interurban trains over 9 miles of new track immediately south of the city of Milwaukee. The new track is entirely on private right-of-way and is substantially free from grade crossings. It will make high-speed operation possible and insure more satisfactory maintenance of schedules than the present route, which is located almost exclusively along heavily traveled public streets and highways.

The Milwaukee Common Council has acted favorably upon the company's franchise application for a subway and rapid transit outlet toward the west. Some further preliminary steps need to be taken, but the company is hopeful of being able to begin physical work on this improvement this year.

Wage Renewal Suggestion Rejected in Connecticut

Employees of the Connecticut Company have rejected the proposal of the company to renew the present wage schedule, which expired on June 1. It is known that the employees are taking their stand for increased wages on the grounds that Massachusetts companies controlled by the New Haven road pay a higher rate with an eight-hour minimum day. Carhouse hands, shopmen and other workmen, all designated as non-uniform employees, who are members of the Amalgamated Association, also are seeking increases. President John K. Punderford of the Connecticut Company, referring to the result of the voting, said it was probable that officials of the company and representatives of the employees would confer at once with the hope of settling the problem without arbitration.

Free Rides in Michigan City

Free street car and bus rides for everyone was a feature of the city-wide bargain day sponsored on May 22 by the Chamber of Commerce of Michigan City, Ind. Through the efforts of the local retail board of the chamber, all passengers on the cars of the Chicago, South Bend & Northern Indiana Railway and on the buses of the Jahn's Bus Line and Shore Line Motor Coach Company were carried free between

9 a. m. and 4 p. m. Practically every retail store in Michigan City advertised special low values on their goods and urged their patrons to take advantage of the free transportation service on that day.

Car Ordinance Given Columbus Company

A certified copy of legislation passed by the City Council of Columbus, Ohio, making all streets with car tracks main thoroughfares and establishing a speed limit of 25 m. p. h. for street cars, has been forwarded to the Columbus Railway, Power & Light Company by City Clerk Wilkins. Work on the establishment of the skip-stop system will not be started until acceptance of the main thoroughfare ordinance by the railway.

New Fares in Lawrence

A new schedule of railway and bus fares for Lawrence, Kan., was approved recently by the Public Service Commission. The approved schedule is one fare for 10 cents and two for 15 cents with free transfers between the two classes of transportation. The operating company is the Kansas City, Kaw Valley & Western Railway.

Franchise Ordinance for Toledo Approved

By a vote of seventeen to one with two absentees the City Council of Toledo, Ohio, approved the plan of railway settlement presented to it by Mayor William T. Jackson two weeks ago and formulated along the lines of agreement worked out by Commissioner E. L. Graumlisch and the Street Railway Board of Control in negotiations covering several months. After considerable study the plan was endorsed unanimously by the railroads and telegraphs committee of City Council. It had unanimous indorsement and support of the Chamber of Commerce, and it was approved by the city commission on publicity and efficiency. The ordinance will become effective in 30 days provided it is not subject to a referendum vote.

Business leaders consider the plan the most forward-looking step in transit development undertaken in Toledo since the Milner plan was launched more than six years ago. The present ordinance appears to have corrected most of the former troubles without committing the city up to a transit monopoly for a long period of years. Extensive repaving of streets and development of new home districts will be undertaken as a result of the passage of the new transit plan, it is believed.

The new plan is a supplementary agreement between the city and Community Traction Company. Details were given in the ELECTRIC RAILWAY JOURNAL issue of May 12. Adequate guarantees to both interests are set up in the ordinance. The entire plan is based on a five-year period.

Recess Appointment for P. J. Farrell

The United States Senate failed to act upon the nomination of Patrick J. Farrell to become a member of the Interstate Commerce Commission to succeed John J. Esch of Wisconsin, but he was given a recess appointment by President Coolidge on June 7. This appointment will fill the gap in the commission's ranks.

Date Set for Hearing on Rome Fare Request

June 12 has been set by the Georgia Public Service Commission as the date for hearing the plea of the Rome Railway & Light Company, owned by the Georgia Power Company, for an 8-cent cash fare instead of the 6-cent fare now in effect; to sell two tickets for 15 cents, and to establish a 4-cent fare for school children instead of the present 3-cent fare.

Hearing in Hamilton on June 12

The application of the Hamilton Street Railway, Hamilton, Ont., to increase its fare and that of the men to win a wage advance will be brought before the Ontario Railway and Municipal Board on June 12. This decision was made on May 21, when the board sat to hear evidence in the application of the railway men for a wage increase. C. R. McKeon, chairman of the board, said that while the board could give no decision until it heard the evidence, any action favorable to the men's application would depend largely upon the company's ability to pay increased wages. Any decision by the board will be retroactive to May 1.

Endeavor to Fix Blame in Illinois Wreck

Three separate investigations are being conducted to fix responsibility for the collision of two trains of the Illinois Traction System near Danville, Ill., on May 31, which resulted in the death of seven persons and serious injuries to 29 others. Both cars were limited of semi-steel construction. The wreck occurred about 700 ft. east of the siding and approximately in the middle of the 2-mile stretch of tangent track. The scene of the wreck is at Fithian, 7 miles west of Danville, Ill.

Would Operate One-Man Cars on Fort Wayne Line

Permission to operate one-man cars on its lines between Fort Wayne and Garrett, Garrett to Kendallville and Garrett to Waterloo was asked in a petition filed recently with the Indiana Public Service Commission by the Indiana Service Corporation, Fort Wayne. The petition sets out that receipts have been steadily decreasing for the past year.

Recent Bus Developments

Business Men Headed by Railway President Buy Cincinnati Taxis

Negotiations for the purchase of the Zumstein and the Town Taxicab Companies by a group of business men represented by Walter A. Draper, president of the Cincinnati Street Railway, have been consummated. The two taxicab properties will be merged and operated as one concern by a new company. Mr. Draper said:

A group of Cincinnati business men has completed an agreement to purchase the Zumstein Taxicab Company and the Town Taxi Company, Inc. A new company will be formed to take over the business of both companies. It is expected the details will be worked out within the next two or three weeks.

Both Frank J. Zumstein and Joseph Erman will be identified with the new company, Mr. Zumstein as a vice-president and Mr. Erman as a vice-president and general manager. The other officers of the company have not as yet been selected.

These two taxicab companies are being brought together as a step toward improving the taxicab situation in Cincinnati. While in some cities taxicabs are operated by companies that run the railway and the motor coaches, it has not been thought wise at this time to include the taxicab business as a part of the Cincinnati Street Railway. The taxis will be operated as a separate and distinct unit, with no connection with railway business.

The company's policy will be to improve the service and as far as possible to help in improving the taxicab situation as a whole. Further announcements will be made later of steps to be taken to accomplish this purpose.

One-Year Consent Granted International

Although it rejected the application of the International Railway, Buffalo, N. Y., for a ten-year consent to operate buses over Bailey and Kensington Avenues at a 10-cent fare the legislative committee of the Common Council has agreed to a consent for a one-year period. Under the proposed consent, the rate of fare will be 10 cents for all passengers who occupy seats, including children, but the transfer restrictions applying to the Delaware and Delevan bus lines, on which only one transfer is issued, do not apply.

Walter C. McCausland, public relations officer of the company, who represented the company at the hearing, said the proposed consent would be taken under advisement. He said the company was desirous of a ten-year consent.

The International now is running a bus over Bailey Avenue from Broadway to the north city line. It has no franchise. The rate of fare is a regular trolley token and unlimited transfer privileges extend to intersecting trolley lines.

In voting this agreement, which was not made unanimously, the committee indicated that while it was not in agreement with all the terms of the proposed franchise, it felt it should heed the petition of residents in the Kensington-Bailey section who are asking for additional transportation facilities.

Modern Bus Station Open at Oklahoma City

A new bus station, in many respects modeled after a modern electric railway depot, was opened at Oklahoma City, Okla., on June 4. It is located near the Santa Fe Railway station and is 100x140 ft. in dimensions. It contains an information bureau, a central ticket window, issuing tickets for all lines operating out of the station, and a spacious waiting room. Ninety buses will arrive at or leave the station daily.

Controversy About Leased Buses

Conflict arises over arrangement by which Detroit Municipal leases equipment. Auditor removed for remarks made without commission's approval

WILLIAM M. HAUSER was removed as auditor of the Department of Street Railways, Detroit, Mich., on May 31 at a special meeting of the Street Railway Commission. His dismissal had the approval of the Mayor. G. Ogden Ellis, president of the commission, stated that the meeting was called to consider a public statement by Mr. Hauser in which the auditor criticized W. B. Mayo, a former member of the commission and now its consulting engineer. The commission regarded Mr. Hauser's statement an insult to Mr. Mayo.

Mr. Hauser was appointed auditor about three years ago to succeed I. N. Merritt during the time John W. Smith was Mayor and shortly after Col. H. U. Wallace was made general manager of the Detroit municipal system. No action has been taken to fill the position. In the meantime Charles J. Faber, chief assistant auditor, will have charge of the auditor's office.

In the interview Mr. Hauser was quoted as including the statement that Mr. Mayo was "a pensioner of Henry Ford" and "an interested party" in the controversy over the rental of buses by the D.S.R. from the Detroit Motorbus Company, of which Mr. Mayo is an officer. Mr. Hauser was quoted as saying that Mr. Mayo's name is printed on the railway department's letter head and that it also appears on that of the Detroit Motor Bus Company, but does not appear on the Ford stationery.

When the matter of the purchase of

Extensions in Washington

Permission has been granted to the Washington Railway & Electric Company to extend its Rhode Island Avenue bus line from Fourth and Franklin Streets, N.E., to the intersection of Queens Chapel Road, Washington, D. C. The commission ruled that the extension would provide additional service to residents along the proposed route. No changes were made in either the rate of fare or transfer privileges now in effect. The company was also authorized to extend its Park Road bus line by changing the route of this line and dividing it into two branches.

New Service in Iowa Awaited

Bus service will be started by the Waterloo, Cedar Falls & Northern Railway, between Waterloo and Cedar Rapids, Ia., June 15, according to a recent announcement of Maurice Welsh, superintendent. One round trip daily is scheduled for the opening of the service, giving the only morning connection between the two cities.

new buses by the D.S.R. came up several weeks ago, the propriety of purchasing new equipment of that nature was questioned and Mayor Lodge and the commission asked Mr. Mayo to study the department's bus situation and report on the operating costs. Mr. Hauser questioned the matter of considering Mr. Mayo's report "the last word on the subject, particularly when he is first vice-president of the interested company." This refers to the fact that the Department of Street Railways is renting buses from the Detroit Motorbus Company. Mr. Hauser and Commissioner Barlum were opposed to renting the equipment from the private company and at a recent meeting Mr. Barlum stated that as Mr. Mayo's report of his bus survey was announced as soon forthcoming, he would withhold a motion to purchase new buses.

About a week previous to his dismissal, the auditor stated that in the 10 months ended April 30, 1928, the D.S.R. had paid \$228,000 for rental of buses. Although Commissioner Barlum and Mr. Hauser agreed in the contention that the rental was inadvisable, the motion to dismiss Mr. Hauser was made by Mr. Barlum. Mayor Lodge stated that the bus rental arrangement was O.K.'d by the Street Railway Commission and approved by the Council and the Mayor last July. The Mayor added that Mr. Hauser was discharged for insubordination. His statement also pointed out that "I do not like these rows; I do not like friction in our City

departments, but I must take action in a case of this kind or we can have no morale in the administration of city affairs."

MR. HAUSER'S EXPLANATION

Following his dismissal, Mr. Hauser issued a written statement in which he is quoted as follows:

I have given my very best in an endeavor to make public ownership of Detroit's street railways a success. My files will show that I have tried to give the chief executives of the Street Railway Commission the facts about the operation of the people's transportation system. I have endeavored to do this honestly without fear or favor, and have been very careful of the trust imposed on me. I feel that a man in public office owes his loyalty first to the entire people, and in this respect my conscience is clear.

There are many ramifications to the relations of the Detroit Motor Bus Company with the Department of Street Railways which undoubtedly will in time come to light and in the end my action will be appreciated.

These are my own personal opinions. Others may have different ones, but I stand on what I think and what I believe to be right.

The story of the success of the Detroit Motor Bus Company in the last few months can in part—in a very large part—be attributed to the contractual relations it has with the Department of Street Railways with respect to rented coaches.

I accept the result of the expression of my honest conviction very cheerfully since I have stood for what is right and not what some other man thinks is right.

Mr. Hauser said that the statement referring to Mr. Mayo as a pensioner of Henry Ford should not have been published, but insisted that he would stand by his contention that it was not proper for Mr. Mayo, an officer of the Detroit Motor Bus Company, to make a report as consulting engineer for the D.S.R. He held to the belief that no man is big enough to sit on both sides of the table at the same time.

BUS INDUSTRY IN TRANSITORY STATE

Del A. Smith, general manager of the Detroit Municipal Railway, was quoted in part as follows:

The bus industry is in a highly transitory state. It is only within the past year that a satisfactory bus carrying 35 to 60 passengers has been developed. The efficient 40-passenger bus has come only in the last 10 months, and the day of the double-deck bus is distinctly done. We could not foresee the development of one type and the obsolescence of the other a year ago.

Had we purchased buses then, we would have acquired a fleet which by now would be antiquated and rendering service unsatisfactory in comparison with machines we can buy now. As to Mr. Hauser's statement that the Detroit Motor Bus Company is making 10 cents a mile, the idea is ridiculous. We rent the buses for 31 cents and it is impossible to operate buses such as the motor bus company leased to us for anything like 21 cents.

They make a small margin of profit, but that small margin is all the city is losing—and it certainly is not 10 cents for every mile the rented buses travel. Further, we were justified in renting new buses to avoid delay in opening new territory. Four-

teenth Street was promised service for two years before it got it. Now we are hauling slightly less than 3,000 passengers a day over that route and could haul more if we had bigger buses.

Rented buses now run about 20,000 miles a month compared with 30,000 when rented buses were run by the Municipal on Fourteenth Street.

Bus Patronage Satisfactory in Kansas City

Buses operated by the Kansas City Public Service Company, with a new grant of 15-cent bus fares on trunk lines, apparently are holding the patronage enjoyed when a 10-cent fare was asked, according to a check made by the company during the rush periods. The patronage is about as usual, according to D. L. Fennell, superintendent of transportation of the company. The double-deck buses did a light business the first few days, says Mr. Fennell, because the weather was not suitable for outside riding, but on the whole there was no indication the patrons considered the 15-cent fare too high. Of the new routes the South Oak line seemed popular. The trunk line passengers, beginning with the new six months' temporary franchise, can obtain free transfers to certain intersecting street car lines. Feeder line fares remain 10 cents.

Complaint Against Gary Railway Operation

The Midwest Motor Coach Company, Gary, Ind., in a petition filed recently with the Indiana Public Service Commission asked that the Shore Line Motor Coach Company and the Gary Railways be ordered to cease operating motor coach routes in competition with its own coaches between Gary and 63rd Street, Chicago. It was the complainant's contention that it had been authorized by the commission in October, 1925, to operate a motor coach route between these two points and that the other two companies held certificates permitting them to operate only over that part of the route between Indiana Harbor and Whiting, but that both companies were now carrying passengers over the entire route. The petition asks that the certificates granted them by the commission be withdrawn and that they be ordered to desist.

An injunction sought by the Midwest Motor Coach Company to restrain the Shore Line Motor Coach Company from operating buses over this route was denied last February by the Porter County Superior Court at Valparaiso, Ind.

Service Sought in Indiana City

In a petition filed recently with the Indiana Public Service Commission, it was requested by residents of Fairmount, Ind., that the Union Traction Company of Indiana be compelled to provide bus service for that city, as required in the certificate of convenience and necessity granted by the commission.

Petitions for Westchester Heard

An attempt to induce the City Council of New Rochelle, N. Y., to reconsider the proposal of the Third Avenue Railway, New York, to substitute buses for trolley cars over the East Main Street line under the conditions requested by the railway failed recently, when the Councilmen refused to put the suggestion for reconsideration into the form of a motion.

The Public Service Commission has approved the tariff filed by the Westchester Street Transportation Company, Inc., a subsidiary of the Third Avenue Railway, for bus operation in place of cars upon its Silver Lake line in White Plains and Harrison. Sub-route or short line buses are operated over carrying portions of the route to meet requirements of traffic. Fare on this line is 10 cents. Free transfers are given from this line to other bus lines or street car lines entitling the passenger to ride to any point in the city of White Plains.

Eight Motor Coach Routes in Pasadena

The California Railroad Commission has granted a certificate to the Pacific Electric Railway for the operation of coaches in the city of Pasadena over eight routes, covering its present operations. These routes are to be considered as experimental, however, and subject to any further order by the commission in case corrections or alterations may be required.

Municipal Bus Lines Do Well. Pass Popular in St. Petersburg

According to the *Times*, St. Petersburg, Fla., that city's municipal bus lines, started on June 5, 1926, have solved the transportation problems of thousands of residents in the outlying sections of the city, particularly in the Haines Road district, north and south Disston Boulevard, along Lakeview Avenue and in the Lakewood Estates section. This same authority says that the lines were operated at a loss for several months, but are slowly becoming self-supporting. Since the lines were started eight city buses have carried 840,048 passengers and collected \$82,519 in passenger fares. The system now covers a wide section of the city not reached by the municipal railway.

Bus transportation is said to have been made more popular by the public utilities department through the sales of two classes of tickets, one form interchangeable with the street cars and the other a straight weekly pass good only on the street cars. The combination weekly pass good on both the car and bus sells for \$1.75. The straight weekly pass selling for \$1 entitles the holder to ride only the street cars. Since the weekly pass system was put into effect the railway has shown an increase in sales from about \$500 the first week to more than \$1,100 a week at the present time.

Financial and Corporate

Reorganization of Michigan Electric Railway

Formation of a plan and agreement for the reorganization of the Michigan Electric Railway, Jackson, Mich., and its properties has been adopted by the bondholders' committee. Any depositor who may dissent to the plan, should it be approved, will receive bonds and coupons represented by his certificate of deposit upon payment of an amount to cover pro rata share of cost and expenses fixed by the committee, not exceeding \$15 for each \$1,000 bond.

The plan provides for the organization of a new company and the necessary subsidiaries to acquire the present company's property and operate such additions, extensions and betterments as it may find necessary. No stock or securities will be issued for or on account of the outstanding stock of the company. The new company will not issue or sell any notes, bonds, or other obligations except for money necessary to pay expenses.

Holders of first and refunding mortgage bonds will receive for each \$100 principal amount of bonds one share of stock in the new company. Holders of Jackson & Battle Creek Traction Company bonds will receive a like amount for each \$100 principal amount of bonds, and holders of Jackson Consolidated Traction Company bonds will receive a similar distribution.

St. Louis Formally Discharges Receiver

Rolla Wells was formally dismissed from his duties as receiver for the United Railways by United States District Judge Faris on May 28. The ending of his tenure of office was on his own application and after his final reports had been approved by the court. He entered on his task in April, 1919. The St. Louis Public Service Company took over the railway on Dec. 1, 1927, following the sale of the property under foreclosure.

German Issue Offered in American Market

An \$8,000,000 ten-year 5½ per cent gold loan for the Hamburg Elevated, Underground & Street Railway, Hamburg, Germany, is being offered by Brown Brothers & Company, the International Acceptance Bank, Inc., and the Illinois Merchants Trust Company at 92½, to yield 6.33 per cent. Proceeds will be used to refund a \$6,000,000 short-term loan and to provide for improvements and extensions to the property. The company owns and operates all elevated, underground and railway systems, as well as ferry and bus services,

in Hamburg, serving a population of about 1,500,000. Net earnings of the company in 1927 and for the past four years, after all charges and depreciation, were about 3¼ times annual interest requirements on this loan.

Suit to Prevent Washington Merger Dismissed

Justice Peyton Gordon in Equity Division 2 on June 1 sustained the motion of the Washington Railway & Electric Company, Washington, D. C., to dismiss the suit for injunction brought by John J. Noonan, minority stockholder of the company, against the North American Company and the local company to prevent the suggested merger of the railway

lines of the company with the Capital Traction Company and the Washington Rapid Transit Company. Attorneys William G. Johnson and Joseph D. Sullivan, counsel for Mr. Noonan, gave notice of intention to appeal when the formal order of dismissal has been signed.

Smaller Milwaukee Property Merged

The Milwaukee Northern Railway, operating a city car line in Milwaukee, Wis., and an interurban railway between Milwaukee and Sheboygan, was merged with the Milwaukee Electric Railway & Light Company on April 30, 1928. This merger is primarily a consolidation of the properties, with the smaller losing its corporate identity. The Milwaukee Northern, with assets of \$4,450,000, had been controlled and operated by the Milwaukee Electric Railway & Light Company for several years as a subsidiary.

Analysis of Operating Statements

Railway association statistician comments on returns of companies 1927 as shown in detailed compilation for *Aera*. Figures summarized for presentation by Journal

IN *Aera* for May there was given a summary of the operations in 1927 of a group of 206 electric railways divided among city lines, interurban lines and combination city and interurban lines. In the June issue of that paper the companies in each of the three groups, comprising city, interurban and combination city and interurban lines, are each further subdivided into three smaller groups, the first consisting of so-called Class A companies whose annual revenues exceed \$1,000,000 a year, the second consisting of companies whose annual revenues amount to more than \$250,000 and less than \$1,000,000, and the third consisting of companies earning less than \$250,000 a year. In addition there is also given a combined comparative balance sheet and income statement of 161 companies. This group is then subdivided into city, interurban and combination city and interurban companies and a combined comparative balance sheet and income statement is given for each group.

Edmund J. Murphy, chief statistician of the American Electric Railway Association and author of the article, says that when the companies are segregated into classes according to their size it at once becomes apparent that the large companies are in the strongest position and make much the best showing. This is true in the case of all three classes of companies, but in the case of the city lines the companies in the medium sized group, that is, those companies earning between \$250,000 and \$1,000,000 a year, make almost as good a showing as the larger

companies earning more than \$1,000,000 a year. This is due largely to the fact that the medium sized companies succeeded in making a very material deduction—13.24 per cent—in their deductions or fixed charges, consisting principally of rentals and interest on bonded indebtedness.

The traffic on the large city lines was practically the same in 1927 as in 1926, there being a decrease of only 0.01 per cent. Traffic on the medium sized lines, on the other hand, decreased 1.32 per cent. The operating revenues of the two groups followed practically the same trend, there being a decrease of 0.83 per cent in the case of the Class A companies and a decrease of 1.07 per cent in the case of the Class B companies.

When the interurban lines are considered it is found that the difference in the showing made by the small companies and the large companies is more sharply drawn than in the city group. Among the interurban companies apparently the smaller the company the more difficult it finds it to operate successfully, and this is not unnatural, for as was pointed out in *ELECTRIC RAILWAY JOURNAL* for May 5, in which Mr. Murphy's previous article was reviewed, in the smaller communities and outlying districts the private automobile has become a family necessity and is used more universally and more intensively than in the larger centers of population.

Further evidence that the large interurbans were developing their freight business is shown by the car-mile figures. While the number of passenger

Statistics Compiled by American Electric Railway Association

ANALYSIS OF INCOME STATEMENT, SHOWING PER CENT OF INCREASE OR (D) DECREASE

	City Companies			Interurban Companies			Combined Properties		
	42 Cos. with Revenues of More than \$1,000,000 a Year Each	23 City Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	14 Cos. with Revenues of Less than \$250,000 a Year Each	3 Interurban Cos. with Revenues of More than \$1,000,000 a Year Each	21 Interurban Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	26 Interurban Cos. with Revenues Less than \$250,000 a Year Each	34 Cos. with Revenues of More than \$1,000,000 a Year Each	23 Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	20 Cos. with Revenues Less than \$250,000 a Year Each
Railway operating revenue.....	(D) 0.83	(D) 1.07	(D) 2.64	0.14	(D) 4.40	(D) 3.63	(D) 3.51	(D) 4.48	(D) 10.76
Railway operating expense.....	(D) 1.66	(D) 0.83	(D) 1.84	1.21	(D) 1.89	(D) 0.49	(D) 2.10	(D) 2.58	(D) 5.01
Net operating revenue.....	1.22	(D) 1.84	(D) 5.31	(D) 5.32	(D) 17.90	(D) 21.49	(D) 8.40	(D) 13.05	(D) 59.59
Net revenue: Auxiliary operations.....	33.10	.....	39.82	11.47	(D) 19.50	(D) 90.18	7.41	(D) 7.53	(D) 9.52
Taxes.....	(D) 0.35	4.20	(D) 10.90	3.31	(D) 5.71	(D) 14.51	(D) 5.90	(D) 6.58	(D) 1.25
Operating income.....	1.87	(D) 4.00	(D) 3.66	(D) 5.36	(D) 24.94	(D) 29.07	(D) 8.24	(D) 16.39	(D) 76.49
Non-operating income.....	10.57	(D) 3.03	(D) 16.15	(D) 2.90	12.36	(D) 8.71	(D) 3.52	41.77	(D) 6.80
Gross income.....	2.40	(D) 3.97	(D) 4.75	(D) 4.94	(D) 17.28	(D) 27.47	(D) 7.76	1.93	(D) 71.67
Deductions from gross income.....	1.07	(D) 13.24	(D) 11.93	(D) 4.05	2.38	(D) 13.83	1.41	(D) 12.16	(D) 2.52
Net income.....	7.37	9.53	.....	.....	.....	.....	(D) 74.06	.....	.....
Dividends.....	(D) 0.48	30.23	.....	.....	(D) 4.34	.....	(D) 2.38	154.63	(D) 2.29
Operating ratio (per cent).....	0.83	0.25	0.83	1.06	2.62	3.25	1.45	1.97	6.43
Ratio: Net income to operating revenue..	8.33	10.61	.....	.....	.....	.....	(D) 73.08	.....	.....

OPERATING EXPENSES BY PRIMARY ACCOUNTS—PER CENT INCREASE OR (D) DECREASE

	City Companies			Interurban Companies			Combined Properties		
	42 Cos. with Revenues of More than \$1,000,000 a Year Each	23 City Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	14 Cos. with Revenues of Less than \$250,000 a Year Each	3 Interurban Cos. with Revenues of More than \$1,000,000 a Year Each	21 Interurban Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	26 Interurban Cos. with Revenues Less than \$250,000 a Year Each	34 Cos. with Revenues of More than \$1,000,000 a Year Each	23 Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	20 Cos. with Revenues Less than \$250,000 a Year Each
Way and structures.....	(D) 5.25	3.53	7.54	6.25	(D) 0.19	7.60	(D) 2.43	5.52	(D) 3.31
Equipment.....	(D) 1.53	1.78	(D) 6.64	(D) 1.61	0.48	1.71	2.75	(D) 7.09	6.89
Power.....	(D) 1.73	(D) 4.93	(D) 2.03	0.57	(D) 8.96	(D) 5.19	(D) 4.40	(D) 2.89	(D) 8.76
Conducting transportation.....	(D) 1.90	0.02	(D) 5.66	(D) 2.08	(D) 0.34	(D) 2.49	(D) 3.82	(D) 4.07	(D) 6.29
Traffic.....	(D) 25.86	23.58	(D) 5.06	21.60	7.93	(D) 23.68	3.09	17.54	(D) 22.11
General and miscellaneous.....	3.29	(D) 4.55	3.74	3.49	(D) 2.01	(D) 2.02	(D) 1.25	(D) 5.44	(D) 17.02
Transportation for investment—Credit....	20.51	57.67	.....	.....	(D) 75.59	(D) 100.00	(D) 67.15	(D) 71.17	(D) 46.37
Total operating expense.....	(D) 1.66	(D) 0.83	(D) 1.84	1.21	(D) 1.89	(D) 0.49	(D) 2.10	(D) 2.58	(D) 5.01

OPERATING STATISTICS—PER CENT INCREASE OR (D) DECREASE

	City Companies			Interurban Companies			Combined Properties		
	42 Cos. with Revenues of More than \$1,000,000 a Year Each	23 City Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	14 Cos. with Revenues of Less than \$250,000 a Year Each	3 Interurban Cos. with Revenues of More than \$1,000,000 a Year Each	21 Interurban Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	26 Interurban Cos. with Revenues Less than \$250,000 a Year Each	34 Cos. with Revenues of More than \$1,000,000 a Year Each	23 Cos. with Revenues of \$250,000 to \$1,000,000 a Year Each	20 Cos. with Revenues Less than \$250,000 a Year Each
Passenger car-miles.....	(D) 0.68	1.99	(D) 3.04	(D) 2.77	(D) 3.55	(D) 1.42	(D) 2.78	(D) 3.85	(D) 4.80
Total revenue car-miles.....	(D) 0.70	(D) 0.91	(D) 2.53	0.32	(D) 0.42	(D) 1.43	(D) 2.27	(D) 3.13	(D) 5.19
Revenue passengers.....	(D) 0.011	(D) 1.32	0.44 ⁷	(D) 3.96 ¹¹	(D) 8.96 ¹²	(D) 0.76 ¹⁵	(D) 7.13 ¹⁸	(D) 8.25	(D) 10.95 ²⁴
Transfer passengers.....	(D) 2.68 ²	(D) 1.96 ⁵	(D) 39.94 ⁸	(D) 3.37 ¹¹	(D) 3.00 ¹²	(D) 6.57 ¹⁶	(D) 6.39 ¹⁹	(D) 7.57 ²²	0.52 ²⁵
Total passengers.....	(D) 1.57 ¹	(D) 0.82	(D) 6.39 ⁷	(D) 3.40 ¹¹	(D) 8.63 ¹²	(D) 0.88 ¹⁵	(D) 7.02 ¹⁸	(D) 8.26	(D) 10.81 ²⁴
Passenger revenue.....	(D) 0.92	(D) 0.01	(D) 4.87	(D) 3.75	(D) 7.86	(D) 5.58	(D) 4.21	(D) 8.28 ²²	(D) 10.03
Revenue car-hours.....	(D) 2.02 ³	(D) 0.78 ⁶	(D) 1.15 ⁹	.....	(D) 3.30 ¹⁴	(D) 0.35 ¹⁶	(D) 3.33 ²⁰	(D) 3.89 ²²	(D) 9.74 ²⁸
Passenger car-hours.....	(D) 2.02 ³	(D) 0.78 ⁶	(D) 2.20 ¹⁰	.....	(D) 3.90 ¹⁴	0.29 ¹⁵	(D) 3.22 ²⁰	(D) 3.90	(D) 9.34 ²⁵
Miles of single track.....	0.08	(D) 1.18	3.04	.....	0.33	0.61	(D) 0.23	(D) 1.68	(D) 2.12
Passenger cars operated (a).....	(D) 1.11 ⁴	0.20	2.61	7.61 ¹¹	(D) 0.31 ¹⁴	(D) 1.02 ¹⁷	(D) 5.45 ²¹	(D) 4.77 ²³	(D) 9.71 ²⁷

a Average maximum number of passenger cars in service daily.
¹ Reported by 41 companies. ⁷ Reported by 13 companies. ¹³ Reported by 5 companies. ¹⁹ Reported by 29 companies. ²⁴ Reported by 18 companies.
² Reported by 39 companies. ⁸ Reported by 9 companies. ¹⁴ Reported by 15 companies. ²⁰ Reported by 30 companies. ²⁵ Reported by 9 companies.
³ Reported by 40 companies. ⁹ Reported by 12 companies. ¹⁵ Reported by 24 companies. ²¹ Reported by 27 companies. ²⁶ Reported by 19 companies.
⁴ Reported by 36 companies. ¹⁰ Reported by 11 companies. ¹⁶ Reported by 5 companies. ²² Reported by 22 companies. ²⁷ Reported by 15 companies.
⁵ Reported by 18 companies. ¹¹ Reported by 2 companies. ¹⁷ Reported by 23 companies. ²³ Reported by 20 companies.
⁶ Reported by 21 companies. ¹² Reported by 20 companies. ¹⁸ Reported by 33 companies.

car-miles of these companies decreased 2.77 per cent the total car-miles increased 0.32 per cent. The companies in the Class B group were attempting to do the same thing, as is shown by the fact that their passenger car-miles fell off 3.53 per cent, while their total car-miles dropped only 0.42 per cent.

It would naturally be expected that companies operating both city and interurban service would show results somewhere between those shown by the city lines, on the one hand, and by the interurban on the other. In other words, the combination lines ought to present approximately an average of the results of the other two classes of companies. According to reports of these companies, however, they seem to have suffered much more heavily from the adverse conditions prevailing in 1927 than either of the other groups. Probably the explanation is that, in general, they serve and

connect up comparatively small cities and rural communities. They are, therefore, more directly susceptible to the competition of private automobiles and intercity bus lines. All of the companies in this group were affected adversely by conditions in 1927 but, as usual, the small companies seem to have been affected more than the others.

This year for the first time Mr. Murphy has been able to present comparative balance sheets of a large group of companies. The last eight tables in his series are devoted to comparative balance sheets and income statements of a group of 161 companies and separate balance sheets and income statements are shown for the 58 city companies, 44 interurban companies and 59 combination city and interurban companies that comprise the group of 161 companies.

The balance sheet of the whole group

shows an investment of \$1,778,335,435 in road and equipment in 1927 compared with \$1,749,764,866 in 1926—an increase of \$28,570,569. The total investment in road and equipment of these 161 companies represents approximately 35 per cent of the total investment of the entire electric railway industry in the United States. As against the investment in road and equipment there was outstanding \$749,858,830 in stock and \$924,731,265 in long-term debt, a total capitalization in 1927 of \$1,674,590,095, or \$103,745,340 less than the value at which the physical property was carried on the books.

The total corporate surplus of the group of companies increased from \$76,731,095 for 1926 to \$79,546,234 in 1927. Most of this increase was in the appropriated surplus which arose from \$24,758,845 in 1926 to \$27,108,668 in 1927—an increase of \$2,349,823.

The profit and loss surplus increased \$432,552, or from \$51,790,088 in 1926 to \$52,222,640 on 1927. The total current assets amounted to \$105,398,316 in 1927, compared with a total current liability of \$116,455,404—a ratio of 0.90. In 1926 current assets amounted to \$104,081,399 and current liabilities to \$114,132,465—a ratio of 0.91.

It is interesting to note, says the author, that in these balance sheets all of the groups materially increased their reserves for depreciation. In the case of the city companies the reserve was increased from \$70,648,998 in 1926 to \$75,597,252 in 1927, or an increase of

7 per cent. Interurban lines increased their reserve from \$7,405,358 in 1926 to \$8,089,032 in 1927, or 9.23 per cent, while the combination city and interurban group increased their reserve from \$35,439,553 to \$40,726,296, or an increase of 14.91 per cent.

In all of the groups the reserve for depreciation is approximately 7 per cent of the investment in road and equipment. For the 161 city, interurban and combination city and interurban companies, the depreciation reserve amounted to \$124,412,580 or about 6.45 per cent of the investment in road and equipment.

TRAFFIC STATISTICS OF THE UNION TRACTION COMPANY

Dec. 31, 1927

Passengers carried, interurban lines.....	4,234,896
Passengers carried, city lines.....	6,688,653
Passengers carried, interurban buses.....	119,529
Passengers carried, city buses.....	2,055,822
Total passengers carried.....	13,098,900
Mileage of cars, interurban lines, miles.....	7,017,752
Mileage of cars, city lines, miles.....	1,434,577
Total mileage of cars, miles.....	8,452,329

the year in that amount. No new equipment notes were issued.

During the year the \$12,000 of Broad Ripple Traction Company bonds were retired and \$6,000 of additional bonds of the issue were purchased out of the proceeds of the property. The interest on the purchased bonds was paid to the receiver. Unexpired proceeds remain in the hands of the trustees for application to the purchase of additional bonds. Interest at 6 per cent was paid as heretofore on the \$328,000 Marion City Railway bonds secured by first mortgage on city lines at Marion and the interurban line between Marion and Summitville and on the \$36,000 of Citizens Street Railway bonds secured by first mortgage on city lines at Muncie. These bonds matured on Dec. 1, 1927. No

Revenues on Union Traction Lower

Anderson, Ind., company reports a decrease of \$109,258. Passengers carried show large increase. Liberal allowance made for maintenance

ARTHUR W. BRADY, receiver for the Union Traction Company of Indiana, has filed the 1927 report in the Circuit Court at Anderson, Ind. It shows that the railway operating revenue for 1927 was \$2,951,206, a decrease of \$109,258 compared with 1926, and that operating expenses were \$2,708,360, an increase of \$141,619 compared with the previous year. Of the increased expenses \$96,689 more than in 1926 was expended for maintenance of way and structures. Gross income for 1927, or the income after operating expenses and taxes but before charges for bond interest and other fixed charges, was \$169,439, compared with \$408,624 in 1926.

of way and structures and \$349,837 for maintenance of equipment. This makes the total sum charged for maintenance of the property \$1,018,150, equal to 34.5 per cent of the gross railway operating revenue for the year.

The 1927 account for additions and

	Total Operating Revenue	Total Operating Expenses	Taxes	Other Income	Gross Income
Union traction.....	\$1,368,596	\$1,188,926	\$38,563	\$16,096	\$157,203
Indianapolis Northern.....	759,696	713,652	22,010	5,101	29,135
Muncie, Hartford & Fort Wayne.....	268,085	247,641	10,054	907	11,296
Muncie-Portland.....	94,348	96,607	5,752	398	*7,613
Indianapolis, New Castle and Eastern.....	296,720	280,174	9,172	1,307	8,680
Muncie-Union City.....	86,136	105,508	7,183	537	*26,017
Marion-Wabash.....	46,775	51,060	3,880	151	*8,013
Anderson-Middletown.....	30,846	24,788	1,381	93	4,769
Total.....	\$2,951,206	\$2,708,360	\$98,000	\$24,593	\$169,439

*Deficit.

While this statement is based on allocations of revenues and expenses differing in some respects from those used in 1925 and 1926, it is still tentative. The revision of the segregated earnings and expenses for the three years of the receivership, with a view to securing more accurate results, has continued to receive active attention, and a report on the subject will be made to the court later.

INCOME ACCOUNT OF THE UNION TRACTION COMPANY

REVENUE FROM TRANSPORTATION	
1927	
Passenger.....	\$1,935,256
Baggage.....	5,197
Parlor, chair and special car.....	10,827
Mail.....	6,048
Express.....	133,212
Milk.....	13,721
Freight and switching.....	676,287
Total.....	\$2,780,552
REVENUE FROM OPERATION OTHER THAN TRANSPORTATION	
Station and car privileges.....	\$14,184
Parcel room receipts.....	55
Car service and storage.....	616
Rent of tracks and terminals.....	3,812
Rent of equipment.....	12,458
Rent of buildings and other property.....	14,320
Power.....	124,247
Miscellaneous.....	960
Total.....	\$170,654
Total operating revenue.....	\$2,951,206
OPERATING EXPENSES	
Way and structures.....	\$668,312
Equipment.....	349,837
Power.....	556,432
Conducting transportation.....	749,497
Traffic.....	52,916
General and miscellaneous.....	331,364
Total operating expenses.....	\$2,708,360
Net operating revenue.....	242,845
Taxes.....	98,000
Net operating revenue less taxes.....	\$144,845
Other income.....	24,593
Gross income.....	\$169,439

In the operating expenses for the year are included \$668,312 for maintenance

of way and structures and \$349,837 for maintenance of equipment. This makes the total sum charged for maintenance of the property \$1,018,150, equal to 34.5 per cent of the gross railway operating revenue for the year. The 1927 account for additions and betterments shows expenditures for the year of \$43,275. There was expended in addition \$8,156 for buses. These amounts are exclusive of charges in 1927 of \$37,159 for extensions of and betterments to the property of the Traction Light & Power Company, wholly owned by the Union Traction Company of Indiana. The operations of the Traction Light & Power Company were extended in 1927 to Honey Creek and Warrington, thus making 50 towns and villages served by the company at the end of the year. The net income of the company in 1927 was \$18,486.

Gross revenues from bus operation in 1927 were \$131,723 and operating expenses, taxes, interest and amortization charges were \$305,559, making the deficit from bus operation \$173,835. This includes \$96,618 for depreciation and amortization.

There were 13,098,900 passengers carried during the year by both interurbans and buses an increase of more than 1,000,000 over 1926.

In 1927, \$172,159 was paid on the principal of notes representing car, bus and power betterment equipment, reducing liabilities shown at the beginning of

arrangement has as yet been made by the railway company for meeting this maturity.

Operation of the Anderson-Middletown interurban line resulted in a surplus of \$4,769. That a surplus instead of a deficit, as in 1925 and 1926, is shown is due to a change in the method of allocating revenues and expenses. Operation of the Muncie-Union City line resulted in a deficit of \$26,017, being \$15,203 greater than that shown for 1926. Operation of the Marion-Wabash interurban line resulted in a deficit of \$8,013, which is \$2,310 more than in 1926. A question under consideration is the action which should be taken with respect to these three interurban lines and certain non-paying street railway lines.

Segregation of earnings and expenses of the respective lines subject to the liens of the principal mortgages and also of the lines leased to the Union Traction Company of Indiana was undertaken, and the earnings and expenses so segregated for the year are shown tentatively and subject to revision.

The Union Traction Company owns 309 miles of line and leases 445½ miles.

Expenses in Honolulu Decreased

Total revenue of the Honolulu Rapid Transit Company, Ltd., Honolulu, I. H. for the year 1927 was \$1,019,245, compared with \$1,023,772 for the year 1926. Total operating expenses for the year were \$626,453, compared to \$662,932 for the year 1926, in addition to which the sum of \$24,238 was charged to operating expenses for replacements during the year compared with \$13,939 for replacements during 1926. These facts were contained in the manager's report for the year ended Dec. 31, 1927.

Traffic revenue and expense figures for 1927 and 1926 are shown in the accompanying tables.

RAILWAY PASSENGER TRAFFIC

	1927	1926
Full fares and half fares.....	16,043,809	16,286,105
Free fares.....	59,593	92,081
Total.....	16,103,402	16,378,186
Transfer passengers carried....	3,550,694	3,357,651

**BUS OPERATIONS
KALIHI**

	1927	1926
Full fares and half fares.....	386,500	347,287
Free fares.....	1,375	1,108
Total.....	387,875	348,395
Transfer passengers carried.....	343,427	315,165
Bus-miles operated.....	126,624	128,441

KAIMUKI

	1927
Full fares and half fares.....	184,506
Free fares.....	36
Total.....	184,542
Bus-miles operated.....	75,008.10

REVENUE

	1927	1926
Passenger revenue.....	\$973,417	\$992,063
Bus revenue.....	30,096	21,536
Special car revenue.....	1,260	1,265
Freight revenue.....		242
Total.....	\$1,004,774	\$1,015,107

OPERATING EXPENSES

	1927	1926
Way and structures.....	\$51,426	\$55,204
Equipment.....	69,865	74,127
Power.....	88,796	94,179
Conducting transportation.....	289,090	322,356
Traffic.....	2,693	2,252
General and miscellaneous.....	124,580	114,811
Total.....	\$626,453	\$662,932

In a consideration of the allowable return in Honolulu President Castle in the report computes a deficiency of \$80,000 in return for 1927. He claims that if the sum of \$70,000 is added for each year for depreciation on track and distribution system which should

REVENUE ACCOUNT OF THE HONOLULU RAPID TRANSIT COMPANY, LTD., FOR YEAR ENDED DEC. 31, 1927

Revenue from transportation.....	\$1,004,774
Operating expenses.....	626,453
Net revenue from transportation.....	\$378,320
Revenue from other railway operations....	14,471
Net revenue from railway operations....	\$392,792
Taxes.....	\$123,801
Property.....	\$87,287
Income.....	8,409
Corporation income.....	25,331
Public utilities.....	2,023
Motor vehicle licenses.....	748
REPLACEMENTS:	
Chargeable to operating expense.....	24,238
Gross revenue, less operating expenses, taxes and replacements.....	\$244,725
Depreciation.....	\$51,766
Profit and loss.....	1,873
Net revenue 1927.....	\$191,111
Interest on bank loans.....	\$6,600
Dividends, 7 per cent.....	175,000
Balance net revenue 1927 to surplus....	\$9,511
SURPLUS:	
Balance as at Jan. 1, 1927....	\$279,914
Less additional corporation income taxes for years 1921, 1922 and 1923.....	11,619
Balance carried to 1928.....	\$277,806

have been charged but was not, the actual deficiency is much greater.

NEED EXISTS FOR FAIR RETURN

Mr. Castle said the street railroad had to run, and the only way it could run was when it returned a fair dividend to its stockholders. Operating expenses could not be cut further, so the only answer was a rate increase. This should be the minimum amount required to operate a decent service and to give to the investors a fair return. He believed that a readjustment of rates would produce more income.

Partial Abandonment in Salt Lake City

Application of the Utah Light & Traction Company to abandon portions of four railway lines in Salt Lake City has been granted by the Public Utilities Commission of Utah. It was shown that the four lines to be abandoned have been operated at a loss for several years. The trackage will total 5 miles.

The company's application to abandon service and tear up tracks on West Temple Street, from Ninth to 21st South Street was denied. The commission ordered this line maintained with "greater comfort and convenience to car-riding patrons."

Traffic, Fare and Wage Figures

The number of revenue passengers, including bus passengers, reported by 215 companies to the American Electric Railway Association for April, 1928, compared with April, 1927, is as follows:

April, 1928.....	800,879,714
April, 1927.....	829,471,710
Decrease, per cent.....	3.45

The decrease for April is the largest which has occurred this year. There were five Sundays in April, 1928, compared with four in 1927, and this fact is largely responsible for the greater decrease.

Average cash fares in cities of 25,000 population and over were:

	Cents
May 1, 1928.....	8.1186
April 1, 1928.....	8.1186
May 1, 1927.....	7.9403

There was no change in the average basic fare in American cities during the month of April.

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

Month	Average Hourly Rate Cents	Index 1913 = 100 Per Cent
May 1, 1928.....	57.40	210.64
April 1, 1928.....	57.40	210.64
May 1, 1927.....	57.11	209.58

Hattiesburg Bonds Called

The Hattiesburg Traction Company, Hattiesburg, Miss., has called for redemption or purchase on July 1, 1928, all of its outstanding general lien, sinking fund 6 per cent gold bonds at principal with interest accrued and unpaid to the date set for payment, together with a premium of 5 per cent of the principal of each of the bonds. They are payable at the office of the American Exchange-Irving Trust Company, New York.

Abandonment of Two Lines in New York State Approved

A declaration of abandonment by the Hudson Valley Railway of the Fort Edward Thomson line and the Northumberland-Stillwater line was approved on April 30 by the Public Service Commission. Actual abandonment of the two lines, the first covering a distance of 11 miles, and the second a distance of 14 miles, is effective July 1.

OPERATING STATEMENT OF THE HONOLULU RAPID TRANSIT COMPANY, LTD.

	Gross Operating Revenues			Operating Expenses and Other Charges							Total Operating Expenses and Taxes	Net Revenue Exclusive of Deductions for Depreciation, Interest and Profit & Loss	
	Trans- portation	Other Than Trans- portation	Total Revenue	Way and Structures	Equip- ment	Power	Conduct- ing Trans- portation	Traffic	General and Miscel- laneous	Total Operating Expenses			Taxes
1927	\$1,004,774	\$14,471	\$1,019,245	\$51,426	\$69,865	\$88,796	\$289,090	\$2,693	\$124,580	\$626,453	\$123,801	\$750,254	\$268,990
Replacements				10,445	13,705	87				24,238		24,238	24,238
Total 1927	\$1,004,774	\$14,471	\$1,019,245	\$61,871	\$83,571	\$88,883	\$289,090	\$2,693	\$124,580	\$650,691	\$123,801	\$774,493	\$244,752
Total 1926	\$1,015,107	\$8,664	\$1,023,772	\$65,832	\$77,438	\$94,179	\$322,356	\$2,252	\$114,811	\$676,872	\$122,678	\$799,550	\$224,221

Per cent operating expenses to operating revenues 64.76.
Per cent operating expenses in total operating revenues 63.84.
Per cent operating expenses and other charges to total operating revenues 75.99.

Book Reviews

Universal Directory of Railway Officials, 1928

Published by the Directory Publishing Company, London, 404 pages, price, \$5, postage included.

This is the 34th edition of a very useful book, containing a list of leading railroad officials. The first part of the book lists the railroads alphabetically by countries. Under the name of each are particulars of the length of track, gage and equipment, with a list of the principal officials. The name of the company is given in English, but is repeated in the language of the country if the country is one in which English is not spoken. The second part of the book contains an alphabetical list of the railroads and railroad associations in the different countries, together with names of officials.

Facts and Figures of the Automobile Industry—1928 Edition

Published by National Automobile Chamber of Commerce, New York, N. Y. 96 pages.

Further information and special studies have been made available in the tenth annual edition of this booklet of the National Chamber of Commerce. Here are tabulations of the major automobile market and of methods of taxation in different states; a study of gasoline consumption by states; trans-continental bus routes; a list of highway grade separations and figures on metropolitan traffic. Many charts and diagrams complete this picture of the automobile industry. A valuable index is included. Certain data on common carrier buses were reprinted from *Bus Transportation*.

Financial and Business Forecasting

Dr. Warren F. Hickernell, Alexander Hamilton Institute, New York. 2 volumes. 914 pages. \$10 for both volumes.

To the business man and manufacturing executive who wishes to possess a working knowledge of the basic theories of the business cycle minus the all too familiar perplexing mathematical formulæ; a quick, though vivid, view of the waves of prosperity and of over-speculation, which have characterized the course of business in the United States and Europe for more than a century past; and finally the basic methods now in use in financial analysis and forecasting, these two volumes will prove interesting and enlightening. The cyclic theories of Mills, Jevon, Moore, Juglar and Mitchell are explained in a simple manner, and their strength and weakness pointed out.

The scholar may stop with an analysis of the causes and effects, but for the man in active business the question of how to apply theory to his own affairs assumes paramount importance. Doctor Hickernell accordingly devotes his

second volume to a study of financial analysis and forecasting, bringing out the fact that the four symbols of forecasting are: (1) basic business statistics; (2) a knowledge of economic principles; (3) perspective, based on a study of business history, and (4) good judgment in applying principles to the interpretation of statistics. Before the war industrial fluctuations went to extremes, and individual markets were importantly affected by the general trend. In recent years, however, economic conditions have been well stabilized, and the analysis of individual markets has become increasingly important.

Business, the Civilizer

By Earnest Elmo Calkins, Boston. Little, Brown & Company, 1928. 310 pages. Price, \$3.

On the assumption that the progressive railway operator has at least a passing interest in the contemporary business scene and a very live interest in the subject of advertising, a reading of "Business, the Civilizer" is informative and assuredly entertaining. Mr. Calkins author of "Louder Please!", the autobiography of a deaf man, reviews the history of advertising, not overlooking some of its questionable practices, which he believes are fast disappearing; stresses its value as a force in modern business and predicts its holding an invulnerable position in a thriving business world. Coming some six months after "Your Money's Worth," a dark picture drawn by Messrs. Chase and Schlink of the American gullibility for advertising misrepresentation, this work presents the constructive side of this activity.

Not all of Mr. Calkins's subject has application to the railway industry. However, his comments on living up to advertising and its remarkable effects on business are directly in line with the advice of advertising men connected with railway enterprises. Certainly, "the service you ought to render" has transformed more than one company because of the effort of making a worthwhile appeal to the public. On this point Mr. Calkins says: "He cannot say one thing and do another, and since the things he says, or permits his advertising man to say for him, is that more nearly ideal thing which he always meant his business to be, it is that thing which, under the influence of the advertising urge, his business gradually becomes." Fifty years ago, he says, neither the salesman nor his employer realized the potentialities of future business as a casual purchaser represented. Then came advertising and its prestige known as good will. Good will, in his opinion, is built up by continuous advertising which will ensure continuous buying on the part of a large number of consumers.

And when he discusses beauty as a business force and a factor in selling

his ideas, though the ideas are not new, they provoke more thought on the apparent changes in the economic and social life of today. The railway man has not lagged in this movement for converting purely utilitarian products into things of beauty, nor have his efforts to break with tradition in the matter of car equipment gone unnoticed or unrewarded. Mr. Calkins's work is an argument for business "the best-done job in the world."

Elektrische Vollbahnlokomotiven

Electrical Main Line Locomotives, by Dr. Karl Sachs. Berlin, Julius Springer, 461 pages, 22 insert plates. Price, 84 marks.

This is by far the most extensive book on electric locomotive design with which the author of this review is acquainted. It is divided into four parts: (1) Power and loading, which takes up questions of resistance to movement, traction coefficients, speed on curves, etc.; (2) the mechanical portion of the locomotive equipment; (3) the electrical portion, and (4) accounts of different late types of locomotives. The third part, that relating to the electrical equipment, in turn is divided into four parts to cover direct-current locomotives, single-phase locomotives, three-phase locomotives and transformer locomotives. While the book relates largely to European practice, American design and methods are also represented. A feature is the large number of detailed drawings of portions of the equipment, of connections, and of complete locomotives.

Accident Facts, 1928

National Safety Council, Chicago. 46 pages.

No. 17 of the Council's public safety series gives a great many interesting data on accidents in 1927 and in earlier years. The figures show, for example, between 1911 and 1927 an increase of 20 per cent in all accidental deaths. These include an increase of 1,050 per cent in automobile deaths, a decrease of 37 per cent in railroad deaths and a decrease of 44 per cent in street car deaths. Altogether, there were 1,661 deaths during 1927 due to street car accidents; of these 475 were caused by collisions with automobiles. The total number of accidental deaths from motor vehicle accidents was 25,775 during the same year. Sixty-five per cent of the motor vehicle deaths were caused by motor vehicles striking pedestrians.

Storage Batteries

Morton Arendt, assistant professor of electrical engineering Columbia University, Fellow American Institute of Electrical Engineers. D. Van Nostrand Company, Inc., New York, N. Y. 290 pages. Price, \$4.50.

This is a practical survey of the storage battery covering its production, performance and control. An introduction to the subject and a history of it are covered and a study of factors influencing capacity and efficiency.

Personal Items

A. T. Clark Honored as Head of New Association

A. T. Clark was elected president of the newly formed Association of Electric Railway Equipment Men of the Middle Atlantic States at a meeting in Baltimore on May 16. The association was formed through a desire of outstanding equipment men to improve methods and practices in the shops. Mr. Clark is superintendent of rolling stock and shops of the United Railways & Electric Company, Baltimore. He is also chairman of the rolling stock committee of the American Electric Railway Association and chairman of the



A. T. Clark

judges of the maintenance prize committee for *ELECTRIC RAILWAY JOURNAL*.

Back in 1907 when Mr. Clark was in the employ of the J. G. Brill Company he was asked by the then superintendent of rolling stock and shops, H. H. Adams, to go to Baltimore to assume the duties of assistant superintendent. About a year thereafter Mr. Adams resigned as superintendent and Mr. Clark was appointed acting superintendent, later receiving the full title.

Early in his career he was employed as an apprentice in the erecting shop of the Southwark Foundry & Machine Company, of Philadelphia. Later he resigned from that position to enter the drafting room of the Bethlehem Steel Company, South Bethlehem, Pa. In 1901 he became connected with the Link-Belt Engineering Company, Philadelphia, but two years later resigned to go with the Brill Company. When the Brill Company opened a department for the construction of steel underframes in 1907 Mr. Clark was appointed foreman of the department.

Mr. Clark was born in Oakland, Cal., 49 years ago. He received his elementary education in the public schools of that city and prepared for Yale at the Central High School in Philadelphia. He was graduated from the Sheffield Scientific School with the degree of M.E., and later pursued a special

course in electrical engineering conducted in the evening at Drexel Institute, Philadelphia.

H. S. Johnson Resigns at Honolulu

H. Stewart Johnson has resigned as manager of the Honolulu Rapid Transit Company, Honolulu, Hawaii, after more than 20 years' service, due to ill health. He is planning a round-the-world trip.

Mr. Johnson arrived in Honolulu in May, 1899, and was employed as an assistant engineer in the construction of the road. In 1913 he was appointed chief engineer and in 1918 manager.

During his association with the company he handled several projects for outside organizations. He was connected with the U. S. Army in the installation of the batteries on Diamond Head, with the Territorial Loan Board on highway construction and for a time was assistant city engineer. He also acted as civil engineer for the Honolulu Gas Company.

William Chamberlain Heads Chicago Utility

William Chamberlain, vice-president and general counsel of the United Light & Power Company, Chicago, Ill., since 1914, was elected president at the recent annual meeting of directors. He succeeds Richard Schaddelee, resigned, who was elected chairman of the executive committee. Mr. Schaddelee, who was one of the organizers of the United Light & Railways Company, predecessor of the United Light & Power Company, had been general manager since 1904 and president since 1926.

Changes Announced in Parkersburg Division

William M. Martin, manager of the Parkersburg-Marietta, W. Va., division of the Monongahela-West Penn Public Service Company, resigned on June 1 to accept a position with a large electrical company in New York State. Mr. Martin had been manager of the Parkersburg-Marietta division since October, when he succeeded C. Howard Hardesty, now assistant to Capt. J. M. Alexander, who is assistant to the president.

James H. Trissler, former power distribution superintendent, has been named acting manager of the division. He became an employee of the Parkersburg, Marietta & Interurban Railway, in 1909, having formerly been an employee of the old West Virginia Telephone Company. At one time he was connected with the Kanawha Traction & Electric Company.

Promotion for J. A. Longley With Tennessee Properties

James A. Longley, for the past several years manager of the production and transmission department of the Tennessee Electric Power Company, Chattanooga, Tenn., was recently appointed assistant to J. C. Guild, general manager of the Tennessee Electric Power Company and president of the Nashville Railway & Light Company.

Mr. Longley's first connection with the electrical industry was in 1910 when he went to Portland, Ore., on power plant construction work for the Portland Railway, Light & Power Company. In 1913 he went east to Columbus, Ohio, just after the Dayton flood, to work on a power plant in that city, later going to Nashville on the construction of the Nashville steam plant. In October, 1914, he was transferred to Chattanooga as as-



James A. Longley

stant general superintendent of the Tennessee Power Company and since that time has been identified with the local utility interests in that city. As manager of the production and transmission department of the Tennessee Electric Power Company, Mr. Longley has been responsible for the vast system of transmission lines in middle and eastern Tennessee.

Mr. Longley is a native of Massachusetts and received his engineering education at the Massachusetts Institute of Technology. After leaving college his first work was along steam heating lines. Later he was engaged in mining engineering in Arizona.

Obituary

W. E. FREIR, editor of the *Electric Railway & Tramway Journal*, London, died suddenly in a railway train near Paris when he was on his way back to England from the International Tramway Congress in Rome. Mr. Freir founded the *Electric Railway & Tramway Journal* in 1899. For many years prior to that he had been editor of *Ironmonger*. He was well known as an English journalist. Mr. Freir was 80 years old.

Manufactures and the Markets

Public Opinion Within Industry Will Stop Price Cutting

Industrial associations should call conferences of buyers and sellers to discuss ethics of buying

By EARL WHITEHORNE

EXECUTIVES of American industry realize today that they have made a serious mistake through the last quarter century. They have allowed themselves to become so absorbed in the problems, the achievements and the fascinations of production that they have neglected distribution. Our methods of distributing our goods have grown by main strength and awkwardness. The American business man faces this well-known problem.

Also something else has been happening that has not been generally noticed. This tremendous increase in production has brought with it an intense pressure on sales. American industry has also become so engrossed in selling that it has neglected the efficiencies of purchasing. Yet for every sale there must be a purchase and the practices and the policies and the principles of the man who buys have as much influence upon the success of the transaction as the methods and the motives of the man who sells.

The time has come, therefore, to turn some thought upon this business of buying that has so much to do with whether sales are profitable or not. We have got to throw the searchlight on the present status of the purchasing function in industry just as we have got to study and reform the process of distribution in this country.

When a manufacturing company enters the market with a line, its officials set a schedule of prices based on their costs, which in turn are regulated by competitive conditions. If the president of that company will permit his sales manager to come in and talk him into permitting a price cut to get some big order and the salesmen find it out, then the salesmen will everlastingly be importuning the sales manager to let them cut to meet another bidder on this job and that.

Price cutting is not the salesman's fault. It is the fault of the executive who can not face the fact that the only relief in a market demoralized by over production and price cutting is reduced production. It is the fault of the executive who lacks the pluck to reduce his output rather than sell at a loss.

Manufacturers will have to ultimately face the economic law that to sell at a loss is waste and an offence against industry. When prices fall below cost they will have to accept their individual responsibility to voluntarily curtail production as their contribution toward restoring the market to a balance.

The purchasing agent has always been the red-headed stepchild of industry. In the beginning the boss did the buying in odd times. Then he detailed a young man to help him. As buying has grown in volume purchasing agents have become more important, until today in many progressive corporations the buying is done by a vice-president with an able staff, and he is a big man with a broad knowledge of markets and men. But in too many cases the purchasing agent still lacks the responsibility and authority he needs to make his job measure up to his titular function. Too often he is just expected to buy what he is told and his performance is measured by his ability to save money on price.

As one large buyer stated, "There are four factors in every purchase that should be given consideration:

1. Suitability to the need
2. Quality of the article
3. Responsibility of the vender
4. Price

Price is only one of the elements that must be weighed in establishing a value and it should not be considered until the other three factors have been established as satisfactory." This man knows what he is talking about.

Therefore, if the purchasing agent is to contribute his share toward overcoming this practice of price cutting that industry is suffering from and stewing about right now, he must face these facts, and facing them he will bring new dignity to his profession and new opportunity to himself. He must recognize that nothing short of this ideal relationship between the seller and the buyer is really efficient and profitable. He must set his entire operation as nearly as possible on that plane and make value, not price, the chief objective. He must study the cost of buying as well as the cost of goods.

Exhibitograph No. 11

Inquiries for Space

at the

BIG A.E.R.A. SHOW

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Have your
Convention Arrangements
been completed,
Mr. Manufacturer?

There are four things to be done:

1. If the purchaser would demand firm bids, then general price cutting would soon cease. For a firm bid is like a signed order, it's the word of the house. It puts industry on the one price basis just as solidly as the modern department store. It means that a price made is the best and final price and the buyer is expected to place the business by selecting the firm bid that offers the best value—not price alone, but value.

2. While this practice of firm bids is crystallizing into a custom, whenever bidders are called back by a purchasing agent and asked for a better price, let the bidder demand that the other bids be shown to him, so that he will know that he is not being lied to, and that his price is indeed high for equal value.

3. While the trickery of baiting bidders still continues in the world of business let bidders hold *post mortem* comparisons of bids, by submitting their bids on closed business to their trade associations for comparison and report.

4. Let the buyer frankly and publicly proclaim that he will thereafter shun the man who cuts his price, because the first price is supposed to represent the honest value of the goods, and the man who cuts stands self-convicted either of trickery or weakness.

Price cutting is just an economic disease. Immediate relief can only be sought through the building of public opinion among buyers and sellers. But the only way there is to develop public opinion is by discussion that corrects loose thinking and makes clear the moral and economic principles which all men desire to follow once they are generally understood and have gained social standing.

This calls for leadership and I believe that in this kind of a situation this leadership can best come from two sources—the industrial associations and the industrial press. I, therefore, offer these two suggestions, which I believe will bring more immediate influence to the correction of the practice of price cutting than any other action which might now be attempted—

1. That the trade, industrial, and business publications of the country promote the widest possible discussion of the economic inequity of price cutting, drawing out the opinions, principles and practices of the leading men of the field and developing a more common acceptance of the truth of it, and a more general adoption of these simple resources of correction.

2. That the trade and industrial associations of each branch of industry support this purpose by calling a conference of the leading purchasing agents of the group to meet with a representative number of their prominent sales executives, for a discussion of the ethics and economics of this business of buying to the end that trade practice in that field may be improved both in selling and in purchasing in so far as price cutting is concerned.

I have asked a good many sales executives this question, when they have been discussing this buyer market—"What is your own purchasing agent doing? Is he buying in the way that you would like to have your own customers buy? Does he foster price cutting?"

To many of them it has been a new

slant on the subject. Yet there is no single influence more important to success in sales than the methods and principles of the man who buys. It is worth while, therefore, for the sales minded chief executives of industry to see that their own purchasing methods are right.

Signal System for Pittsburgh

Pittsburgh Railways, Pittsburgh, Pa., has ordered materials from the Union Switch & Signal Company for installation of an absolute permissive block signal system on its single-track line between Mine No. 3 and Tylerdale, a distance of 20 miles. The power for this installation will be supplied from three substations over a 2,200-volt single-phase transmission line. The work involves 58 color light signals, 60 impedance bonds, 180 a.c. relays, 95 transformers, and automatic substation panels by which power is fed from reserve substations in case of failure of the normal source.

Order Exhibit Extras Now

Hardwood and wicker furniture, oriental and domestic rugs, flowers, plants and floral decorations, drinking water, compressed air and current will all be available at the A.E.R.A. Convention. To avoid the last minute rush, Director of Exhibits Fred Dell advises that the order blanks for the above-mentioned service be filled in and returned to the exhibit committee as soon as possible. All exhibitors have been furnished with these blanks. Where a choice in quality is to be had such as in furniture, rugs and flowers, there is a decided advantage in ordering early.

New Track in Worcester

Work will be started soon by the Worcester Consolidated Street Railway, Worcester, Mass., on the reconstruction of 3,154 ft. of track on Grove Street, from Chadwick Square to the Walker Ice House, Worcester, Mass. The following material will be used: 97 tons of rail, 1,600 ties, 105 Thermit joints, 3,154 tie plates, 535 flat tie rods and 21 kegs of spikes at a cost of \$20,284.80.

Work was started about June 1 on the renewal of a switch, mate, frog and lead rails and the reconstruction of 100 ft. of track on Vernon Street at T.O. near St. Vincent's Hospital. The following material will be used: one complete end of a turnout, 130 ties, 3 tons of 7-in. girder rail, 100 tie plates, 18 tie rods, 2 kegs of spikes, 200 yds. of paving and 40 bonds at a cost of \$2,771.42.

Renewal of a switch and mate at T.O. 86 on Franklin Street near the B. & A. freight depot and also the installation of a new solid manganese steel crossing over the tracks of the B. & A. Railroad near the Graton & Knight tannery at a cost of \$2,400, are planned in the near future.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	June 5, 1928
Metals—New York	
Copper, electrolytic, cents per lb.....	14.525
Copper wire, cents per lb.....	16.625
Lead, cents per lb.....	6.30
Zinc, cents per lb.....	6.475
Tin, Straits, cents per lb.....	49.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.....	4.2
Somerset mine run, f.o.b. mines, net tons.....	1.825
Pittsburgh mine run, Pittsburgh, net tons.....	1.775
Franklin, Ill., screenings, Chicago, net tons.....	1.70
Central, Ill., screenings, Chicago, net tons.....	1.55
Kansas screenings, Kansas City, net tons.....	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft. wire base, N. Y., cents per lb.....	5.3
Weatherproof wire base, N. Y., cents per lb.....	17.125
Cement, Chicago net price, without bags.....	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.....	10.8
White lead in oil (100-lb. keg), N. Y., cents per lb.....	13.75
Turpentine (bbl. lots), N. Y., per gal.....	\$0.61

Chicago "L" Terminal Started

Construction work is now under way on a new \$50,000 terminal station at Logan Square, which is being erected by the Chicago Rapid Transit Company, Chicago, Ill. The exterior of the terminal will be in white terra cotta with old English style mission brick panels. The interior will be finished with art marble wainscoting throughout and the floors will be of terrazzo.

Platform facilities at Adams and Wabash station in the Loop are being increased by widening the south end of the outer platform from 10 to 14 ft. and extending canopies a total of 176 ft. at the north ends.

Track and Terminal for Trenton

Trenton & Mercer County Traction Corporation, Trenton, N. J., will lay a double track on Perry Street, from Broad to Warren Streets and new tracks on North Warren Street. The company also will shortly have plans drawn for a terminal on Perry Street. The total improvements will cost about \$250,000.

ROLLING STOCK

HOUSTON ELECTRIC RAILWAY, Houston, Texas, has ordered four urban type coaches from the Twin Coach Corporation.

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY, Milwaukee, Wis., has received five urban type Twin Coaches.

ST. LOUIS PUBLIC SERVICE COMPANY, St. Louis, Mo., has purchased four urban Twin Coaches.

UNITED ELECTRIC RAILWAY, Providence, R. I., has ordered one gas-electric Twin Coach from the Twin Coach Company, Kent, Ohio.

TRACK AND LINE

OMAHA & COUNCIL BLUFFS STREET RAILWAY, Omaha, Neb., will spend approximately \$26,000 in track improvement on Twentieth Street. Of this

amount about \$11,000 will be spent on curveouts, switches and other intersection equipment.

PACIFIC GAS & ELECTRIC COMPANY, San Francisco, Cal., is inquiring for poles.

SHOPS AND BUILDINGS

NEW YORK, NEW HAVEN & HARTFORD RAILROAD, New Haven, Conn., plans a power plant at New London, Conn.

ST. LOUIS ELECTRIC TERMINAL RAILWAY, St. Louis, Mo., plans a terminal and freight building to cost about \$1,000,000.

PUGET SOUND POWER & LIGHT COMPANY, Seattle, Wash., has received a permit for a switching station.

HARTFORD ELECTRIC LIGHT COMPANY, Hartford, Conn., plans to purchase and install \$200,000 worth of equipment to supply 5,000 kw. of additional power to the Connecticut Company, New Haven, Conn. The contract was signed on May 28.

TRADE NOTES

GEORGE F. SCHLESINGER, director of highways of the state of Ohio, has resigned his position effective June 15, 1928, and will become chief engineer and managing director of the National Paving Brick Manufacturers' Association on July 1, 1928. The headquarters of the association, which are now in Chicago, will be moved to Washington, D. C.

INGERSOLL-RAND COMPANY, General Electric Company and the American Locomotive Company have received an order to build jointly, three 300-hp. oil-electric locomotives for the Ashland Division of the American Rolling Mill Company.

BAKER & SPENCER, New York, on June 1, moved to 17 Battery Place, New York City.

ADVERTISING LITERATURE

PEREY MANUFACTURING COMPANY, New York, N. Y., has issued a folder entitled "How to Keep Out of Red Ink," descriptive of Perey turnstiles.

HEYWOOD-WAKEFIELD COMPANY, Boston, Mass., has published a bus seat catalog illustrating a number of new ideas in bus seat construction including views of actual installations made.

MITSUBISHI ELECTRIC ENGINEERING COMPANY, Japan, has issued Catalog C-166 on door engines. The descriptive matter is all in Japanese.

SANGAMO ELECTRIC COMPANY, Springfield, Ill., has published Bulletin No. 75 on its Type HB maximum demand register.



When the Light Turns
Red and Traffic Stops
then your car needs a
PEACOCK STAFFLESS BRAKE

Speed and 4-wheel brakes distinguish 1928 autos. Impatient drivers try to beat traffic. Some of these lads with their classy sport models are quick on the trigger. They've got brakes that act quick. It's fun for the fellow with his toe on the accelerator, but tough on the motorman.

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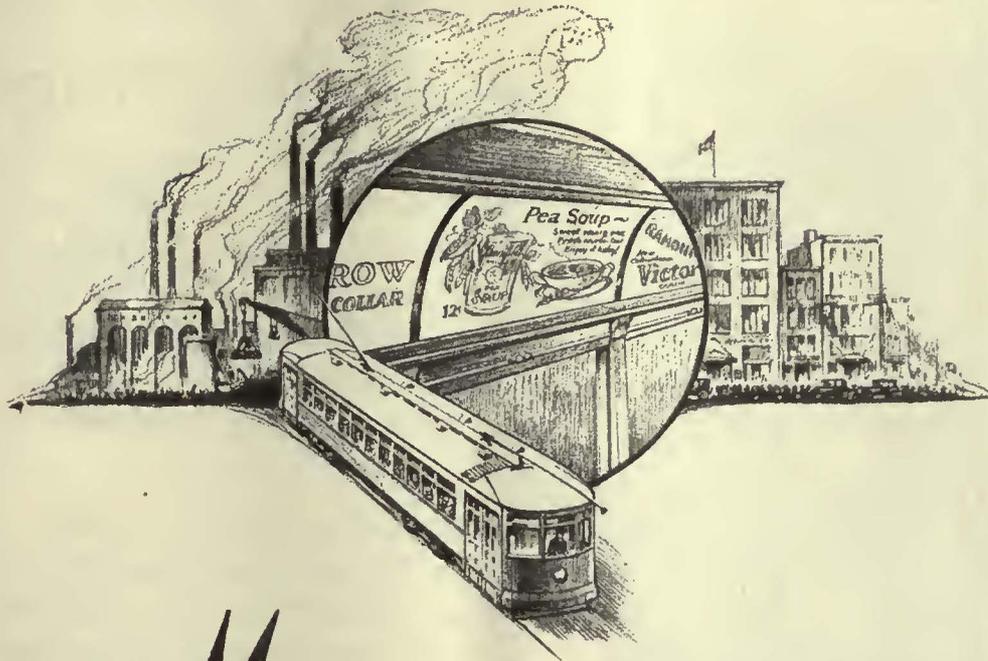
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- Revere, Mass.*, J. F. Drummy, 75 Pleasant Street.
- Los Angeles*, Electrical Engineering Sales Co., 502 Delta Bldg.
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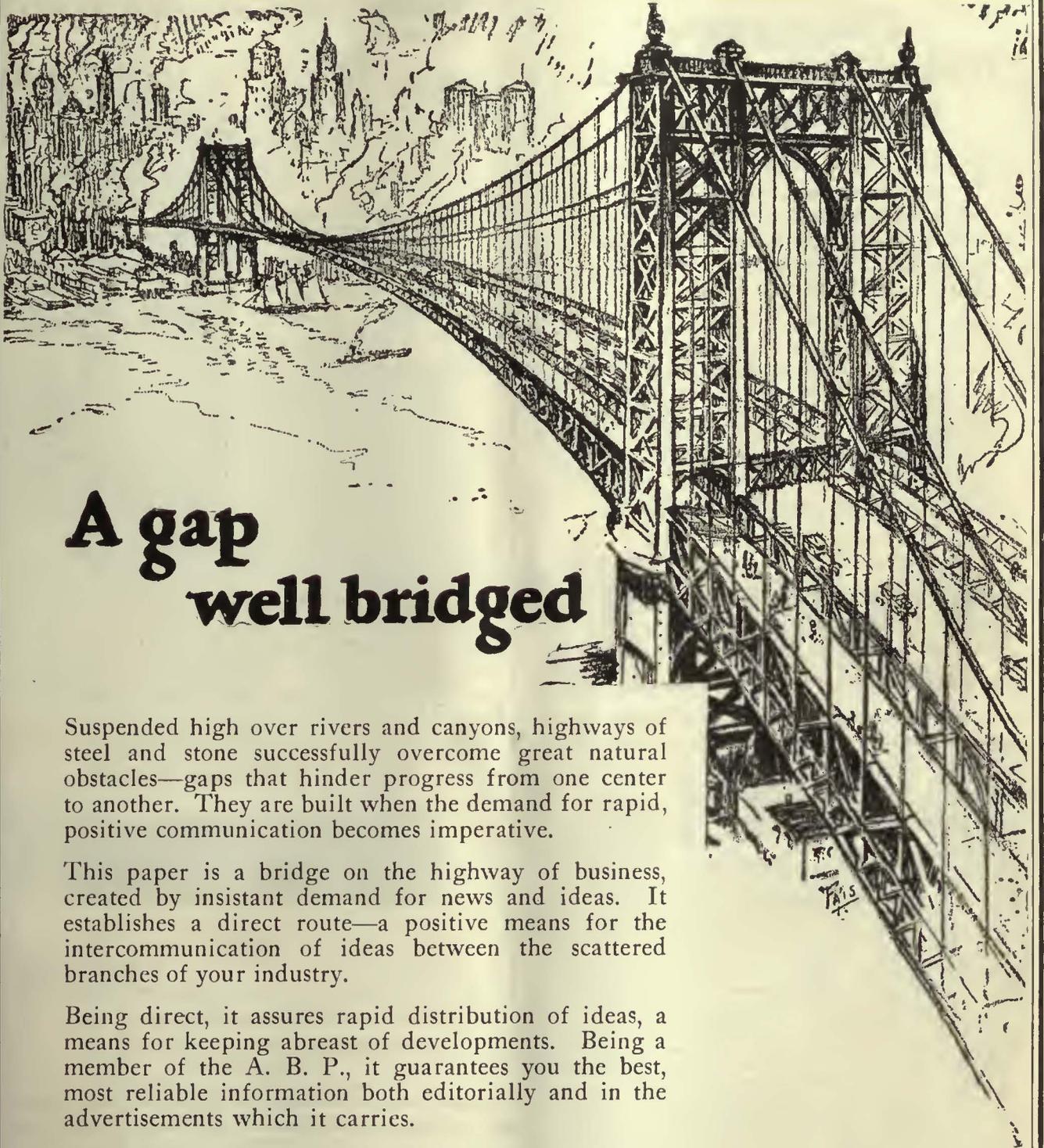
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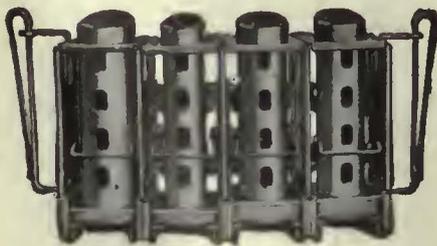
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INSULATED WIRES and CABLES

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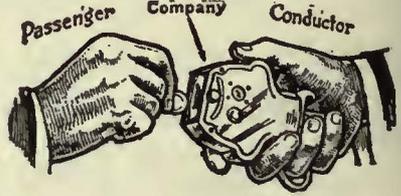
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Manganese Steel in Trackwork, originated by Wharton over thirty-four years ago, is still the metal par excellence for this purpose.

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ELECTRIC HEATERS WITH OPEN COIL OR ENCLOSED ELEMENTS
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Car Heating and Ventilating

—are no longer operating problems. We can show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Heater will save, in addition, 40% to 80% of the cost of any other car heating and ventilating system. Write for details.

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The Searchlight Section is the classified advertising section for giving publicity to all kinds of business wants of interest to other men in the field. It is the weekly meeting place of the man with a miscellaneous business need and the men who can fill that need.

When you want additional employees, want to buy or sell used or surplus Railway equipment, seek additional capital or have other miscellaneous business wants—advertise them in the Searchlight Section for quick, profitable results!

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SUPERVISOR bureau investigation, broad experience, established successful record street railway and bus transportation; available short notice; best of references. PW-112, Electric Railway Journal, Tenth Ave. at 36th St., New York.

TRAFFIC inspector and investigator desires temporary position; can qualify any capacity, transportation department, electric railways and buses; available June 22 to July 23, also Saturdays, Sundays and holidays throughout the year. PW-114, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SALESMAN AVAILABLE

SALES representative with broad association in electric, steam and bus field, open for connection in near future. SA-115, Electric Railway Journal, 7 South Dearborn St., Chicago, Ill.

- 3—Double truck, pay within, **One-Man Two-Man Cars**, 41 ft. over bumpers. No. 77E-1 motor trucks, 28-in. wheels, Westinghouse 508-A Motors, and G.E. 258-A Motors.
- 2—Single truck, double end, **Closed Birney Type Safety Cars**, length over bumpers 27 ft. 9 1/2 in. Brills special No. 78M-1 trucks, 28-in. wheels, Westinghouse 508 Motors and G.E. 258-A Motors.
- 1—28-ft. single truck **Birney Type Motor Car**, Brills 21-E truck, G.E. 258-A Motors.

The above equipment has recently been withdrawn from service and is in splendid operating condition.

Omaha, Lincoln and Beatrice Railway Co.

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One Standard Gauge Steel Under Frame Motor Flat Car

Equipped with M.C.B. couplers suitable for switching steam railroad cars around material yard.

The Cincinnati Street Railway Company

Attention General Manager
 Cincinnati, Ohio

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue
This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

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Collier, Inc., Barron G.
- Air Brakes**
General Electric Co.
Westinghouse Traction Brake Co.
- Anchors, Guy**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
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Columbia Machine Works
Elec. Service Supplies Co.
- Automatic Return Switch Stands**
Ramapo Ajax Corp.
- Automatic Safety Switch Stands**
Ramapo Ajax Corp.
- Axles**
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Bethlehem Steel Co.
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Carnegie Steel Co.
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Timken Roller Bearing Co.
- Bearings and Bearing Metals**
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Columbia Machine Works
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Columbia Machine Works
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- Bearings, Thrust**
Timken Roller Bearing Co.
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- Bells and Gongs**
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Railway Trackwork Co.
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Plymetl
Haskellite Mfg. Corp.
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- Rollers**
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- Bolts, Case Hardened**
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- Bond Testers**
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- Bonding Apparatus**
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Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.
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McGraw-Hill Book Co.
- Brackets and Cross Arms**
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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
- Brake Adjusters**
Brill Co., The J. G.
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Brill Co., The J. G.
- Brake Testers**
National Ry. Appliance Co.
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National Brake Co.
Westinghouse Traction Brake Co.
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Morganite Brush Co.
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- Brushes, Graphite**
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- Brushholders**
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- Railheads**
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- Bus Lighting**
National Ry. Appliance Co.
- Bushings, Case Hardened and Manganese**
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Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
- Cables (See Wires and Cables)**
- Cambric Tapes, Yellow and Black Varnish**
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Irvington Varnish & Ins. Co.
- Carbon Brushes (See Brushes, Carbon)**
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- Car Panel Safety Switches**
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
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Cincinnati Car Co.
- Car Wheels, Rolled Steel**
Bethlehem Steel Co.
- Cars, Dump**
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Differential Steel Car Co.
- Cars, Gas-Electric**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
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Brill Co., The J. G.
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Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.
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Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works
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Timken Roller Bearing Co.
- Castings, Malleable & Brass**
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Columbia Machine Works
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Ohio Brass Co.
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- Ceilings Plywood Panels**
Haskellite Mfg. Corp.
- Chairs, Parlor Car**
Heywood-Wakefield Co.
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Electric Service Supplies Co.
- Change Trays**
Cincinnati Car Co.
- Circuit-Breakers**
General Electric Co.
Westinghouse E. & M. Co.
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Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
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Oakite Products, Inc.
- Cleaners and Scrapers Track**
(See also Snow-Plows, Sweepers and Brooms)
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Cincinnati Car Co.
- Coll Banding and Winding Machines**
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Elec. Service Supplies Co.
Westinghouse E. & M. Co.
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Columbia Machine Works
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Westinghouse E. & M. Co.
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General Electric Co.
Westinghouse E. & M. Co.
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- Coin Counting Machines**
Cleveland Fare Box Co.
International Cash Register Co., The
Johnson Fare Box Co.
- Coin Sorting Machines**
Cleveland Fare Box Co.
Johnson Fare Box Co.
- Coin Wrappers**
Cleveland Fare Box Co.
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Westinghouse Traction Brake Co.
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Westinghouse E. & M. Co.
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Westinghouse E. & M. Co.
- Connectors, Trailer Car**
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Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
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- Controlling Systems**
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Westinghouse E. & M. Co.
- Converters, Rotary**
General Electric Co.
Westinghouse E. & M. Co.
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Anasconda Copper Mining Co.
- Copper Wire Instruments, Measuring, Testing and Recording**
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Anasconda Copper Mining Co.
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Elec. Service Supplies Co.
International Cash Register Co., The
Roebing's Sons Co., John A.
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Elec. Service Supplies Co.
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Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.
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Nichols-Lantern Co.
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- Crossings**
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Wm. Wharton, Jr. & Co.
- Crossings, Frogs & Switches**
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
- Crossings, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
- Crossings, Track (See Track Special Work)**
- Crossings, Trolley**
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- Cutting Apparatus**
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Westinghouse Electric & Mfg. Co.
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Omaha, Lincoln & Beatrice Rlwy. Co.
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- Derailing Switches**
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- Destination Signs**
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- Door Operating Devices**
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Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
- Doors, Folding Vestibule**
National Pneumatic Co.
- Drills, Track**
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Ohio Brass Co.
- Dryers, Sand**
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Ohio Brass Co.
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- Ears**
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General Electric Co.
Ohio Brass Co.
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- Electric Grinders**
Railway Trackwork Co.
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- Electrodes, Steel**
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McClelland & Junkersfeld
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- Fenders and Wheel Guards**
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(Continued on page 31)



FORGED
then **ROLLED**
 for
**Safe,
 Smooth
 Service**

BETHLEHEM Rolled Steel Wheels for electric railway service are safe, smooth-running and economical.

A combined forging and rolling process imparts toughness and gives the metal a grained, dense structure, insuring against breakage and crystallization. Flats are practically unknown.

Maximum service with minimum cost of maintenance is realized, with every investment in Bethlehem Rolled Steel Wheels for Electric railway service.

Bethlehem forged steel axles possess the same high quality found in all Bethlehem forged products. They can be furnished heat treated, annealed, untreated or rough-turned all over.

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General Offices: Bethlehem Pa.

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*Bethlehem Steel Export Corporation, 25 Broadway, New York City.
 Sole Exporter of our Commercial Products.*

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ROLLED STEEL WHEELS

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- Forgings**
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Cincinnati Car Co.
Standard Steel Works
- Frogs and Crossings, Tee Ball**
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Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
- Frogs, Track (See Track Work)**
- Frogs, Trolley**
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General Electric Co.
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- Grinding Bricks and Wheels**
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Ramapo Ajax Corp.
- Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.
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- Harps, Trolley**
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Wm. Wharton, Jr. & Co.
- Manganese Steel Castings**
Bemis Car Truck Co.
Lorain Steel Co.
- Manganese, Steel, Special Track Work**
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.
- Manganese Steel Switches**
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- Poles, Trolley**
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Nuttall Co., R. D.
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International Cash Register Co., The
- Rail Braces and Fastenings**
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Carey Co., The Philip
- Rail Grinders (See Grinders)**
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Rail Joint Co.
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Lorain Steel Co.
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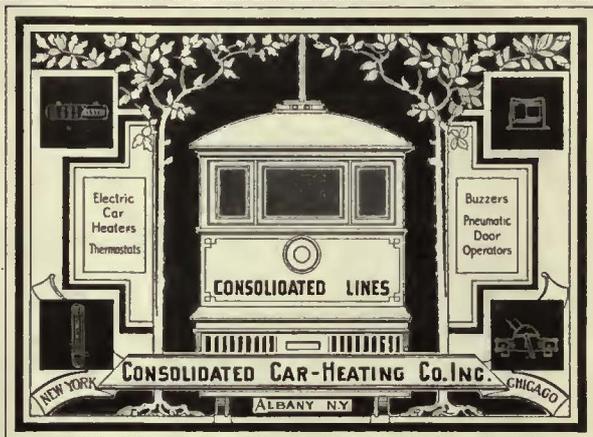
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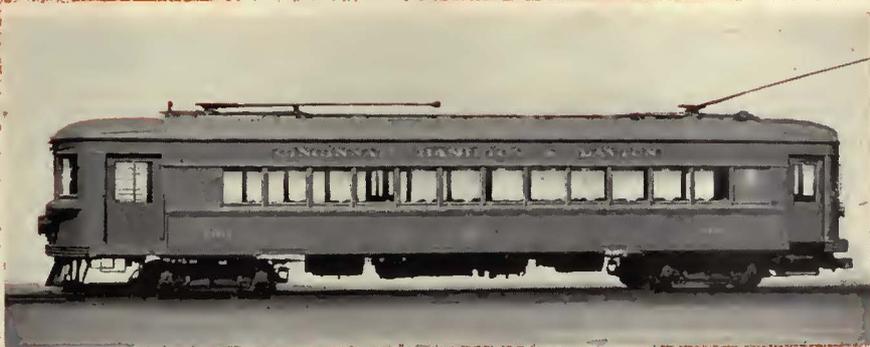
ALPHABETICAL INDEX TO ADVERTISEMENTS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

A	Page	F	Page	M	Page	S	Page
American Brass Co., The.....	29	Faille & Co., E. H.....	28	McClellan & Junkersfeld.....	28	Ramapo Ajax Corp.....	29
American Car Co.....	Third Cover	Ford, Bacon & Davis.....	28	McGraw-Hill Book Co.....	20	Richey, Albert.....	28
American Steel Foundries....	8	"For Sale" Ads.....	31	Money Meters, Inc.....	30	Roebbling's Sons Co., John A....	30
American Steel & Wire Co....	30	Foster & Co., L. B.....	20	Morganite Brush Co., Inc.....	22		
Anaconda Copper Mining Co... 29							
		O		N			
B		General Electric Co.....	18	Nachod and U. S. Signal Co... 35		Sanderson & Porter.....	28
Babcock & Wilcox Co.....	29	Gold Car Heating & Lighting Co. 30		National Brake Co., Inc.....	19	Searchlight Section.....	31
Batea Expanded Steel Truss Co. 24				National Paving Brick Mfra.		Smith Heater Co., Peter.....	30
Beeler Organization.....	28	H		Ass'n.....	22	Standard Steel Works Co.....	27
Bell Lumber Co.....	29	Hale-Kilburn Co.....	35	National Pneumatic Co.....	13	Star Brass Works.....	29
Bemia Car Truck Co.....	26	Haskelite Mfg. Corp.....	Back Cover	National Ry. Appliance Co.... 35		Stevens & Wood, Inc.....	29
Bethlehem Steel Co.....	33	"Help Wanted" Ads.....	31	Nichols Lintern Co.....	29	Stone & Webster.....	28
Brill Co., The J. G.....	Third Cover	Hemphill & Wells.....	28	Nuttall & Co., R. D.....	Second Cover	Stueckl Co., A.....	35
Buchanan & Layng Corp.....	28	Heywood-Wakefield Co.....	21				
Bylesby Co., H. M.....	28	Holst Englehardt W.....	28				
				O			
C		I		Oakite Products, Inc.....	26	T	
Carey Co., The Philip.....	10	International Register Co., The 29		Ohio Brass Co.....	5	Texas Company, The.....	14
Carnegie Steel Co.....	10	International Steel Tie Co.... 7		Okonite-Callender Cable Com-		Timken Roller Bearing Co., The 12	
Chase & Co., L. C.....	15	Irvington Varnish & Insulator		pany, Inc., The.....	30		
Cincinnati Street R'lwy Co... 31		Co.....	35	Okonite Co., The.....	30	U	
Cincinnati Car Co.....	17			Omaha, Lincoln & Beatrice		Una Welding & Bonding Co... 30	
Cleveland Fare Box Co.....	30	J		R'lwy Co.....	31	Union Switch & Signal Co., The 24	
Collier, Inc., Barron G.....	23	Jackson, Walter.....	28				
Columbia Machine Works.....	27	Johnson Fare Box Co.....	20	P			
Consolidated Car Heating Co... 35				Perey Mfg. Co., Inc.....	35		
		K		Positions Wanted and Vacant... 31			
D		Kelker, DeLew & Co.....	28	Prettyman & Sons, J. F.....	27		
Day & Zimmerman, Inc.....	28	Kuhlman Car Co.....	Third Cover				
Differential Steel Car Co., The.. 35				R			
		L		Rail Joint Co.....	35		
E		Lorain Steel Co.....	30	Railway Track-work Co.....	0		
Electric Equipment Co.....	31			Railway Utility Co.....	35		
Electric Ry. Equipment Co.... 20							
Electric Service Supplies Co... 0							

WHAT AND WHERE TO BUY—Continued from page 34

Sweepers, Snow (See Snow Flows, Sweepers and Brooms)	Ticket Choppers and Destroyers Elec. Service Supplies Co.	Trimming Materials Chase & Co., L. C.	Turntables Elec. Service Supplies Co.	Welding Wire American Steel & Wire Co. Railway Trackwork Co. Roebbling's Sons Co., J. A.
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Tapes and Cloths (See Insulating Cloth, Paper and Tape)	Trackless Trrolley Cars Brill Co., The J. G.	Trolley Wire American Brass Co. American Steel & Wire Co. Anaconda Copper Min. Co. Roebbling's Sons Co., J. A.	Welding Processes and Apparatus Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.	Wires and Cables American Brass Co. American Steel & Wire Co. Anaconda Copper Min. Co. General Electric Co. Okonite Co. Okonite-Callender Cable Co. Inc. Roebbling's Sons Co., J. A. Westinghouse E. & M. Co.
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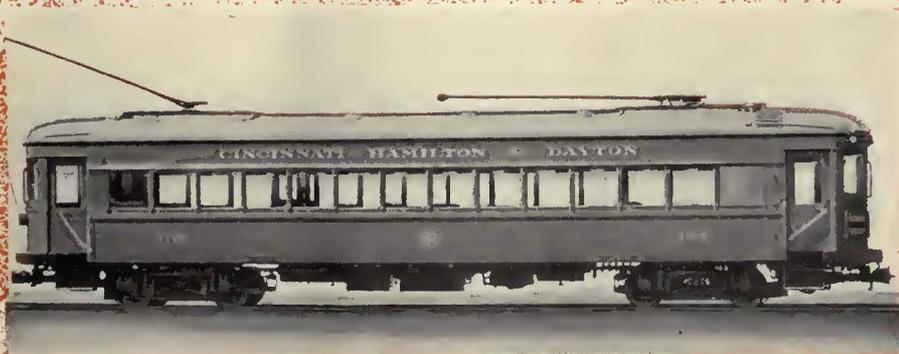
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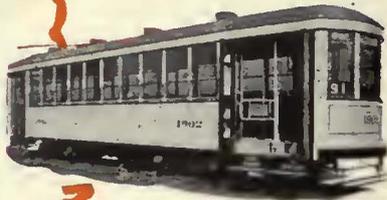
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