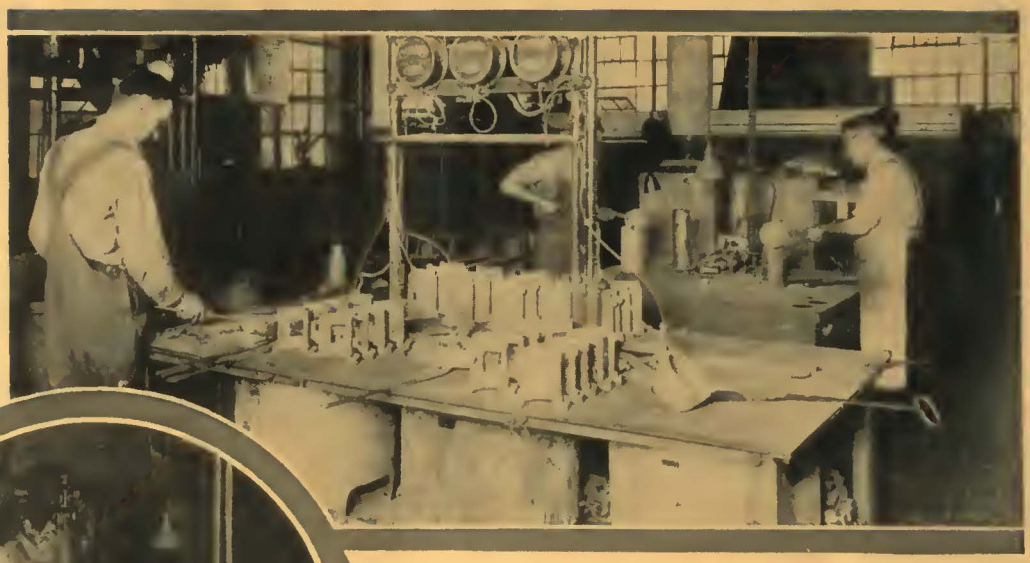
McGraw-Hill Publishing Company, Inc. June 26, 1926 Twenty Cents per Copy

ELECTRIC RAILWAY JOURNAL

Each one of your assets responds to the way it is managed. Well managed, it has dependable value. Badly managed, it ceases to be an asset. The development and management of your car advertising space should be entrusted only to those of widest experience and with the longest record of success.



About Babbitting

in its relation to your operating costs

NEXT to inadequate lubrication, faulty babbitting is the greatest source of bearing failures. That is why we also place so much stress upon the babbitting of Westinghouse Specification Bearings.

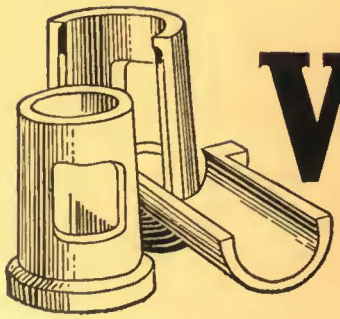
The new Homewood Works is equipped with the most modern appliances for the absolute heat control so essential to good results. Experts, trained to the task, and guided by competent engineers, babbitt the bearings with specially alloyed virgin metals. Machining and milling to correct tolerances assures the accurate fit and easy replacement of Westinghouse bearings.

Westinghouse renewal parts, made from the same patterns and moulds as those on your original Westinghouse motors, contribute to the maximum of economical service from your equipment.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of
the United States and Foreign Countries

1926



Westinghouse

Specification **Bearings**

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CHARLES GORDON, *Editor*

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Vol. 67
No. 26

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JUNE 26, 1926

Facts First—

The Duty of the JOURNAL

NOT long ago a railway manager remarked that the publication of deficits was not an encouraging note to sound in the pages of the leading magazine of the industry. While this is true it has nevertheless been this very policy of publishing facts, good or bad, that has made possible such leadership.

Success of the JOURNAL depends as much on the success of the industry as any other affiliated agency, and a deficit is no more glad tidings to its staff than to the railway board of directors to which such a report may be addressed. To hide the results or camouflage the facts would be not only bad publishing, but as futile as the habit of the ostrich, which hides his head in the sand to avoid his enemies.

The JOURNAL has faith in the industry and faith in the ability of its personnel to build bigger and better the structures of its art. The deficits of today, like the mistakes of yesterday, will be but landmarks to guide the progress of tomorrow. The truth is essential and cannot be avoided.

McGRAW-HILL PUBLISHING COMPANY, INC.

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Electrical World
Industrial Engineer
Electrical Merchandising
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Successful Methods
Journal of Electricity
(Published in San Francisco)
American Machinist—European Edition
(Published in London)

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala, Chile and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

Published weekly. Entered as second-class matter, June 23, 1909, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

How do you Measure Ear Service?

Here is Shown What One Road Gained by Using Marathon Ears

1. Life of Ears: 24 months for Marathons vs 6 to 8 months for others.
2. Savings in Dollars: Estimated at $5,000 a year since using Marathon Ears.
3. Reduction of Trolley Breaks: Average of 73 breaks per year before installing Marathons vs 30 since.
4. Reduction in Ear Replacements: 1923, 1470 per month; 1924, 1009 per month; 1925, 50 per month.
5. Life of Trolley Wire: 15% increase is estimated.
6. Wear of Wire Directly Under Ears: None since using Marathons.

These figures were furnished by the Electrical Engineer of a large city property and are actual performance records. Facts such as these show that O-B Marathon Ears do insure substantial, worth-while savings. And they give you a new standard by which to measure trolley ear service.

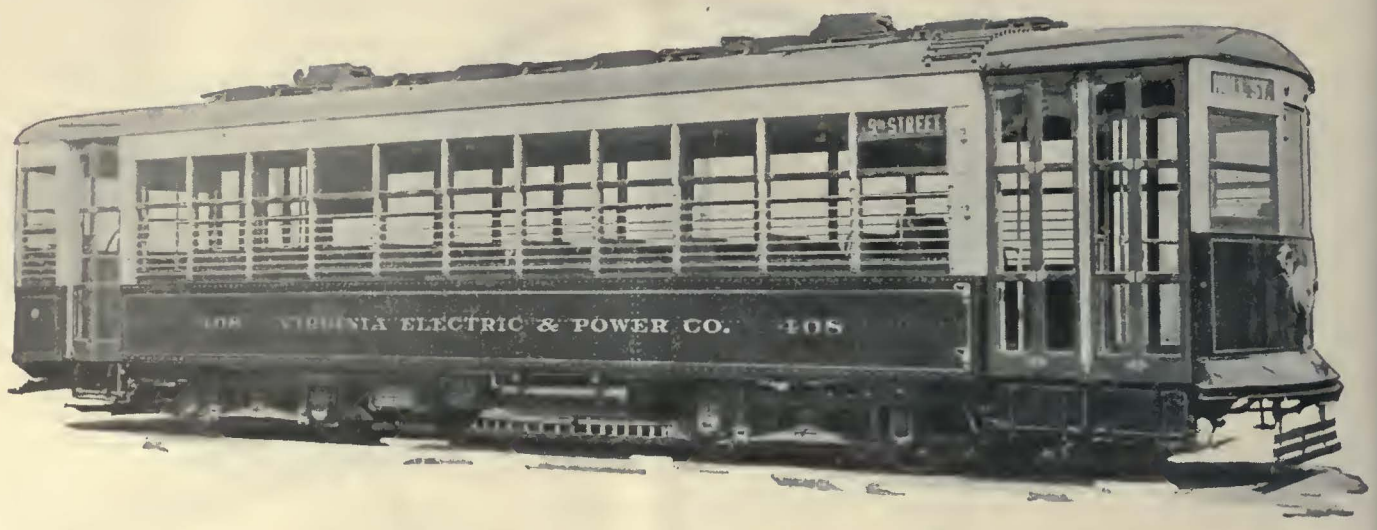
This is but similar to the records of these modern ears on many properties. All of them show substantial economies. It will pay you to specify Marathons on your next order.

Ohio Brass Company, Mansfield, O.
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada

80B

Ohio Brass Co.

PORCELAIN INSULATORS · LINE MATERIALS · RAIL BONDS · CAR EQUIPMENT · MINING MATERIALS · VALVES



A new user of Variable Load Brakes

The *Virginia Railway and Power Company* has recently put into service 15 new cars equipped with Westinghouse Variable Load Brakes.

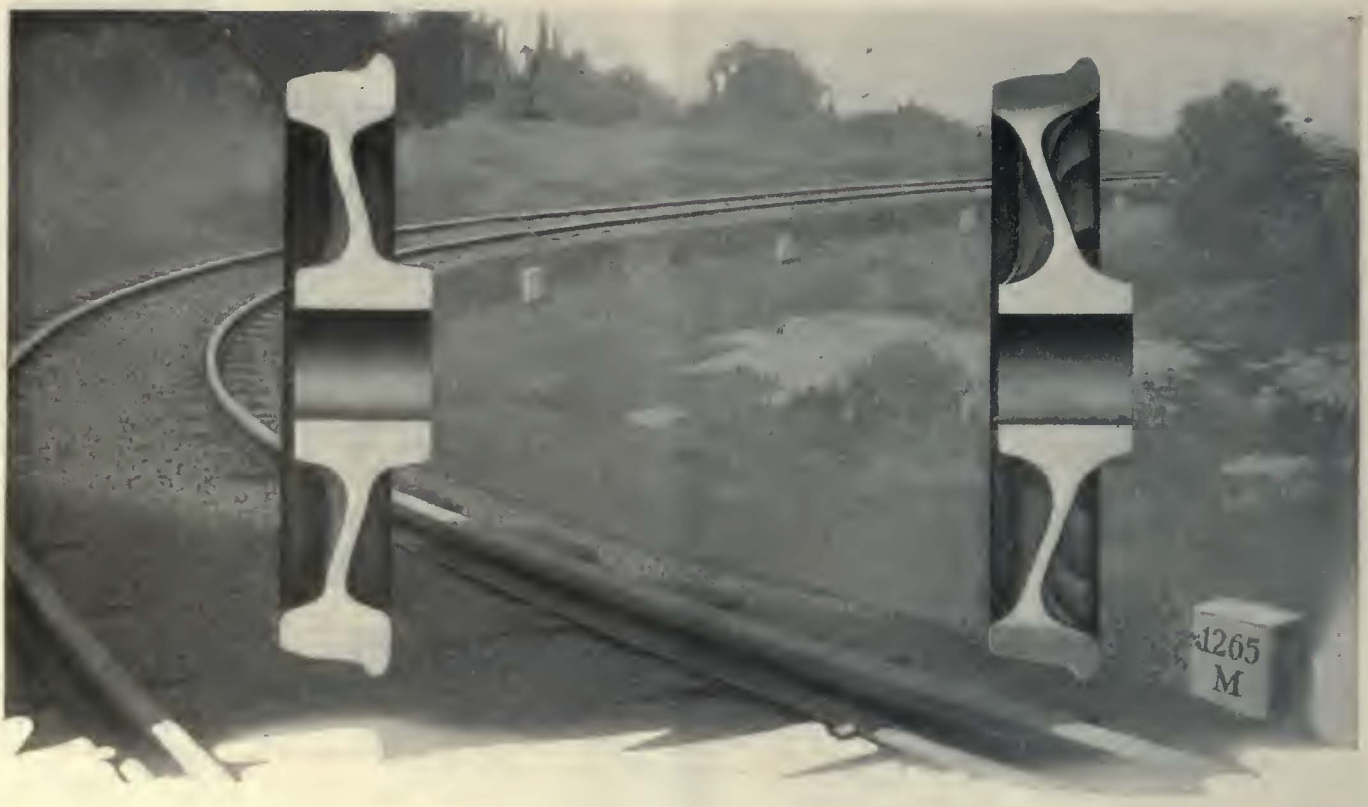
This is one of the many traction companies that have recognized the auspicious part that Variable Load Brakes can play in the operation of modern light weight surface cars.

Variable Load Brakes provide for the same effectiveness of retardation throughout the entire range of car loading, thus assuring uniformly short stops which are reflected in greater safety and increased schedule speeds.

Information regarding Westinghouse Variable Load Brakes may be obtained upon application to our nearest district office—*Ask for Descriptive Catalogue T-2045.*

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



Metal or Mileage

IN this "multiple wear wheel" you get a lot of metal for your money. But it's mileage, not metal, you're after.

This un-treated tread soon wears. The wheel is removed, sent to the shop for re-turning, comes back, is reapplied and the shimms adjusted for correct platform height.

But it quickly wears again and the maintenance story is repeated.

Finally after another interval of service it is discarded.

IN this Davis "One-Wear" Wheel, you get the mileage with less weight and without the maintenance.

Made from special steel and heat-treated, the Davis "One-Wear" Steel Wheel is fundamentally strong.

Heat treatment secures the utmost wear that the special high manganese steel can develop.

The Davis "One-Wear" Steel Wheel keeps running while other wheels are in the shop for turning. Buy Davis Steel Wheels for greater serviceability of equipment.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

A familiar scene in many of the larger cities, where attractive buses with Bender-built bodies and Hunter Signs are popular!

Unquestionably a public conveyance!

That's the business touch which Hunter Signs give to the motor bus

By day or night Hunter Signs "Tell the Public where you're going." Reliable bus companies operating on fixed routes and schedules sell the public their transportation service by means of Hunter Signs. They are made in types for every service.

ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Illinois Merchants' Bank Bldg.

PITTSBURGH
1123 Bessemer Building

BOSTON
88 Broad St.

SCRANTON
316 N. Washington Ave.

DETROIT
General Motors Building

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

The Phono Record

1865 A bulletin of Phono-Electric Achievement 1926

Atlanta becomes a Phono City

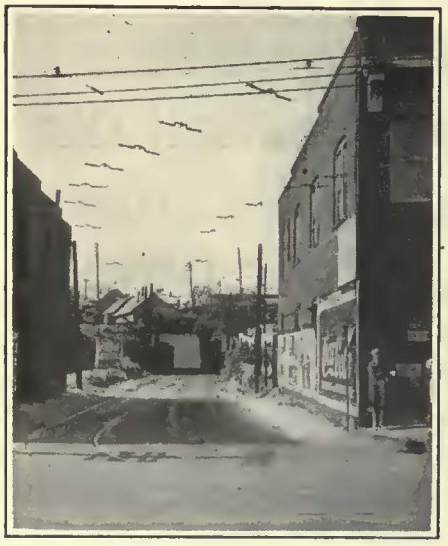
Modern overhead and modern cars help build street railway prosperity

Where Sherman Marched Car Bell Now Clangs

Eighty-two years ago Atlanta had not been thought of. Today she ranks sixth city of the United States,— the booming industrial headquarters of the South.

The car bell, sign of prosperity and progress, now clangs merrily where Sherman's soldiers once trod. And Phono-Electric Trolley Wire, sign of progressive thinking in overhead construction, now totals 20 miles in and around the city.

Thus Phono-Electric in service again proves claims made on a basis of its performance in practically every city of importance in the United States. It outwears ordinary hard drawn copper two to three times. It reduces wire breakage. It possesses fatigue resistance and high tensile strength of particular value to operators of city systems such as that in Atlanta, where sharp curves, short headways and heavy traffic are rules of the day.



Rejected—becomes dominant city

Old Story of Stone Rejected by Builders Becoming Corner Stone of South

When the Georgia Railroad wanted to build its terminus in Decatur, Georgia, the inhabitants refused permission, so the line was extended 6 miles, and a new village established. At the time this village was called, appropriately, Terminus. Now it is called Atlanta, sixth city of the country,— *and Decatur is one of its suburbs.*

The moral being that it pays to keep well abreast of developments, and to take good care that prejudice never becomes a handicap whether you buy real estate or trolley wire. Have you had your copy of the Phono-Electric Book? Better let us send you one right now, it is full of interesting facts.

"Bridgeport" BRASS TRADE MARK CO. Phono-Electric

Rapidly becoming standard in Atlanta

Strength, toughness and ductility at such places are good qualities on which to build.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

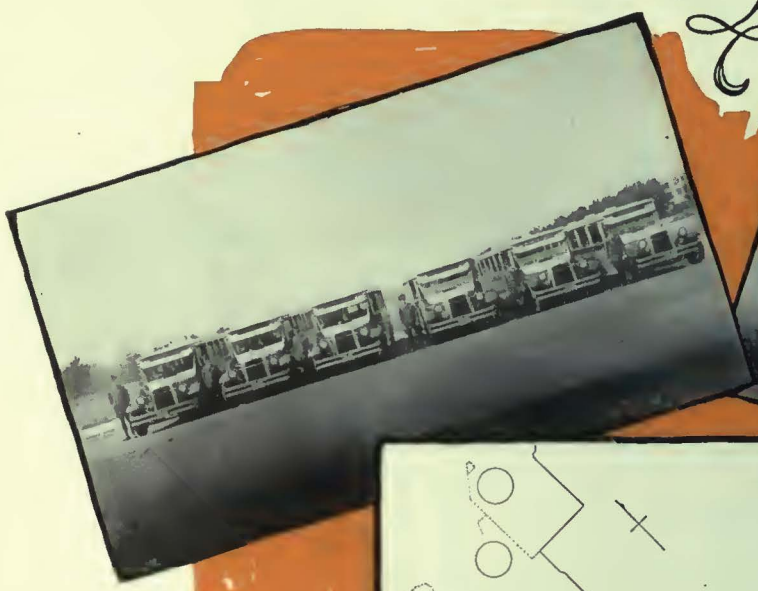
Bridgeport Brass Company
BRIDGEPORT - CONNECTICUT

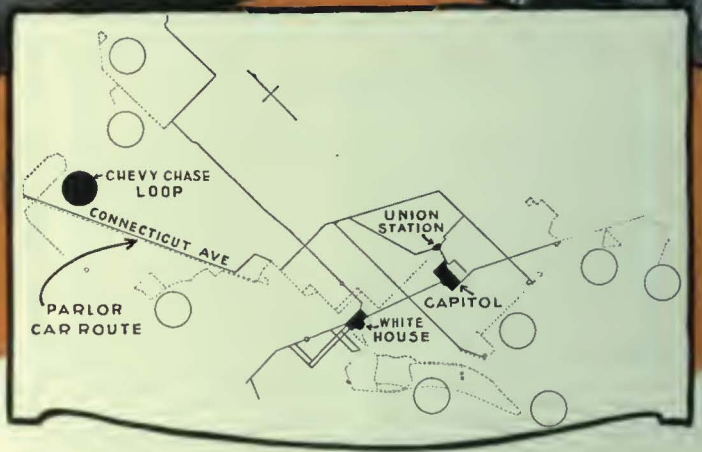
213,492 COACH MILES *and* ONLY *ONE* STOP *for* MECHANICAL TROUBLE

YELLOW KNIGHT

that's PERFORMANCE

the exclusive CHEVY CHASE RUN uses YELLOW PARLOR COACHES -exclusively





THE Capital Traction Company at Washington D. C., operate eight Yellow Parlor Coaches over the exclusive Chevy Chase Coach Line.

Only *once* in 213,492 miles has a Yellow Coach been out of service for mechanical trouble—and then only for a few hours.

Moreover, during 1925 when covering a total of 98,000 miles there were only nine delays on the road from trouble of *any sort*, including tires. Only 282 minutes lost from all causes.

That's performance!!

The service was inaugurated on September 15, 1925, to operate on a route eight miles long, connecting the exclusive Chevy Chase suburb with the downtown section, including the Union Station and the Capitol.

The fare was fixed at 25 cents with a policy of giving the finest possible class of service with a seat for every person, no standees even during peak hours.

From the beginning the operation was a success. Within eleven weeks the company was making money, and profits have been steadily climbing up ever since.

Eight Yellow Parlor Coaches are now averaging 130 miles a day, and each is constantly contributing to the

success of the operation, as is proven by the accompanying operating cost figures, in cents per mile.

Everybody rides on the Chevy Chase Coach Line from Senators to children, and the service duplicates that given by the Company's own street cars at something more than three times the fare. No apparent reduction has been noted on the car lines, in fact the tendency for street car riding shows an increase, due to general local trend. The traffic attracted by this de luxe service is new business, or business which the Capital Traction Company had years ago and which slipped away during the rapid growth of the private automobile.

Yellow Coach *plus* General Motors are at *your* service to help you build up profitable operations.

	Cents per Mile
MAINTENANCE	
Buildings	0.30
Bus Bodies	0.39
Bus Chassis	1.12
Tires and Tubes	1.75
Shops and Garage Equipment	0.01
Service cars — maintenance and operation	0.06
Depreciation	5.13
TOTAL	8.76
GARAGE OPERATION	
Garage Employees	1.41
Garage Supplies and Expenses	0.66
TOTAL	2.07
TRANSPORTATION	
Chauffeurs' Wages	5.66
Gasoline	3.38
Lubricants	0.22
Other transportation expenses	0.47
TOTAL	9.73
TRAFFIC PROMOTION	
Advertising	0.04
GENERAL AND MISCELLANEOUS	
Officers' Salaries	0.32
Injuries and Damages	0.11
Insurance	0.01
Rent of Equipment	0.16
Miscellaneous and General	0.05
TOTAL	0.65
Taxes	1.00
Operating Expenses and Taxes	22.25

YELLOW TRUCK & COACH MANUFACTURING CO.
SUBSIDIARY GENERAL MOTORS CORPORATION
5801 WEST DICKENS AVENUE, CHICAGO, ILL.

SOLDIERS AND SAILORS MONUMENT, CLEVELAND, OHIO

NP

RECOGNITION

This monument commemorates a service rendered. It is a token that the public is both quick and certain to appreciate all contributions to its safety, comfort and protection.

In a more humble capacity, National Pneumatic Door and Step Controlling Mechanisms have also contributed to public safety. On the cars of Cleveland and in many other cities, therefore, these devices play no small part in the maintenance of favorable public relations and increasing the number who faithfully contribute to the street car fare box.

NATIONAL PNEUMATIC COMPANY

Executive Office: 50 Church Street, New York
General Works: Rahway, New Jersey

MANUFACTURED IN

CHICAGO
518 McCormick Building

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

PHILADELPHIA
1010 Colonial Trust Building

Pat. Off.

CTRIC -one-motor drive

Economy points to one motor

Only one electric motor is used in the Mack Gas-Electric One-Motor Bus.

Mack engineers *might* have adopted the usual two motor drive, but one motor does the job where two motors mean more weight, more care and higher maintenance costs.

Economy for the operator, and the value of retaining the standard Mack rear axle and single propeller shaft, pointed to one motor drive as the logical design behind which Mack could stand 100 per cent. Motor is high speed type, driving through dual reduction gears and differential to the rear wheels. Road clearance is the same as in the standard Mack gear driven bus.

Again Mack wins by employing a Rubber Torsion Insulator to take up the inertia of the generator and armature. Only Mack uses this feature, developed after long experience with Rubber Shock Insulators. Self-excited generator and the one motor are both mounted in rubber.

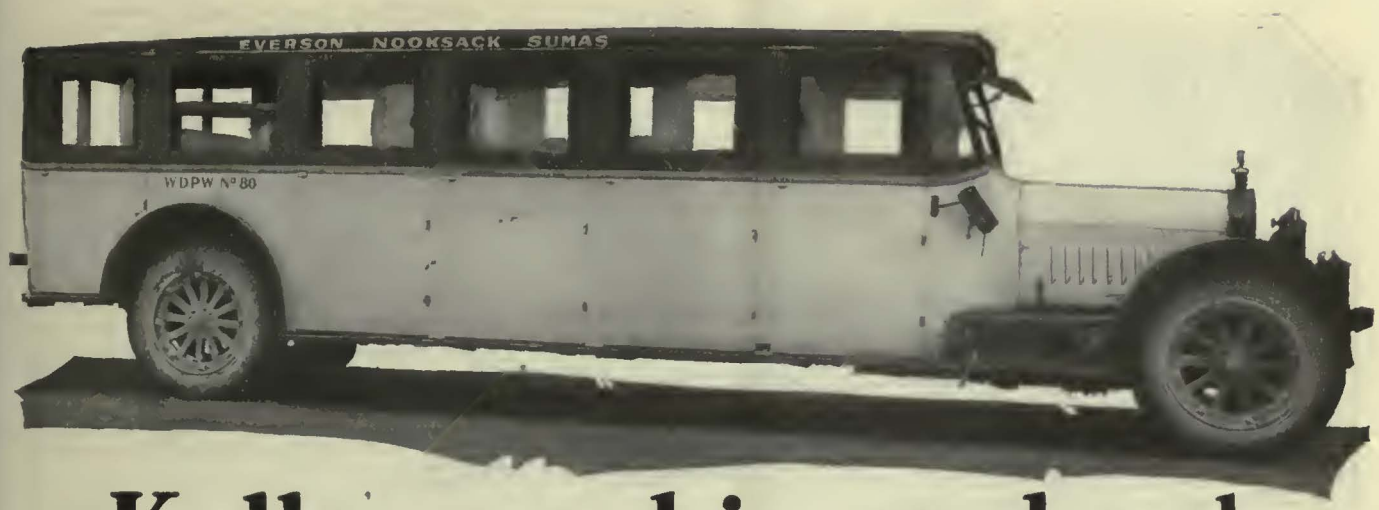
Mack engineering skill also provides complete accessibility to all electrical units for inspection and repairs. They can be reached through conveniently situated trap doors in the floor or they can be removed from below without interfering with adjacent assemblies.

If you are looking for more service hours on the road, faster schedules, ease of maintenance and more profitable operation, investigate the Mack Gas-Electric One-Motor Bus through the Mack direct factory branch nearest to you.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 Broadway, New York City

One hundred and seven direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY," "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION," or "MACK TRUCKS OF CANADA, Ltd."

The Mack Bus



Kellys cut his overhead better than 40 percent

STAGES
BELLINGHAM PHONE 1956
AFTER 6 P. M.—200
SUMAS
PHONE X-226: X-821

NOOKSACK
NOOKSACK

J. C. HESSELGRAVE
SUMAS, WASH
January 25th, 1926

Kelly-Springfield Tire Company,
1412 Ninth Avenue,
Seattle, Washington.

Attention Mr. P. E. Myers, Branch Manager

Dear Mr. Myers:

You may, if you wish, use the following information for advertising purposes.

As you know, I have been using Kelly-Springfield Heavy Duty Tires on my six motor coaches operating out of Bellingham to Sumas and way points for sometime and I have found after years of experimenting with other makes of tires that my overhead expense on tires has been cut better than forty percent thru the use of your Heavy Duty line. I am operating one twenty passenger Fageol with 36 x 6 Singles on the front and 36 x 6 Duals on the rear; also one twenty passenger White with 36 x 6 Singles on the front and rear. I have four Packards on 35 x 5 Heavy Duty Tires.

It is rare indeed that a tire goes out of service at a mileage less than thirty thousand miles on any of these cars. Considering that fifty percent of my run is over dirt and gravel roads, the mileage I have been receiving from your tires is nothing short of phenomenal. You may rest assured that so long as your merchandise delivers the service it has in the past, I will be one of your strongest boosters.

Very truly youre,

J. C. Hesselgrave

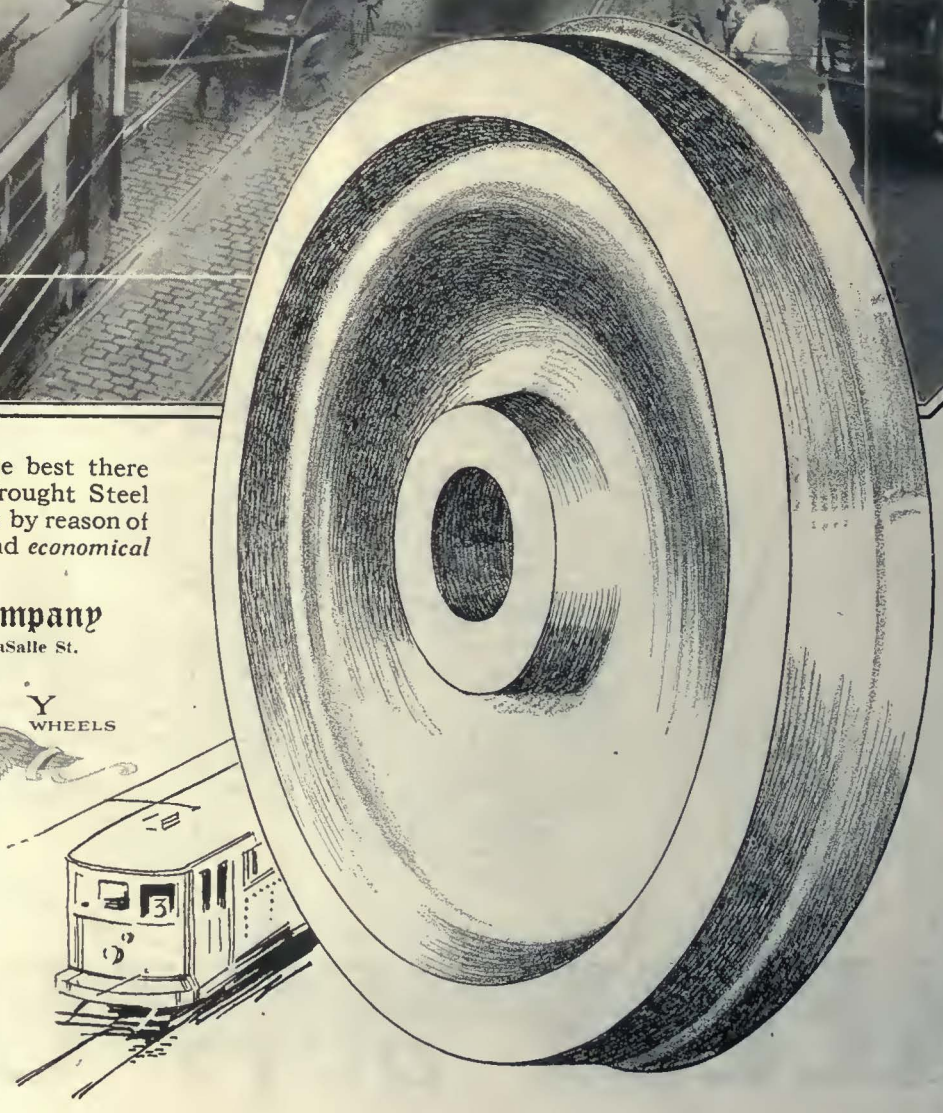
KELLY HEAVY DUTY CORD

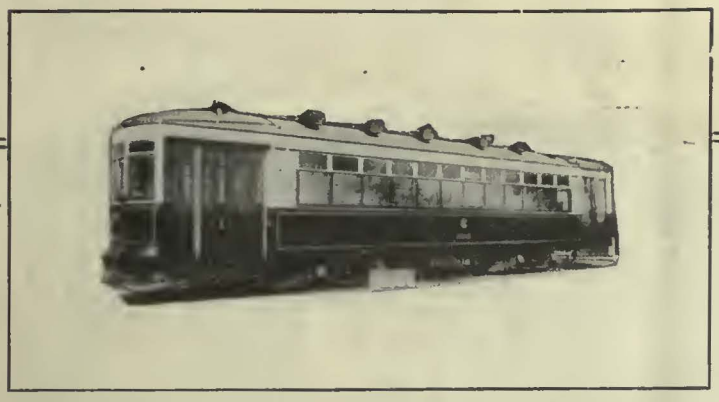
Modern traffic demands the best there is in equipment. Gary Wrought Steel Wheels meet these demands by reason of their *safety, dependability* and *economical mileage cost.*

Illinois Steel Company

General Offices, 208 South LaSalle St.
Chicago, Illinois

GARY WROUGHT STEEL WHEELS





The Modern Car *is a business builder*

WHAT could be more effective in drawing increased patronage to the electric railway than the modern car? Its convenience has never been equalled. Now it is more pleasing in appearance, more comfortable to ride in, and quieter than ever before.

With all the modern features the street car is becoming the preferred method of transportation.

Among recent orders received by this company is one for 34 cars of the type illustrated, for the Chicago Surface Lines.

Cummings Car and Coach Company

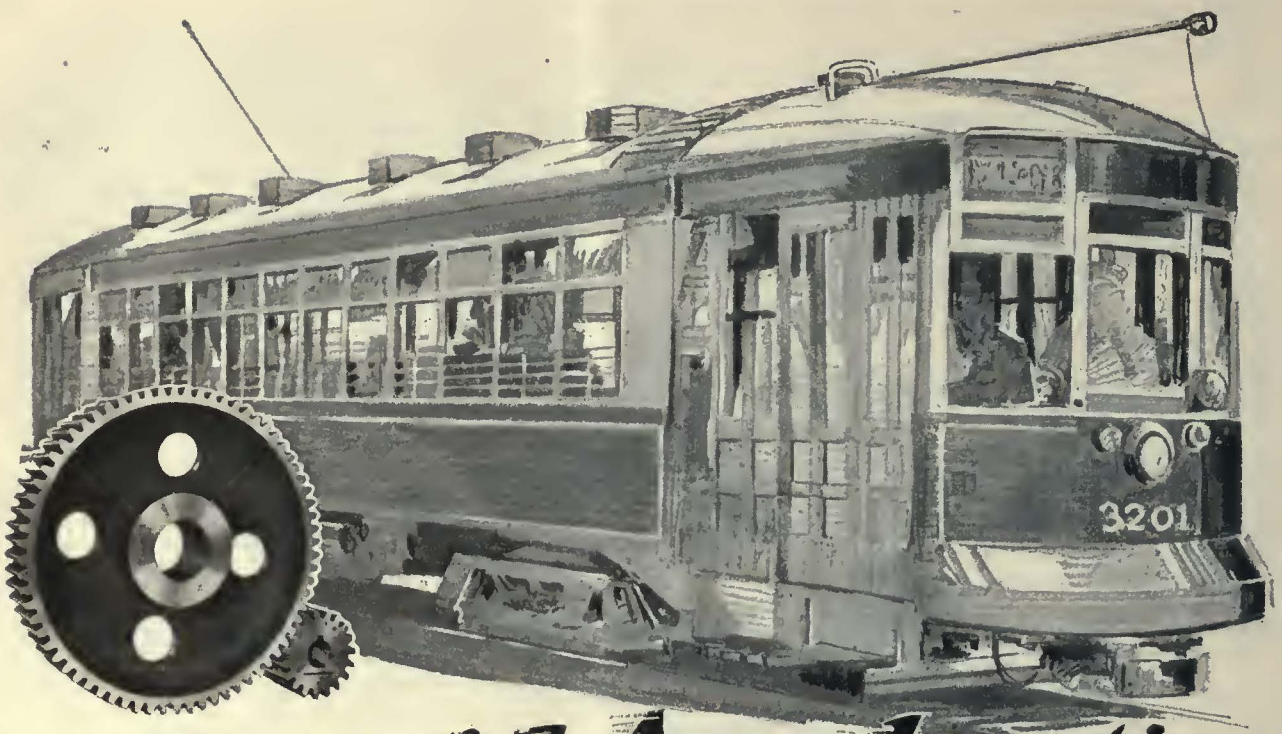
Successor to McGuire-Cummings Mfg. Co.

111 W. Monroe St., Chicago, Ill.

Light Weight City and Interurban Cars

Single and Double Trucks

Cummings Gas-Electric Motor Coach



Rapid Acceleration
– a test and proof of Gearing

Near the top of the list of high-schedule-speed systems is the Chicago Surface Lines, maintaining this position in spite of traffic congestion that is equalled in few cities.

Tough, indeed, must be the gears which will stand such gruelling, rapid-acceleration service as Chicago's—and the Chicago Surface Lines selected grade M Gears and Pinions for more than half its requirements of the past year, and for its total 1926 requirements.

Bear this fact in mind in connection with your modern-cars-for-better-service program in which rapid acceleration is so vital a factor.

G-E Railway Gearing is favored by research facilities that are unsurpassed, and nothing is omitted from the processes of its manufacture and test that will help insure the highest-quality product that it is possible to produce.

For
Modern Equipment Standards

54C-32

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Publishing Company, Inc.

CHARLES GORDON, *Editor*

Volume 67 New York, Saturday, June 26, 1926 *Number* 26

Now that the Car Engineers Have Reported, What Will the Industry Do?

FOLLOWING an exhaustive study of the electric railway car situation the engineers forming the committee on essential features of modern cars have presented their report. A comprehensive digest is published in this issue. The time of these three engineers was donated to the industry by the respective manufacturing companies which they represent. They were appointed to their task after a series of meetings of interested manufacturers and railway executives, for the purpose of stimulating development of the electric car. The plan received the formal approval of the American Electric Railway Association executive committee and the engineers have worked under the chairmanship of G. C. Hecker, special engineer of the association, in close contact with Managing Director Storrs.

In its study the committee sought advice and counsel wherever it was available. It co-operated closely with the committee on unification of car design and its findings reflect the operators' views as well as those of the manufacturers. The report has been accepted by a group of manufacturer executives acting under the chairmanship of Mr. Storrs. Present plans contemplate printing the report in full and distributing it to all operating companies and interested manufacturers.

What will be the result? Will this constructive piece of work take its place along with countless other recommendations of association committees which gather dust while operating officials blithely continue to gratify their personal whims in demanding special requirements that add heavy cost to electric railway equipment? Or will it bring about realization of the necessity for creating a market for cars of the types recommended so that car building can be put on a manufacturing basis with a consequent saving in cost of cars? Will those responsible for the executive control of operating properties accept this as a "fine report" and then forget it, or will they hold conferences of their operating and mechanical officials and demand to know why its recommendations should not be followed? If they disagree with the recommendations will they throw the report aside and continue to point to the high cost of new cars as the reason for continuing to operate the 25,000 obsolete cars that give electric railways a "down at the heels" aspect in the minds of the public, or will they understand and appreciate its intent and spirit to the extent of writing out their objections and forwarding them to the association?

But the report will also go to manufacturers—car builders, equipment manufacturers and others. What will they do? Will they grasp the opportunity thus afforded to put car building on a manufacturing instead of a contracting basis? Are they prepared to accept the responsibility of assuming the initiative in improving the electric car? Are they ready to come before the industry with cars that reflect their individual enterprise provided a market is reasonably assured?

Is the electric railway industry ready to accept the challenge of the automobile? Has it the necessary faith in the possibilities of the electric car? Has it the ingenuity and courage necessary so to improve the character and attractiveness of common carrier vehicles as to win back many of those who are becoming tired of the expense and the traffic difficulty experienced in providing individual transportation? Are both manufacturers and operators alert to the opportunity for getting together for the good of the industry as pointed out in the report?

The work of the committee will have been in vain unless its report results in action. It does not contemplate a standard car. It does not limit progress and development by the manufacturers. It merely attempts to bring about some agreement as to the general types, sizes and weights of cars suitable to average city and interurban conditions. The report affords a basis for agreement between operators and manufacturers as to the general features of design, which would assure the latter a market to justify them in taking the initiative in development.

NOW is a critical period for the electric car in street and interurban service. The action—or the lack of it—following this report will determine whether operators and manufacturers have the vision and courage to grasp the present opportunity. The committee suggests a questionnaire to determine how many operating companies would adhere to its recommendations in buying cars. That would help in determining the extent of the market available. But there is another way of bringing about constructive action. The mechanism is already set up in the Advisory Council. Its membership includes men who wield a strong influence over the buying policies of many properties. It has there the power to create a market for cars manufactured according to the committee's recommendations. It is also in a position to ask pointed questions of manufacturers who fail to carry out the spirit of the report. With a start of that kind competition and merchandising effort will assure progress.

The action of the industry at this time is the turning point for the street car. Either it will assume its proper place as an up-to-date common carrier vehicle or it will be crowded off the streets of many American cities due to the timidity, lack of vision or obstinacy of those interested in its operation and manufacture. These are strong words, but the occasion demands them.

What will the industry do?

Prospects Appear Good for a New Deal in Tacoma

SOME time ago mention was made in ELECTRIC RAILWAY JOURNAL of the handicap under which the Tacoma Railway & Power Company had operated its railway lines during the periods of incumbency of Mayor Fawcett. That anachronism of American politics continued to play the single catgut in discord until the people of Tacoma turned him out of office. Meanwhile distressing damage had been done to the railway, but not damage that was irreparable. Things appear to be much better now in Tacoma. There is a new Mayor in the saddle and with him sits a new Council. Under this new Mayor, Melvin G. Tennent, conferences have been started with the end in view of restoring relations between the city and the company to a basis that should prove profitable to both.

Things have not yet gone very far in Tacoma under the new régime, but the negotiations have been opened under conditions that are auspicious. The fact seems now to be realized that the railway is no less worthy of its hire than is the individual and as a basis for fixing that hire a valuation is to be agreed upon and the company is to be permitted to earn at least 6 per cent on the valuation so reached, with fares, of course, on a basis that will permit that return to be earned. As one of the first indications of its willingness to help toward a settlement, the city has refused to renew operating permits to the Puget Sound Transportation Company, until recently a competitor of the railway. That in itself is very important. Moreover, it is more than a gesture, for the new Mayor appears to be fully cognizant of the harm that has been done in the past by just such so-called competition.

As for the railway, Manager Sullivan expressed a hope that the city might find a solution of its transportation problem so good and so advanced that it would set a pace for cities faced with similar problems. He declared that the system must be ready to give the city 24-hour service 365 days a year, but said that some of the problems of service are beyond human power to determine in advance of application and that a period of experimentation is essential. In this he is absolutely correct. The city needs not only to try to be fair to the company but to be patient with it as well. Of course it is too early to attempt to predict the possible outcome of the present negotiations, but the spirit evident in the first session may be regarded as auguring well for the railway and the city to reach some settlement of the problem.

Sane Transit Advice from Wall Street

UNCANNY understanding of the problems of the electric railways is shown in a recent editorial in the *Wall Street Journal*. It might be expected that that paper would be well informed on questions of finance connected with electric railway operation, but it did come somewhat as a surprise to see it manifest such knowledge as it did of the city transportation problem as a whole in its recent discussion of the proposal of former Comptroller Craig to sell certain surface lines to the city. Its discussion was of a subject of prime interest to New York, but the observations are equally applicable in most any community. On this account the comment is of general interest. One may or may not agree with its strictures regarding terms of the proposed sale of certain surface lines to the city, but surely that paper is on sane ground when it suggests as it did an engineering study on the public's behalf "of the advantages of buses compared, not with antiquated surface cars now feebly operated but with modern electric cars adequately maintained and competently run."

But New York City has done many stupid things transit-wise in the past. It would appear that it is likely to do them again despite all the warnings. If it had not in the past done some stupid things, the roads in the city now sore beset would not be in their present plight. True, there may have been traction manipulations in the past, but the local roads have more than atoned for any sins of earlier days. The onus for their present condition is not altogether theirs. It is largely the city's. In short, it is one thing to make a mistake. It is another thing to keep on repeating that mistake. The unfortunate thing is that New York City keeps repeating its transit mistakes. It keeps on repeating its mistake because for a long time past the railways have been made a political football. Why should there be any display on the part of the city of a willingness to entertain proposals for bus operation based on acceptance of a 10-cent fare while the avowed attitude is to deny a similar rate to the railways? Not until there arises in public office a man big enough to put the best interest of the city above the matter of his own political aggrandizement will the issue be settled.

The situation in New York is too complicated to say just what will come out of it, but it will indeed be most unfortunate if anything importunate is done before the railways have a chance to demonstrate what can be done with the roads worked as the *Wall Street Journal* would have them operated. It would seem that there are examples enough throughout the country for New York to study to prove that the *Wall Street Journal* is right. Yes, New York may be in need of buses. But more than that does it need modern electric cars adequately maintained and competently run. And that means a policy consistently as fair toward one mode of transportation as it is to another. Is that beyond hope? If surface indications mean anything it appears to be. That is why the transportation policy of New York is a poor guide for the rest of the country.

Flexibility of the Bus in Theory and in Practice

IT IS the amateur student of traffic problems in particular against whom the *Wall Street Journal* and trained transportation men issue their words of warning. From time to time these amateurs bob up with the proposal that buses be substituted for street cars in order "to relieve congestion." The basis for such suggestions appears to be the idea that the bus is more flexible in operation than the street car. While this may be true in theory, the extent of its realization in actual practice is somewhat problematical. Moreover, flexibility itself really is of small value as a means of reducing congestion.

In theory it is possible for the bus to alter its course to pass around temporary obstructions, something which the street car cannot do, but it usually happens where traffic is dense that the bus is so closely wedged in among other vehicles that its freedom of motion is largely lost. Consequently it is subject to just about

the same minor delays as the street car. Cross traffic at intersections has the same detrimental effect on its operation as on car operation.

Nor is there much to choose between a bus and a street car so far as the influence on the movement of other vehicles is concerned. The car stops on its tracks halting other vehicles behind it and immediately alongside it. The bus weaves in and out of the traffic to reach the curb to pick up and discharge its passengers, thereby interfering seriously with other vehicular movements. Careful study of traffic has shown conclusively that weaving in and out tends to produce congestion. Without some definite advantage one way or the other comparison of carrying capacity or effect on congestion of bus and car in the same character of service get nowhere.

The layman is prone to expect the bus to be successful in replacing the street car everywhere because in the past it has been successful in doing it on certain routes. Then, too, the thing which we lack always looks more attractive than the thing which we have. The interference to other traffic caused by street cars is a known quantity—that which would be caused by buses is only a vague possibility until the change is made. A change such as this should be made only after due investigation and deliberation, therefore, lest the last state of congestion be worse than the first.

The Railway Now Dons the Rôle of the Good Samaritan

IT IS indeed a dull week when the citizens of Philadelphia are not greeted with some service innovation on the part of the Philadelphia Rapid Transit Company. The most recent of these deals with the manner in which the company has undertaken to succor the hereditary foe of public transportation, the private automobile. Having taken over the local Yellow Cab Company some weeks ago the problem of caring for disabled taxis sprang into being. Realizing that it would be necessary to keep towing facilities on hand for this purpose it occurred to company officials that the towing trucks might well be made available for public use, thus providing an added duty for this equipment tending to greater economy. The manner in which a number of old cabs were remodeled for this service was recounted in the issue of ELECTRIC RAILWAY JOURNAL for June 12.

To adopt an attitude of studied indifference toward a source of profitable revenue such as this simply because it may prove to be a boon to the automobile owner ill befits the railway executive today. For this the railway has been able to reduce overhead in this particular department and has made a definite bid for improved good will by showing itself ready to cooperate with the public in every form of transportation, even though of a competitive nature. Towing service with fixed meter charges will quickly drive the pirate off the streets. At the same time no vast bulk of present car riders will desert the public transportation facilities for private automobiles simply on the strength of this new service.

The present towing service makes no bid for patronage from truck or bus, due to the excessive weight of the latter. But it would seem that the same plan might be expanded by railways operating large bus fleets, to embrace the heavier vehicles which have failed at the roadside. Even the best of buses break down now and then. Emergency equipment must be kept on hand for these exigencies that in many cases might be profitably placed at the call of the truck operator who is operating far from his own base and is without emergency equipment. For the automobile owner, at least, the idea of a standardized towing charge has much to commend it and it is safe to predict that the Philadelphia company will soon be faced with the necessity of providing enough supplementary equipment to cope with the growing demand.

As Others See Us

MOST electric railway men are agreed that the automobile has introduced new conditions in the transportation market which have completely upset old standards and old methods. As the result of the widespread use of private vehicles, common carrier transportation found itself faced with serious competition. The need for merchandising effort soon became obvious, and the subject of attracting riders to street cars has occupied a large part of the industry's attention.

The automobile manufacturers have more than demonstrated their genius both as engineers and salesmen. They have literally put America on wheels. Although street car riding has suffered, their efforts have resulted in building up an enormous increase in the total riding habit.

Viewing this situation in a broad way, some transportation men have seen new opportunities for increasing common carrier business. There is a growing conviction that this can be accomplished by making street car riding more attractive. The automotive reaction to present railway activity is reflected in a recent editorial in *Automotive Industries* under the heading "Selling the Street Car."

> With the constantly increasing popularity of the automobile and the motor bus making them more worried every year about future business, the electric railways in many cities are conducting active campaigns to sell the public on street car transportation.
>
> Positive, constructive sales effort on the part of the electric lines is not only natural, but entirely warranted under the circumstances. But when these efforts are tied up with an attempt to decrease the sale of automobiles they may fairly be criticised.
>
> Indianapolis street cars, for example, are carrying a sign, prominently displayed, which reads: "Why buy the car when you can buy a ride at a time on the street car?" The automotive industry has never gone out to suggest that people stop riding street cars, however strongly it has merchandised the desirability of its own products. Positive selling almost always turns out to be more profitable than negative selling.
>
> A good example of the positive brand of selling as applied to street railway transportation is to be found in Grand Rapids, where the railways are now attempting to get what they consider to be their just share of the business by placing at the disposal of the public a new type of street car which is designed as far as possible along automotive lines. The cars are advertised as "electric railway coaches," are finished in striking colors, have a skirt around the bottom to give a low-hung appearance, are fitted with vibration-damped trucks and wheels and silent gears to reduce noise, and the seats are of the individual chair type, arranged in pairs, to further increase the comfort of the passengers.
>
> This is constructive merchandising. If the street railways expect to maintain their place in the transportation picture they must proceed along the line of improving the general character of their equipment.

New Light-Weight Equipment Pays

Lower Car Prices Are Possible

A.E.R.A. Committee on Essential Features of Modern Cars Submits Designs for City and Interurban Service—Elimination of Needless Variations in Dimensions Urged—Results with New Cars on a Number of Properties Show Big Return on the Investment

MANUFACTURING economies in the production of electric railway cars, with reflection in lower prices and reduced maintenance cost, are possible with reasonable unification of design. The great variety of designs in the past has prevented savings and any approach to quantity production. It is possible to eliminate the needless variations in dimensions, weight, and general arrangement of cars. Modern cars have been found to attract greater patronage and earn more revenue than those of obsolete design. These are the principal findings of the committee on essential features of modern cars of the American Electric Railway Association, which has been formed during the past year through the co-operation of the association and its manufacturer and operating members.

Following its studies, the committee submitted plans of a city car and an interurban car, showing how they may be adapted to meet conditions on practically any property without affecting the basic principles of the unification plan. Either car is planned so that it may be arranged for one-man, two-man, or one-man-two-man operation. Single-end or double-end operation is possible and the seating capacity may be adjusted to meet local conditions by designing the body with ten, eleven or twelve windows. Electric motors are standardized in three sizes, 25, 35 and 40 hp. The wheels recommended are of 26-in. diameter.

The drawings published herewith indicate that the dimensions included are general ones only. The proposed standardization will in no way limit manufacturers in developing a distinctive product. The cars may be equipped with any known specialties or safety devices. Ingenuity may be fully exercised in the design of structural details to reduce weight. Features which are intended to make the cars more attractive and add to the comfort and convenience of passengers are optional.

The second section of the report contains experience data on eight properties where modern light-weight cars have been installed. Operating and financial

Formation and Aims of the Committee on Essential Features of Modern Cars

DURING the annual convention of the American Electric Railway Association at Atlantic City last October a meeting of electric railway officials and manufacturers was held at the invitation of James H. McGraw to discuss the problem of replacing with modern equipment those cars which were built prior to developments in design tending toward attractiveness, comfort and light weight, as well as the inclusion of safety features. At this meeting it was decided to form a committee for the purpose of considering and reporting on ways and means of assisting electric railways in a general car replacement program. This committee worked out a plan which was approved by the executive committee of the American Electric Railway Association, and which was later presented to and approved at a meeting of manufacturers.

The principal features of the plan were: (1) Organization of an engineering committee representing car builders and equipment manufacturers, with the association's special engineer as chairman, to develop suitable car designs and to coordinate the efforts of the manufacturers in introducing uniformity in fundamental features. (2) Inauguration of a co-ordinated publicity and advertising effort on the part of the manufacturers to stimulate interest in the purchase of new cars. (3) Development of suitable arrangements for financing the purchase of cars through car trust certificates on terms which would make it possible to go forward with a general car replacement program. (4) Organization of an executive committee of manufacturers with Managing Director Lucius S. Storrs as director to supervise the activities of the engineering committee, and to carry out the other phases of the program.

The committee on essential features of modern cars was organized late in 1925 with the following membership: J. A. Brooks, chief engineer of the J. G. Brill Company, representing the car builders; C. A. Burleson, railway engineering department General Electric Company, representing electrical manufacturers; W. J. Clardy, engineering department Westinghouse Electric & Manufacturing Company, representing electrical manufacturers, and G. C. Hecker, special engineer American Electric Railway Association, chairman. This committee came to the conclusion that for the present, at least, its efforts should be directed toward the following important studies: (1) Selection of a series of modern cars, as few in number as possible considering the range of operating conditions to be encountered in both city and interurban service. (2) Presentation of data and information showing benefits derived on a number of properties as a result of introduction of modern rolling stock and modern methods of operation. (3) Analysis of the age of cars now in service.

The present report digested in this article consists of three parts, covering the topics outlined above.

statistics show the savings that have been effected and the return on the investment from the purchase of new equipment. The gross return ranges from 13 to 65 per cent on the cost of the new equipment that has been installed. Some of the properties also show a gratifying gain in gross revenue, indicating that attractive new cars are an important factor in stimulating traffic.

A feature of this section of the report is a bibliography of articles on the advantages of new cars which have appeared in ELECTRIC RAILWAY JOURNAL and other industry publications during the past two years.

In the third section of the report is a wealth of data concerning the purchase of cars since 1907, including a summarized statement, based on returns from 66 per cent of the industry, and the age of equipment in service by five-year periods.

CAUSES OF HIGH COST OF CARS

Modernization of electric railway equipment has been prevented due to the high cost of new cars, uncertainty as to the ultimate effect of motor vehicle competition, financial difficulties, and many other causes. Developments of the past few years have proved conclusively the essentiality and permanence of electric railway transportation. The industry is recovering slowly but surely.

In the opinion of the committee, "perhaps more progress would have been made in modernizing equipment had the manufacturers adopted a more aggressive policy in developing, manufacturing and selling a complete product." The car builders have "waited until the railway companies were in the market for new equipment, and then they called to submit their bids on the specifications and plans submitted by the operating companies. None of the intensive sales methods so prevalent in other lines of business was in evidence in the car-building industry. Today, however, a change is taking place. A more progressive spirit is abroad among the manufacturers. New types of cars are being developed; new ideas advanced, and more aggressive sales methods initiated, all of which should materially hasten the modernization program of the electric railways."

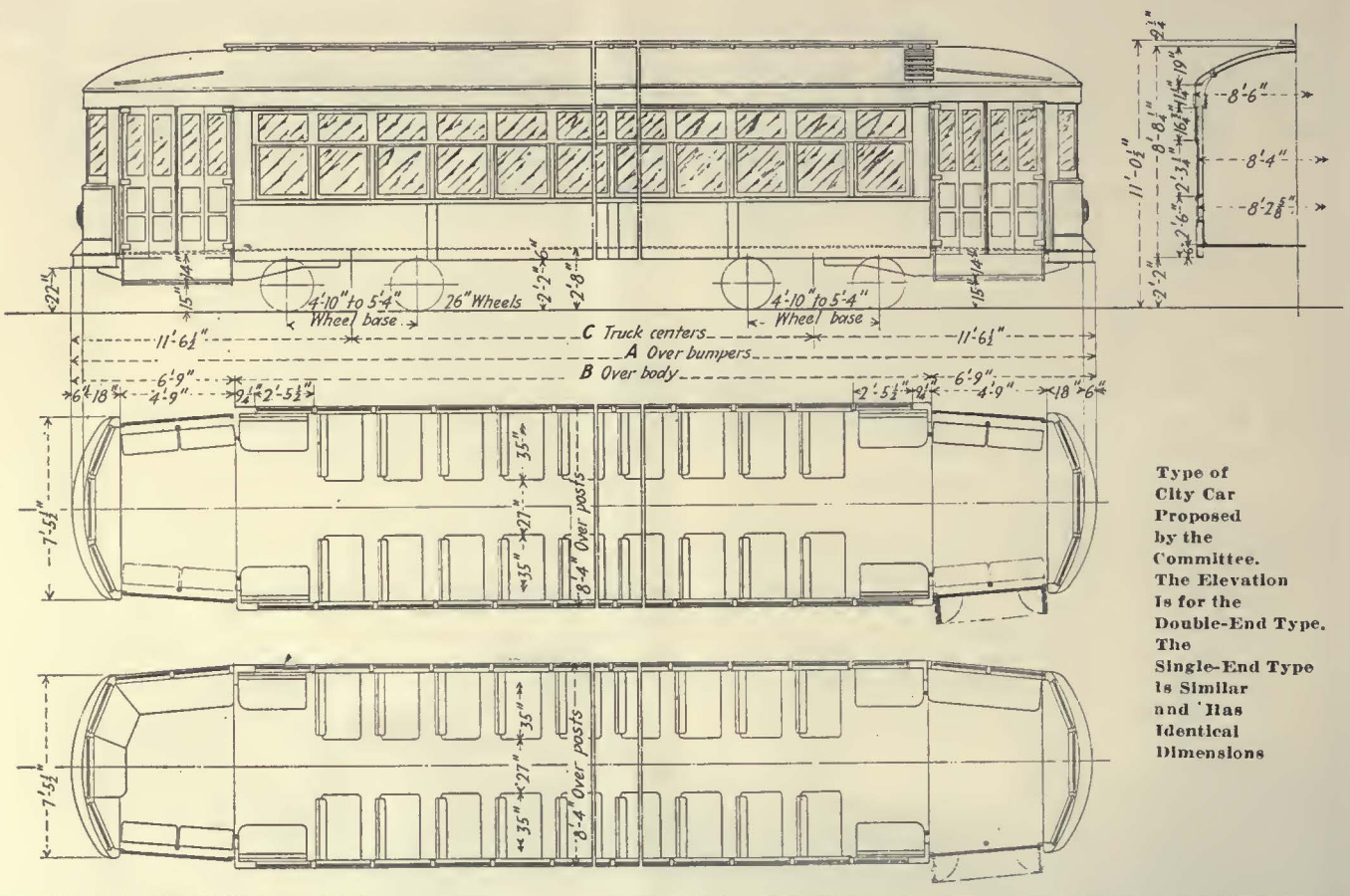
Despite all the drawbacks, developments in car design and in car equipment tending toward lighter weight, greater efficiency, attractiveness and comfort have been marked during the past five years. Railways that have been able to take advantage of these developments have benefited greatly through operating economies and through increased traffic. High cost of new equipment, however, has prevented many companies from keeping pace with these developments. For this reason the committee had in mind in the selection of typical cars the importance of reducing the cost to the railway.

There is little possibility of reduction in material and labor costs. On the other hand, cars have been built in accordance with plans and specifications produced largely by the individual electric railway companies, with the result that scarcely any two lots of cars, even on the same property, are alike. Consequently, it has not been possible to take advantage of manufacturing economies incident to quantity production. The committee "is firmly convinced that substantial savings can be realized through general agreement on certain basic features of car design that will permit an approach to quantity production and the elimination of useless waste in the car-building industry. The possibility of effecting such savings lies entirely in voluntary co-operation on the part of both the electric railway companies and the manufacturers." The committee states that if its recommendations are to bear fruit, a co-operative movement must be organized for bringing about general agreement on, and adoption of, certain fundamental features of design. It is purely a problem in economics.

Modern Two-Car Multiple-Unit Train of the Pittsburgh Railways. This Is Typical of the Equipment Both for City and Interurban Service

At the outset, the committee was able to utilize the information gathered by the committee on unification of car design appointed by the American Electric Railway Engineering Association in 1921. In the five years that committee has been functioning it has collected and analyzed a vast amount of data on car design.

To develop further information on which to base fundamental dimensions, weight, and arrangement of a typical series of cars to meet average operating conditions for city and for interurban service, the new committee requested each car manufacturer to submit drawings and weights of light-weight, low-floor cars built in recent years. As a result of this request, data were received from nearly all the leading car builders. This information was studied by the committee.



Type of City Car Proposed by the Committee. The Elevation Is for the Double-End Type. The Single-End Type Is Similar and Has Identical Dimensions

PROPOSED CITY CAR—LENGTHS, SEATING CAPACITIES AND WEIGHTS

Double-End Cars

Number of Windows in Body	Length: Over Bumpers "A" Ft. In.	Length: Over Body "B" Ft. In.	Truck Centers "C" Ft. In.	Seating Capacity	Maximum Weight: Four 25-Hp. Motors	Maximum Weight: Four 35-Hp. Motors
12	44 6½	31 0½	21 5½	48–56	32,000	37,000
11	42 1	28 7	19 0	44–52	31,200	36,200
10	39 7½	26 1½	16 6½	40–48	30,400	35,400

Single-End Cars

Number of Windows in Body	Length: Over Bumpers "A" Ft. In.	Length: Over Body "B" Ft. In.	Truck Centers "C" Ft. In.	Seating Capacity	Maximum Weight: Four 25-Hp. Motors	Maximum Weight: Four 35-Hp. Motors
12	44 6½	31 0½	21 5½	48–62	31,000	36,000
11	42 1	28 7	19 0	44–58	30,200	35,200
10	39 7½	26 1½	16 6½	40–54	29,400	34,400

It was developed that certain dimensions, weights and other features of cars built by various manufacturers were in close agreement. Comparison of such dimensions with those recommended by the committee on unification of car design in 1922 for city cars showed little variation. The data submitted by the manufacturers showed that a large majority of the cars recently built have been of the end-entrance and exit type. A few designs of end-entrance and center-exit cars submitted were individual in design and applied to special operating conditions. A few designs of single-truck cars were also submitted by the manufacturers. A study of the trend of car purchases during the past ten years indicated clearly that the trend of purchase has generally been toward the double-truck type of car. The single-truck Birney car or modifications thereof is fairly well standardized and all the manufacturers are prepared to build it should it be desired.

Principal Features Considered in Typical Cars

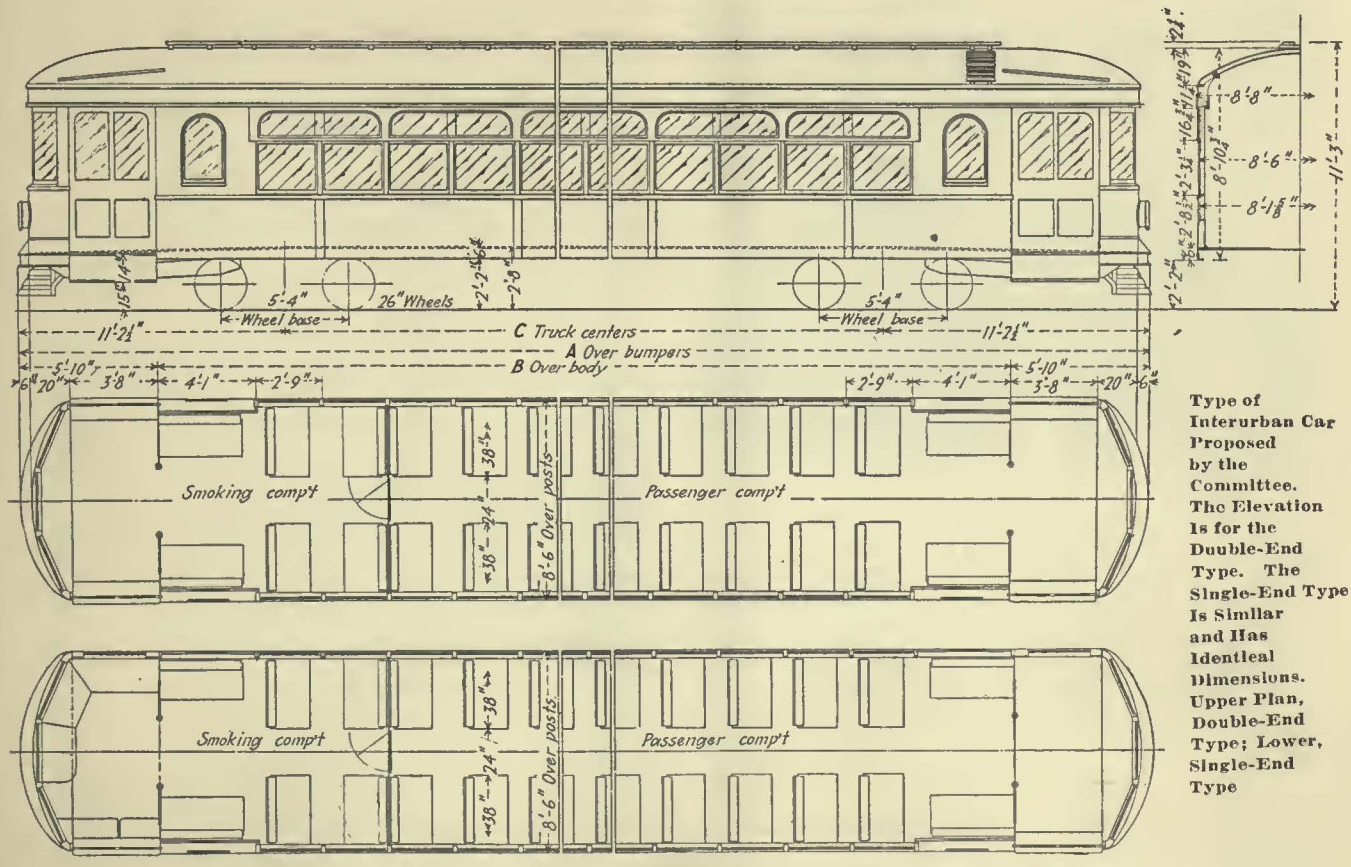
In the selection of the series of typical cars submitted by the committee, some of the important features kept in mind are as follows:

1. Light-weight, low-floor type.
2. Operation by either one man or two men.
3. Single or double-end operation.
4. Average city clearance conditions.
5. Quadruple equipment of motors, ranging 25 to 40 hp. for either single car or train operation.
6. End entrance and exit to permit circulating passenger movement.

With these basic ideas in mind, the three primary elements considered by the committee were size, weight and arrangement. Details of trim and specialties are left entirely to the option of the purchaser and the car builder. This permits individuality, and the designs selected allow the use of all known specialties. The committee believes that the cars selected afford a basis for general agreement except on certain interurban properties where heavy equipment with free running speeds of 60 m.p.h. or higher is considered essential. The designs selected by the committee are not applicable to rapid transit, subway and elevated service, nor has it considered articulated cars.

It is believed that the design should stimulate car manufacturers to develop cars embodying basic dimensions and other features recommended by the committee. The manufacturer, however, is not limited in developing attractive features intended to stimulate traffic.

The committee points out a number of distinct advantages to the industry from the adoption of its recommendations, which, however, cannot be realized to any great extent without the whole-hearted co-operation of



Type of Interurban Car Proposed by the Committee. The Elevation Is for the Double-End Type. The Single-End Type Is Similar and Has Identical Dimensions. Upper Plan, Double-End Type; Lower, Single-End Type

PROPOSED INTERURBAN CAR — LENGTHS, SEATING CAPACITIES AND WEIGHTS

Double-End Cars

Number of Windows in Body	Length Over Bumpers "A" Ft.	In.	Length Over Body "B" Ft.	In.	Truck Centers "C" Ft.	In.	Seating Capacity	Maximum Weight Four 25-Hp. Motors	Four 35-Hp. Motors	Four 40-Hp. Motors
12	47	4	35	8	24	11	48	.....	37,000	40,000
11	44	7	32	11	22	2	44	.....	36,100	39,100
10	41	10	30	2	19	5	40	28,200	35,200	38,200

Single-End Cars

Number of Windows in Body	Length Over Bumpers "A" Ft.	In.	Length Over Body "B" Ft.	In.	Truck Centers "C" Ft.	In.	Seating Capacity	Maximum Weight Four 25-Hp. Motors	Four 35-Hp. Motors	Four 40-Hp. Motors
12	47	4	35	8	24	11	57	.....	36,000	39,000
11	44	7	32	11	22	2	53	.....	35,100	38,100
10	41	10	30	2	19	5	49	27,200	34,200	37,200

both manufacturers and operators. Where the manufacturer adheres to the uniform designs, such as those recommended, it will result in:

1. Uniformity in dimensions which will permit the purchase of raw material in larger quantities.
2. Reduction in engineering expense.
3. Fabrication of parts on a quantity basis.
4. Simplification of the manufacturing process through the elimination of the endless variety of jigs, fixtures and dies.

The advantages to the electric railways that will result from widespread adoption of the committee's recommendations are:

1. Lower cost of cars.
2. Lower maintenance cost resulting from simplification of purchases and storing of parts.
3. Quicker deliveries of cars and renewal parts.
4. Interchangeability of cars among various properties, particularly those operated by the same management.

Basic Features of Design

If the advantages enumerated above are to be obtained, those features of design upon which general agreement is necessary are:

1. Width over posts.
2. Post spacing.
3. Height from bottom of sill to top of roof.
4. Diameter of wheels.
5. Wheelbase.
6. Step heights.
7. Type of roof.
8. Floor height.
9. Flush floor with ramped platform floor.
10. Stationary top window sash. Lower sash to raise behind top sash and letterboard so as to give a clear vision opening.
11. Standard glass sizes.

On these points, the committee states:

"With general agreement on those details, it should be possible for each car builder to proceed to design his own distinctive product and arrange to build such cars on a quantity basis. But if a sufficient part of the electric railway industry will not get behind such a unification scheme, giving up some of the ideas which have been responsible for the almost endless variety of cars, no benefit will result. For that reason, your committee earnestly recommends that the association take a poll of the industry to see how many companies will agree to purchase cars in which the fundamental features, incorporated in the cars recommended herein, are adhered to."

Drawings prepared by the committee were submitted to the committee on unification of car design, which approved the drawings of a series of typical cars and stated that there should be included a statement pointing out the practical stress limitations at certain critical

Table I—Comparison of Old and New Equipments on Roads Considered in Report

Company	Year	Miles		Class of Service	No. of Passenger Cars		Weight Complete, Lb.	Seats	Wheel Diam., In.	One or Two-Man	Motors		Control	Car Speed at 600 Volts, M.p.H.	Grade
		Route	Track		Total Active	New					No.	Hp. Each			
Interstate St. Ry.	1925	24	...	City	11	8	31,000[1]	44	26	1–2	4	25	K 35	..	Level
Penna.-Ohio Electric Co.	1925	19.4	...	Interurban	5	5	37,000	48	26	1	4	35	K 35	40	Level
Beaver Valley Traction Co.	1920	...	...	City and Suburban	..	..	36,000	38	33	2	4	25	K	..	Heavy
	1925	...	36			20[2]	16,500	32	26	..	2	25	..		
					34	6[1]	32,000	40	28	1	4	35	K	37	
Ohio Valley Electric Ry.	1923	...	...	City and Suburban	51	..	26,000 to 58,000	56[3]	33	2	..	..	K, M	..	Light
	1925	...	46		46	40	37,800	48	26	1–2	4	35	K	35	
Illinois Traction System	1925	101	...	Interurban	17	17	37,000	54	26	1	4	35	K 35	40	Rolling
United Electric Railways	1925	239	...	City	515	175	30,000	38	26	1–2	4	35	K 35	..	Rolling
Warren & Jamestown Street Ry.	1920	...	...	Interurban	5	..	60,000	46	33	2	4	60	K	..	Average
	1925	22	...	Interurban	5	3	36,000	50	26	2	4	40	K	40	
Pittsburgh Railways	1920	...	...	City	1,339	327	24,000 to 48,000	28 42	33	2	2 4	55 60	K	..	Heavy
	1925	...	599	City	1,502	795	38,000	56	26	1–2	4	40	K, Mu	35	
Lewistown & Reedsville Electric Ry.	1923	...	...	Interurban	22	..	58,000[3]	50	33	2	4	50	K	36	Moderate
	1925	9	...	Interurban	22[4]	4	36,000	48	28	1–2	4	35	Mu	40	
Milford & Uxbridge Street Ry.	1923	...	...	City and Suburban	42	..	42,800	44	34	2	4	40	K	..	Light
	1925	...	36		42	6	32,000	44	28	1	4	25	K	34	
Cumberland Traction Co.	1921	...	...	City and Interurban	..	..									None
	1925	...	15		9	4[2]	16,500	32	26	1	2	25	K	..	
						3[1]	32,000	48	26	1	4	25	K	35	

[1] Double truck. [2] Single truck. [3] Maximum. [4] Only five regular cars required, new cars do substantial part of total mileage.

points in the car structure. The statement submitted by the committee on unification of car design follows:

1. Car body should be designed to carry under service conditions the maximum live load for which it is designed in addition to its own dead weight.

2. The direct stress in the body bolsters, platform arms, and side frame girder, due to maximum static load, must not exceed 12,000 lb. per square inch of either tension or compression.

3. The combined stress in the body bolster, due to carried load, plus the stress due to the tractive pull of the truck and application of the brakes must not exceed 16,000 lb.

4. All connections should be designed for the maximum load to which the member connected may be subject. The secondary stresses in any member caused by eccentric loads should be combined with the direct stresses in such members. The fiber stresses (except in body bolster, referred to in paragraph 3) may be taken at 20 per cent greater than those given in paragraph 2, but the direct stresses considered alone must not exceed the 12,000 lb. above stated.

5. The report of the committee on unification of car design of 1922, Fig. 2, gives the typical stress analysis of a car body. Proper provision must be made in the side girder to prevent buckling over the bolster.

6. The permissible stresses above given are predicated on steel having the characteristics called for in A.S.T.M. specification No. A-11-24. Structural steel for cars. Where other materials are used, they should bear the same proportion to ultimate strength of material used.

The City Car Recommended

The type of city car selected for city service is shown in the drawing on page 1088. Both single-end and double-end designs are shown. These may be built in three sizes, with ten, eleven, or twelve side windows, giving seating capacities of 40, 44 and 48, and a maximum available seating capacity of eight more in each case if folding seats are used. The single-end car is similar, having seating capacity of 40, 44 and 48 inside the body, the maximum available seating capacity in each case being increased by fourteen more on the platform.

The design is such that when the car is equipped with four 25-hp. motors, double-end single-car control and all safety features, the maximum weight will not exceed 32,000 lb.; when equipped with 35-hp. motors, double-end train control and safety features generally in use, the maximum weight will not exceed 37,000 lb. Weights of the single-end cars will be approximately 1,000 lb. less than those given.

The use of 40-hp. instead of 35-hp. motors will increase the weight approximately 1,000 lb. These are extreme weights. The complete weights specified are primarily limits for the car construction and not for motor selection. Service conditions may require the use of 35-hp. motors on 32,000-lb. cars and in some cases 35-hp. motors may be used on cars weighing more than 37,000 lb. In general, the 35-hp. motor is considered satisfactory for the 37,000-lb. cars.

With regard to weights, the committee states:

"It is greatly in the interest of the operating company to keep the car weights as much lower than the maximum figures given as may be consistent with good practice to suit the various operating conditions. It is

the feeling of the committee that substantial weight reductions can be made in many instances. The way is left open for the exercise of ingenuity by car builders in the design of body structures and in the selection of materials to give minimum weight consistent with adequate strength."

Features of Interurban Cars

Drawings of the cars selected for interurban service are shown on page 1089. The use of different numbers of windows proposed is similar to that for the city car, and the seating capacities vary accordingly. The plan submitted shows a smoking compartment, the seating of which can be varied by moving the partition. This compartment may be located at either end of the car as desired. A toilet of one or two window lengths may be installed by removal of one or two seats.

The design of the car is such that when equipped with four 35-hp. motors, double-end single-car control and safety features generally in use, the maximum weight will not exceed 37,000 lb. If 40-hp. motors are substituted, the weight should not exceed 40,000 lb. In some cases, the ten-window car may be equipped with four 25-hp. motors with double-end single-car control and safety features without exceeding 28,200 lb. In each case the single-end car will weigh about 1,000 lb. less. On level tangent track and with approximately 600 volts on the trolley, these cars are capable of free running speeds of 45 to 50 m.p.h.

For both the city and interurban cars, the tables given under the drawings indicate the ruling dimensions and weights for the various lengths and seating capacities.

The committee was impressed by the trend during the past four or five years toward a type of car suitable for operation by either one man or two men. This has been the means of effecting substantial operating economies. All of the cars recommended by the committee may be arranged for one-man operation, one-man, two-man operation or straight two-man operation.

Seats in the New Double-Track Cars of the Interstate Street Railway Are Upholstered in Gray Plush

Certain modifications in the designs submitted may be made without destroying the essential features of standardization. For instance, maximum traction trucks may be used on the city car with 28-in. driving wheels and two 60-hp. motors by using drop platforms. The car body from corner post to corner post may be built exactly like those shown in the drawings, thus preserving to a large extent the economies and advantages claimed by the committee for the general plan of unification. On the interurban car sliding doors have been shown because the committee believes that this type of door is best suited for the class of service. Fold-

One of Eight New Cars for the Interstate Street Railway, Attleboro, Mass. These Have Shown a Saving at the Rate of 65 per Cent on Their Cost

Table II—Comparison of Operating Expenses Showing Reduction in

	Interstate Street Railway		Pennsylvania-Ohio Electric Co.		Beaver Valley Traction Co.		Ohio Valley Elec. Railway		Illinois Traction System [4]		United Electric Railways Providen	
	1925[2]	1925[3]	1922	1925	1920	1925	1923	1925	1923	1925	1921	1
Way and structures	4.10	2.38	7.07	7.43	5.28	3.93	4.67	4.59	8.54	5.59	9.22	8
Equipment	8.11	3.14	6.19	2.66	5.62	3.77	2.88	2.55	5.24	3.11	5.99	6
Power	8.80	5.43	8.52	5.46	5.43	4.56	4.00	3.44	10.24	5.27	6.07	5
Conducting transportation	13.06	9.02	13.94	12.67	14.63	10.17	11.69	9.47	13.68	8.83	19.45	16
General and miscellaneous[1]	3.52	5.93	11.68	11.30	6.99	8.67	8.09	7.55	7.54	4.80	4.15	4
Total	37.59	25.90	47.40	39.52	37.95	31.10	31.33	27.60	45.24	27.60	44.88	41

[1] Includes traffic. [2] January, February, March. [3] September, October, November. [4] Illinois Valley Division

ing doors could be substituted without any serious modification in the design. In order that other details of style may be varied without affecting the essentials of design, many detailed dimensions are not given on the drawings.

The committee points out that the advantages which will result from the use of a uniform car will be increased if standard equipment parts are used throughout, such as the association's standard axles, wheels, brakeshoes, etc. As an example, the motor manufacturers carry in stock motors suitable for standard A.E.R.E.A. axles. If for a given maximum weight a larger axle is used, a special form of motor must be supplied to accommodate this increased diameter, which will mean a serious delay in shipment and a consequent increase in price.

Further Research and Experiment Urged

The tendency during the past ten years toward low-floor, light-weight cars is noted by the committee, as well as the more recent distinct trend toward a more attractive appearance, together with more comfortable seats, improved lighting systems, and more up-to-date interior equipment. Another feature discussed is that of noise reduction. Roller bearings, automotive type brakes and other innovations have been tried out in Grand Rapids and elsewhere for the purpose of reducing noise. The committee also points out that improvements along these lines can be made without in any way departing from the basic features of design recommended.

Economies Produced by Recent Cars

In order to emphasize the soundness of its position in recommending new and improved cars for electric railway service, the committee gives a series of accounts showing actual economies resulting from the substitution of modern light-weight cars for old heavy-type cars on eight properties. In addition, a table is included showing in greater detail the results of operations of the new cars on these and other properties.

On many other roads it was found that both new and old equipments are being operated, but without any segregation of operating expenses between old and new vehicles. This made it impossible for the managements to ascertain what actual savings had resulted from operation of the new cars. In consequence the committee strongly recommends that operating companies segregate these accounts so that actual economies in operation and maintenance, as well as the revenue-producing possibilities with new equipment, can be ascertained. This matter of segregation of accounts is considered important also in determining the point at which it becomes more profitable to scrap the old equipment and purchase new.

Experience of Interstate Line Impressive

On the Interstate Street Railway, Attleboro, Mass., five 31,000-lb., 44-passenger, double-truck, and three 16,000-lb., single-truck, one-man cars were purchased to replace the 45,000-lb. type then in use. The double-truck cars were equipped with four 25-hp. motors, and the single trucks with two 25-hp. motors, with type K control. The seats are covered with plush and are comfortable, while the exterior painting, in a combination of red and cream, makes the cars very attractive. These cars were put in service in July, 1925.

The road operates between Plainville, North Attleboro, Attleboro, South Attleboro, in Massachusetts, and Pawtucket, R. I., about 24 route-miles. The service calls for five ten-second stops per mile. The cars make about 11.3 m.p.h. Schedule speeds have been increased so that one car has been eliminated. This has been due primarily to better line voltage and faster passenger interchange, due to the lighter low-wheel cars. One-man operation is now in effect on all lines, excepting on that portion known as the Attleboro Branch Railroad, where heavier riding requires two men.

It has been found possible to use a semi-automatic substation, which is adjacent to the carhouse, so that a shop man looks after it, releasing three men. On account of the lessened repair work with the new cars, there has been a further reduction in the shop force.

The cars have been in use for such a short time that operating figures for a full twelvemonth period are not available. In Tables II and III are, therefore, comparisons of January, February and March with September, October and November, both in the year 1925. Weather and traffic conditions were quite similar for these periods. Reductions in operating costs per car-mile in the account affected by the new cars are: Equipment, 61 per cent; power, 38 per cent; conducting transportation, 31 per cent, or a total of 33 per cent. The management has been able to reduce other costs also, so that the total expense per car-mile has gone down from 37.59 cents to 25.9 cents. If the savings attributable to the new cars continue, they will be at an annual rate equivalent to 65 per cent on the $84,000 investment in the new cars.

One of the outstanding results which have been obtained is the co-operation of the public. During the receivership the situation was so bad that the Attleboro

h Modern Cars

arren & mestown Street ailway		Pittsburgh Railways		Lewistown & Reedsville Elec. Ry.		Milford & Uxbridge Street Ry.		Cumberland Traction Co.	
20	1925	1920	1925	1923	1925	1923	1925	1921	1925
87	2.85	9.81	6.28	4.71	3.27	5.07	3.61	4.84	2.70
35	1.55	6.91	5.63	1.86	1.72	3.09	3.25[5]	6.52	3.20
25	7.75	6.30	5.05	12.63	7.11	8.15	6.72	6.36	4.60
18	9.18	19.22	18.31	16.00	13.83	14.92	10.40	8.75	7.00
54	4.67	4.96	7.18	2.70	2.67	2.97	2.57	3.40	3.51
19	26.00	47.20	42.45	37.90	23.60	34.20	26.55	29.82	21.01

rhauling old cars included.

residents had to decide whether they wanted car service continued or replaced with buses. Nearly every one wanted the railway to continue. As a result, the municipal authorities have tried hard to assist its management in every way. School children's fares have been increased, the company has been relieved of the necessity of furnishing liability bonds for its buses and permits have been refused to independent operators who wished to compete with the railway's local buses.

During the latter part of 1925 there was a business recession in the districts served, so that no increase in passenger revenue resulted at that time from the use of the new cars. However, it is significant that in March, 1926, there was an increase in passenger revenue of 17 per cent over the preceding year.

Pennsylvania-Ohio Electric Company Finds New Cars Advantageous

On the 20-mile line of the Pennsylvania-Ohio Electric Company, between Youngstown, Ohio, and New Castle, Pa., half-hour service was formerly operated with four regular cars. In 1922 conditions became so bad that it was deemed impracticable to continue the schedule. The logical thing seemed to be to give half-hour service from Youngstown to Lowellville and one-hour service from Lowellville to New Castle. The change was made when the new one-man cars were put in operation in 1923. The revised schedule reduced the car mileage, but not

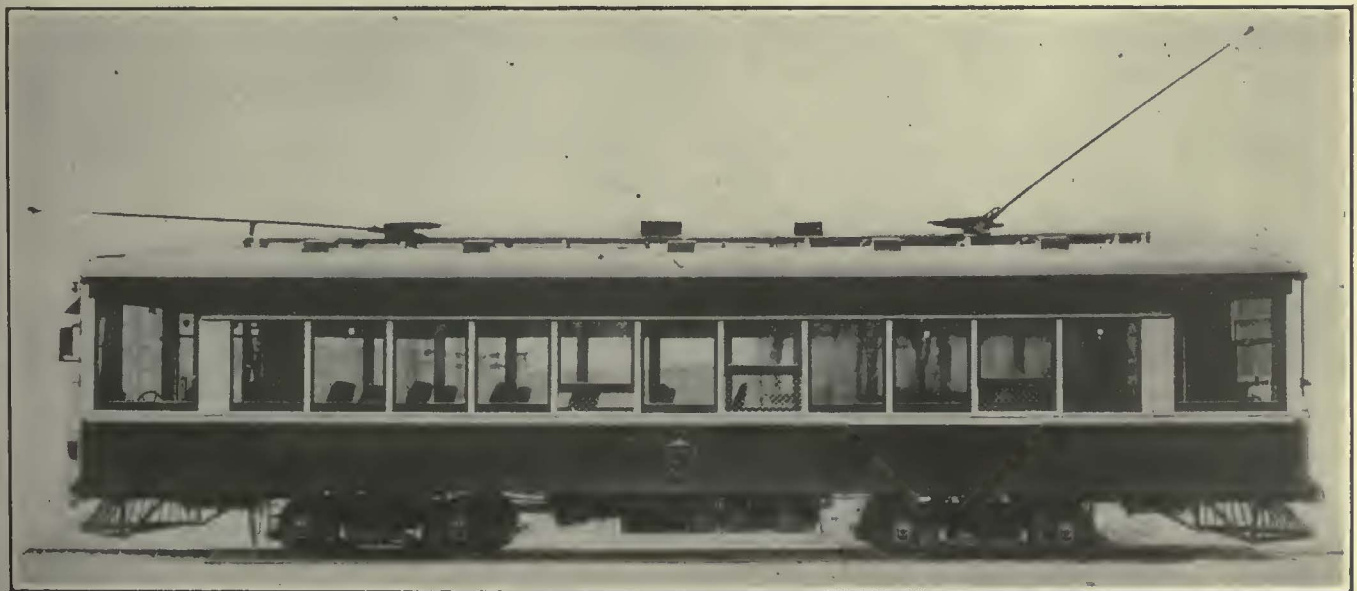
The Interior of the P-O Car Is Attractive and Pleasing to the Passengers

the number of regular cars. It must be remembered that the railway would in any case be operating the present schedule regardless of whether or not new cars were installed.

The new cars weigh 37,000 lb., compared with 54,000 lb. for the old cars. They have four 35-hp. motors as compared with four 90-hp. motors on the old cars. The new cars are attractive and comfortable. There are no hanging straps to obstruct the passengers' view and no advertising signs. Amply spaced plush seats are used. The new cars are geared for about 40 m.p.h., and make the trip from Youngstown to New Castle in 60 minutes. This schedule is made with about 1.4 stops per mile, of eight seconds each.

One-man operation was a success from the start. There has been a considerable reduction in equipment maintenance, power costs and platform expense. The new cars take about 2.76 kw.-hr. per car-mile, as compared with 3.83 for the old cars, a saving of 28 per cent. Equipment maintenance has been reduced 51 per cent and platform expense 15 per cent, the total being 30 per cent less than the former cost.

In Tables II and III the comparison of operating costs is given, with the 1922 mileage adjusted to com-



One of the Four Pennsylvania-Ohio Cars That Have Been Earning 41 per Cent a Year on the Investment

Table III—Gross Return on Investment in Modern Cars Is from 15 to 65 per Cent

Savings in	Intersrate Street Railway	Pennsylvania-Ohio Electric Co.	Beaver Valley Traction Co.	Ohio Valley Elec. Railway	Illinois Traction System[3]	Warren & Jamestown St. Ry.	Pittsburgh Railways	Lewistown & Reedsville Elec. Ry.	Milford & Uxbridge Street Ry.
Equipment	$4,868[1]	$12,270	$32,450	$12,900	$29,592	$4,230	$818,000	.....	.....
Power	4,320[1]	10,720	7,150	12,240	15,477	750	.....	.....	.....
Conducting transportation	4,515[1]	7,075[2]	63,350[2]	51,000[2]	292[2]	.....	206,000	.....	.....
Total	$13,703[1]	$30,065	$102,950	$76,140	$45,361[4]	$4,980	$1,024,000	$8,850	$31,245
Approximate investment in new cars	$84,000	$72,500	$196,000	$500,000	$186,000	$39,000	$7,000,000	$42,000	$77,650
Gross return on investment, per cent	65	41	52.5	15.2	41	12.8	14.6	19.7	.....

[1] Three months, total prorated to twelve months, $54,812. [2] Platform only. [3] Illinois Valley Division
[4] Increased revenue $33,000; total savings and increased revenue, $78,361.

pare with that run in 1925. On this basis there was a saving of $30,000 in the items of equipment, power and platform labor. On an investment for five new cars which approximates $72,500 the gross return figures out 41 per cent.

Beaver Valley Traction Company Modernizes Its Rolling Stock

In the retirement of old cars and making replacements with modern types the Beaver Valley Traction Company has been very active. This company, with a total of 36 track-miles, serves a number of communities in the Beaver Valley having a population in excess of 70,000. The grades and curves are relatively severe, with the result that the demand on equipment is more or less difficult.

The modernization program began in September, 1920. At this time, and in August, 1921, twenty standard safety cars were purchased. In November, 1923, six modern light-weight double-truck cars were added. These latter cars are of the one-man, two-man type, with four 35-hp. motors. They weigh 32,000 lb. and seat 40 passengers. These cars replaced 36,000 lb. double-truck semi-convertible cars equipped with four 25-hp. or four 40-hp. non-interpole motors. It is interesting to note that no extremely heavy cars have been operated and that a large proportion of modern equipment has been in service for a number of years.

The average schedule speed is for all of the lines, including layovers and 10 m.p.h., with six ten-second stops per mile. Seventeen cars are required for the regular schedule and twelve extras are run during rush hours. When new cars have been placed in service headways have been reduced. For this reason not all of the old cars have been retired.

Results have been so good that it is felt by the management that without the use of modern cars and a change to one-man operation it would not have been practicable financially to continue operating the property. As shown in Tables II and III, operating costs have declined and further improvements in this respect are anticipated. The principal savings have been in car maintenance, power and platform labor. The total saving in 1925 as compared with 1920 is $102,950. The approximate investment is $196,000, so that the return on this is approximately 52.5 per cent. It is also interesting to note that during the past four years this railway has financed improvements to the extent of more than $400,000 out of net revenue. The six modern double-truck cars purchased in 1923 were paid for on the basis of 25 per cent cash and the balance in one year, all out of earnings. These cars cost about $11,000 each.

Ohio Valley Electric Railway Has 100 per Cent Modern Equipment

During the latter part of 1923 the Ohio Valley Electric Railway made a complete replacement of all its rolling stock on the lines operated in Huntington, W. Va.; Ashland, Ky., and the suburban route between the two cities. There are four city lines in Huntington and one in Ashland, while the 16-mile connecting line serves a number of intermediate communities. The city lines in Ironton, Ohio, are not included in the equipment replacement. The property comprises 46 track-miles, serving a population in excess of 150,000. As the territory is adjacent to the Ohio River, the grades are comparatively light.

The forty modern light-weight cars which give the entire service weigh 37,700 lb. complete and seat 48 passengers each. They are equipped with four 35-hp. motors. The old rolling stock which they replaced consisted of four single-truck, two-motor cars weighing 26,000 lb. complete, fourteen double-truck, two-motor cars weighing 39,000 to 47,000 lb. and 33 double-truck, four-motor cars weighing 46,000 to 58,000 lb. Twenty-two of the latter had a complete weight of 54,000 lb. or more. The old cars had 33 to 34-in. wheels and all but ten were equipped with various types of obsolete non-interpole motors.

With the installation of new cars a substantial increase was made in the mileage, there being an increase of 12 per cent in 1925 as compared with 1923.

Regarding the operation of the system, the committee says:

"A very interesting fact in connection with the operation of the Huntington-Ashland suburban line is that with modern cars it is possible to maintain the same headway with two less cars. The line originally required twelve cars to provide a fifteen-minute headway, and the same service is now performed with ten cars. The round-trip time, including layover, has been reduced from 180 minutes to 150 minutes, a saving of 16⅔ per cent, and no difficulty is experienced in keeping the modern cars on time. Also, this improvement has been effected without an increase in the free running speed of equipments (except for voltage improvement,

due to the use of lighter cars) as the modern cars are geared for the same car speed as those replaced. High-speed operation is restricted, due to frequent stops, therefore the rapid accelerating and braking rates of the modern cars account, to a considerable extent, for the schedule improvement."

Since some of the modern cars were in service during the last two months of 1923, that year is not entirely representative of old car operation. The reduction in operating costs is, however, quite striking. Actual car maintenance is interesting, as shown by the following costs:

	Cents per Car-Mile		
	1923	1924	1925
Account 30, Passenger and combination cars..	1.00	0.71	0.73
Account 31, Electrical equipment of cars.....	0.51	0.25	0.20

In 1925 there was a reduction of 27 per cent for account 30 and 61 per cent for account 33 from the figures of 1923. It is also interesting to note that the expenditures for maintaining the old cars was reduced to a minimum during their last year of operation.

The modern cars cost approximately $12,500 each, representing a total investment of $500,000. They were purchased on the car trust plan. The total saving of $76,140 in operating expenses shows a return on this investment of 15.2 per cent. While operating revenues have decreased, the management feels that the decline would have been much more drastic if modern cars had not been put in service. The economy of the new equipment enabled the company to continue operation at a profit.

One of the New Providence Cars. These Have Reduced Expenses and Have Cut Pull-Ins to Less Than Half What They Were Before

Illinois Traction Adopts Light-Weight Cars

In 1923 the interurban passenger cars of the Illinois Valley Division of the Illinois Traction System weighed 94,000 lb. Each was equipped with four 100-hp. motors and service was given on a two-hour headway. This line consists of 101 miles of road, extending from Joliet 85 miles westerly to Princeton, with a 16-mile branch from Ottawa to Streator. City cars are also operated in the adjoining cities of La Salle and Peru. A freight and express service is conducted over the interurban route.

During 1924 the heavy cars were replaced by seventeen new single-end light-weight one-man interurban cars seating 54 and weighing only 37,000 lb. These cars are equipped with four 35-hp. motors. With the new equipment the headways were decreased to one hour, doubling the service. Passenger comfort was featured in these new cars. They are geared for about 40 m.p.h. and make an average schedule speed of 21.4 m.p.h., with one 35-second stop per mile. Ordinarily passengers enter and leave by the front door. At heavy loading points the rear door may be operated by a valve and fares collected by a street collector.

The interurban operating costs for these accounts were reduced by the use of these cars as follows: Equipment, 73 per cent; power purchased, 42 per cent; platform service, 27 per cent. There has been a reduction of 33 per cent in the shop force, although there are now two more city cars in La Salle and Peru. In 1923, 92 per cent of the 22,239 trains operated were on time. In 1925 this was increased to 97.2 per cent of the 32,858 trains on time. With an increase of 70 per cent in interurban passenger car mileage, operating expenses in 1925 were about $39,000 less than in 1923. Meanwhile, the passenger revenue increased $33,000. The total gain of $72,000 represents a gross return on the investment of about 39 per cent. Detail figures are given in Tables I, II and III.

Providence Makes Large Saving

Prior to the modernization program of the United Electric Railways of Providence, R. I., 41,000-lb. two-man cars were being operated. Early in 1922, 25 Birney cars were placed in service. About the middle of the next year 150 one-man, two-man cars were added. At present 222 cars are required in base service and a total of 1,242 in rush hours. With the advent of the new cars 222 closed and 269 summer cars were taken from service. At the present time 79 per cent of the cars in base service are of the modern, low-wheel type. In addition, 35 double-truck cars were received in June, making the equipment for base service 85 per cent modern and 100 per cent one-man operated.

About the time of the advent of the new cars a number of changes were made in routing, service and fare collection methods. These have been detailed in ELECTRIC RAILWAY JOURNAL. They have resulted in considerable improvement to service.

Average schedule speed is 8.8 m.p.h., with about 8.5 stops per mile. Schedules were slowed down somewhat when the one-man cars were introduced. It is now felt that it may be possible to increase schedule speed, and a study is being made for that purpose.

It is somewhat difficult to give definite figures of savings in equipment, power and platform expense which may be credited to the new cars. There is no question but what these accounts have been materially reduced and better service provided. Expenditures in account 30, passenger and combination cars, and account 33, electrical equipment of cars, have been reduced 10 per cent and 20 per cent respectively for 1925 as compared with 1921, even though a complete overhaul of cars has been under way for the last year and a half. Pull-ins were 0.67 per thousand miles in 1921 as compared with 0.292 for the first eight months of 1925, a reduction of more than 50 per cent.

Showing the trend, energy consumption may be compared in the city of Pawtucket. In that city 25 new double-truck cars weighing 30,000 lb. recently replaced 25 older cars weighing about 39,000 lb. This change resulted in a reduction of 54,120 kw.-hr. for April, 1926, as compared with last year, representing an annual saving of about 650,000 kw.-hr. Platform expense has been reduced nearly 20 per cent as compared with 1921, even though operators got nearly 20 per cent higher wages than they did in that year. Tables II and III give details of the savings.

EXPENSES REDUCED ON WARREN & JAMESTOWN

Results with modern cars have been very satisfactory on the Warren & Jamestown Street Railway, both from a financial and an operating standpoint. The property consists of a 22-mile interurban line between the two cities. Grades are heavy, in a number of cases being 8 to 10 per cent.

The former rolling stock on the interurban lines consisted of five double-truck cars weighing 50,000 to 60,000 lb. complete. These cars were eighteen to twenty years old, although the motors had been replaced by those of interpole type. In 1923, three modern light-weight, low-floor cars weighing 36,000 lb. complete were purchased to improve service and reduce operating cost. They seat 50 passengers and have long comfortable cross seats. The electrical equipment consists of four 40-hp. motors. When the new equipment was put in service a reduction in running time of five to ten minutes was made. Otherwise, the schedules remained the same. It is considered possible to reduce the running time sufficiently to take one of the three cars out of service and maintain the schedule with two cars. Originally it was planned to run the new cars with one man, but this has not been done. Such operation offers an excellent possibility of further economy.

As shown in Tables II and III, there has been a reduction in operating expense of 41 per cent. The most striking saving is in maintenance of equipment. Account 30, passenger and combination cars, went down from 1.35 cents per car-mile in 1920 to 0.79 cent in 1925, or 31 per cent; while account 33, electrical equipment of cars, dropped down from 1.05 cent per car-mile in 1920 to 0.28 in 1925, or 73 per cent. The total represents a reduction from 2.4 to 1.07 cents per car-mile. It will be noted that the cost of maintaining the old cars was unusually low.

A new concrete highway has been built paralleling the road the entire distance. This adversely affected earnings so that gross revenue went down from 56.25 cents per car-mile in 1920 to 37 cents per car-mile in 1925. Despite this, the total operating expense was reduced 34.19 cents in 1920 to 26 cents in 1925, so that the net revenue went down only from 12.06 cents to 11 cents per car-mile, which is not materially lower.

With the new cars and operating economies, it has been possible to reduce expenses sufficient to keep the property on a paying basis. Future improvements in service will no doubt result in increased traffic and further reduction in operating expenses. Patrons are well pleased with the improvements that have been made.

PITTSBURGH RAILWAYS A PIONEER

Early in 1914, the Pittsburgh Railways began the operation of modern light-weight, low-floor cars. Addi-

Table IV—Age of Passenger Cars Representing 66 per Cent of the Industry

Based on ELECTRIC RAILWAY JOURNAL Questionnaire (March, 1926)

Geographic Division / Date Built	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	Total Cars
	Number of City Cars									
1921—1925	436	2,012	2,182	560	426	171	359	56	616	6,818
1916—1920	1,592	2,947	1,849	581	490	108	284	22	366	8,239
1911—1915	1,323	1,490	2,572	954	524	244	250	210	865	8,432
1906—1010	343	2,665	3,332	569	567	282	267	233	659	8,917
1901—1905	709	2,995	2,338	1,062	509	358	316	112	378	8,777
Prior to 1900	448	3,639	1,172	404	155	136	134	164	198	6,350
Total	4,851	15,648	13,445	4,130	2,671	1,299	1,610	797	3,082	47,533
	Number of Interurban Cars									
1921—1925	45	61	274	15	11	14	11	18	36	485
1916—1920	92	83	186	20	41	15	28	34	16	515
1911—1915	38	152	160	66	28	5	88	46	28	611
1906—1910	91	257	238	43	30	5	45	8	92	809
1901—1905	276	161	340	50	30	32	26	.....	84	999
Prior to 1900	61	71	96	21	19	.....	.....	6	69	343
Total	603	785	1,294	215	159	71	198	112	325	3,762
Total, city and interurban	5,454	16,433	14,739	4,345	2,830	1,370	1,808	909	3,407	51,295
Cars more than twenty years old	1,494	6,766	3,946	1,557	713	526	476	282	729	16,489
Per cent of total cars over twenty years old	27.4	41.1	26.7	36.1	25.2	38.4	26.3	30.9	21.4	32.1

tional cars have been purchased practically every year subsequent to that date. The present replacement program contemplates the retirement of all old and heavy equipment.

Conditions in Pittsburgh are familiar to readers of this paper. The business district of the city is located adjacent to the Allegheny and Monongahela Rivers and the hills are steep, with maximum grades of 8 to 10 per cent. Narrow streets and sharp curves limit the width of cars that can be used.

At present there are 795 low-floor cars in service, and 50 more on order. The city cars weigh complete from 33,200 lb. to 38,000 lb. There are 35 interurban cars included among the modern type, of which fifteen weigh 47,000 lb. complete, while the remaining twenty are similar to the city cars. All the cars have both end and center doors, and seat from 54 to 56 passengers. The standard equipment is four 40-hp. motors mounted on 26-in. wheels, although some of the earlier cars have 24-in. wheels.

Most of the old cars replaced were double-truck type with 33-in. wheels and weighed 48,000 lb. complete. The motors were obsolete types. A large number of old single-truck cars have also been superseded.

To fill the schedules on the 100 lines operated, 494 cars are required in the base schedule, 1,065 in the morning rush hour and 1,126 in the afternoon rush hour. With the modern cars, service improvements have been introduced. Headways have been cut on many lines, or else two-car train operation has been substituted for single units. Schedule speeds have not changed materially, though traffic congestion has increased to the extent that it is doubtful that they could have been maintained with the old equipment.

The new equipment and improved operating methods have naturally reduced operating costs. The comparison given in the tables between 1920 and 1925 indicates what can be accomplished by retiring old equipment.

Table V—Results with New Cars on Six Routes in Pittsburgh

Route No.	Cars	Daily Averages — Earnings	Daily Averages — Mileage	Increase, per Cent — Earnings	Increase, per Cent — Mileage
1	Old	$200	435	.....	.....
	New	245	434	22.5	0.0
4	Old	532	695	.....	.....
	New	570	895	7.14	28.78
26	Old	433	781	.....	.....
	New	523	912	20.78	16.78
34	Old	303	669	.....	.....
	New	355	832	17.16	24.37
87	Old	917	1,716	.....	.....
	New	1,004	2,047	9.49	19.45
96	Old	372	1,102	.....	.....
	New	451	1,408	21.23	27.76

They show a reduction of 10 per cent in operating costs per car-mile during the past six years.

The reduction in car maintenance expense is even more striking. Account 30, passenger and combination cars, has gone down from 3.06 cents per car-mile in 1920 to 2.20 cents in 1925, and account 33, electrical equipment of cars, from 2.26 cents in 1920 to 1.06 cents in 1925. The total expenditures have been reduced 39 per cent during the six-year period.

The new cars, which cost $15,000 each, have been acquired under the car trust plan, with payments in fifteen equal annual installments. The saving shown in Table III, totaling $1,024,000 on $7,000,000, amounts to 14.6 per cent on the investment.

As an indication of the results, the committee makes the following statement:

"Prior to the time when a general program for the retirement of obsolete equipment was inaugurated (1922), no return was being earned on the investment and it was not possible to pay old debts, paving charges and license fees. At present, the company is paying all

Tale V—Results with New Cars on Six Routes in Pittsburgh

Company Class	Annual Gross Revenue	Number of Passenger Cars — 1907	1912	1917	1922
A	Over $1,000,000	49,004	56,704	62,186	62,484
B	$250,000–$1,000,000	10,675	10,497	10,163	9,051
C	Under $250,000	10,337	8,961	7,565	5,766
Total	.....	70,016	76,162	79,914	77,301

Figures from U. S. Census Bureau reports.

operating expenses, taxes, old debts incurred prior to reorganization in February, 1924, paving and license charges, as well as earning a 6 per cent return on a valuation of $62,500,000. The interest and carrying charges on the investment in new equipment and 6 per cent of $5,000,000 borrowed in 1924 is also being earned. Undoubtedly, the operation of modern cars, with the resulting betterment in the character of the service provided, has contributed largely to the improved financial condition of the property. . . .

"Revenues were well maintained during the past few years, a period which has been very unfavorable for many railway properties.

"Although gross revenues per car-mile for 1925 are slightly lower than for the preceding years, the annual car mileage has been increased, and not only have gross revenues increased but the net income for 1925 was greater than for 1924."

These data on revenue apply to the entire system and do not indicate to what extent modern cars have caused improvement in this respect. Comparative data have been kept on certain lines when new equipment was installed, and the results on six routes are shown in Table IV.

Statistics Show Need for New Cars

Some interesting data were brought out by the committee concerning the present passenger car situation. A study of the United States Census figures shows that the number of passenger cars owned by electric railways with gross revenues of more than $1,000,000 a year increased rapidly from 1907 to 1917, while those of smaller systems have decreased, slowly for the companies between $250,000 gross revenue and $1,000,000 gross revenue, and rapidly for the companies of less than $250,000 a year. The figures are given in Table VI.

Approximately 81 per cent of all passenger cars in 1922 were owned by class "A," the group of large companies. Of the remaining 19 per cent, the middle-sized or class "B" companies owned 12 per cent, and class "C" companies, 7 per cent. It is important to note that despite the enormous increase in motor vehicle registration, which went up from 140,300 in 1907 to 10,864,128 in 1922, the cars owned by the large class "A" companies were still increasing in number.

As to the number of cars the electric railways may be expected to purchase annually in the future, the com-

mittee states: "That is a difficult question to answer, and it has been complicated by the advent of the motor bus. No one can predict the extent to which the motor bus will be utilized by electric railways in giving public transportation."

From 1907 to 1916, the electric railways purchased an average of 3,764 passenger cars per year. From 1917 to 1925, the average annual purchases went down to 2,353, or 62.4 per cent of the volume prior to the war. Assuming that the purchases before the war represented a fair average under normal conditions, there has been a deficit of 1,411 cars purchased per year, or a total of 12,699 cars. The motor buses purchased during the later period offset to some extent the deficiency in cars, although many of them have been placed in service as feeders to rail lines, and represent extensions to service.

Replacing of older cars with new and attractive equipment is an economic problem to be determined on each property. The data included in the report make it obvious that on certain properties modernization of equipment has been an essential in stimulating traffic and in reducing operating and maintenance costs. The committee believes that every railway should properly analyze its own situation to see what can be accomplished along similar lines.

The committee gives several tables showing by states and by geographical division the age of passenger equipment now in service. The figures are based on replies to a questionnaire by this paper, covering 51,295 cars or approximately 66 per cent of the total passenger cars in the industry. Table V gives a summary by geographical divisions of the information. It will be observed that 32.1 of all passenger cars reported were built more than twenty years ago. If that proportion is applied to the total passenger cars in the industry as given by the 1922 census report, there are in round figures 25,000 passenger cars in service today that were built prior to 1905. Commenting on this, the committee states:

"Since those cars were built there have been so many improvements in car design tending toward higher efficiency in operation, lower maintenance costs and greater safety and comfort for passengers that their replacement is a matter of vital importance. Car rides can be sold, but not on cars of the vintage of 1905."

Public Safety Demonstrated in El Paso

UNDER the guidance of Tom Walker, manager El Paso Electric Railway, El Paso, Tex., a program of safety stunts and playlets was staged last month. Besides running the railway and other utilities in El Paso Mr. Walker is chairman of the Forum Public Safety Committee, and it was under the auspices of this committee that the stunts were conducted. Amusement as well as instruction was afforded the audience who attended the two performances, one in the afternoon and the other in the evening.

Captain Stanley Good and his traffic force co-operated in several of the acts. The various features presented were "Tribulations of Traffic Police." "Vacation Hazards" was arranged by the Woman's Club and was directed to the school children of the city. "Automobile Hazards" and "Pedestrian Hazards" were arranged by auto dealers and the superintendent of play-ground teachers respectively.

Superintendent of Distribution J. E. Jordan of the El Paso Electric Company arranged the skit on "Street Car Hazards," and the superintendents of two steam railroads conducted a similar affair entitled "Steam Railroad Hazards."

Houston's Talking Cars from Old Equipment

Many Innovations Introduced to Attract the Attention of the Car Rider—Air-Operated Electric Signs Used Effectively

By F. J. Bennett

Master Mechanic Houston Electric Company, Houston, Tex.

PRONOUNCED popularity has resulted from the remodeling of certain old cars of the Houston Electric Company. Many of these cars were due for overhauling, and while accomplishing this maintenance work important changes were affected.

The heavy couplings were removed, effecting some economy of weight. The seats were covered with gray

All Piping Is Inclosed on the Remodeled Cars in Houston, Leaving No Pockets for Dust and Dirt to Collect. Note the Pockets Provided for the Operator's Punch and Transfers at the Left of the Casing

Kemi-suede, and floors were covered with ¼-in. rubber tile. On some cars we used a plain color of material and on others a tiled effect. Either style gives a clean floor and deadens much of the noise arising from the trucks and tracks.

All piping at the front of the car has been neatly incased in a wood compartment, which serves not only to conceal the unsightly pipes and fixtures so common to street cars but makes it possible to sweep and clean the platforms thoroughly.

The urge today is to get something different in designs and finish—something better, but, still, little things that change the appearance and attract attention we believe essential. For this reason we have not standardized on any particular color or finish. Some of the cars are refinished in the interior, using the natural wood colors, and on others we plan to enamel the wood trim, using agreeable colors similar to the newer type Pullman cars today.

The first few cars have been painted a white and cream on the exterior. This combination has been varied on others. The effect is startling and has attracted much favorable comment.

Houston's "Talking Cars"

Bodies are painted a white and cream combination and give the impression of new cars. The sign at the bottom of the right-hand vestibule window reads "Enter at Front." The green illumination of the sign does not photograph clearly. The illustration at the left shows a rear view of Houston's remodeled cars with the open screened-in vestibule. The treadle device has been installed for rear exit use. The red light observed flashes "Stop" when brakes are applied.

Another innovation that has created comment concerning "Houston's talking cars" is the use of illuminated signs. The passenger ready to board the car observes an illuminated sign that flashes on when the car approaches, reading "Enter at the Front." When about to stop, another illuminated sign in the interior lights up over the front vestibule, reading "Leave by the Rear."

Since each of the cars in the city service is operated by one man, these remodeled cars have been equipped with the treadle device that allows the passenger to open the rear door by stepping on the treadle when the car is stopped. The air valve operating this door engine is inoperative except when brakes are fully applied.

Upon leaving, a small sign flashes "We Thank You." This is mounted just above the exit opening. For the approaching motorist, a red light shines to the rear when brakes are applied, illuminating the word "Stop" in red. The switches operating these lights are operated by air pressure, when air is applied to the brake cylinder line.

All of these cars are single-enders, since it is unnecessary to reverse at the line termini. On account of our favorable weather conditions, the rear platform is open except for a screen protection around the outer edge.

Innovations and novelties are considered important elements in arousing interest in our service and creating a realization that the company is attempting to serve the public of this fast-growing city.

Close-Up of Front Sign Reading "Enter at Front." This, as Well as Interior Signs, Is Turned on by an Air-Operated Switch Attached to the Brake Line, so It Is Illuminated Only When Brakes Are Applied

Washing the Brooklyn Tunnels Prevents Delays from Electrical Trouble

BESIDES three bridges in New York City between Manhattan Borough and Brooklyn and Queens Boroughs, three under-river tunnels also are used by the trains of the New York Rapid Transit Corporation, the Brooklyn-Manhattan Transit Corporation's subsidiary. These tunnels are located at the Battery (Montague Street tunnel), Fourteenth Street and 60th Street in Manhattan. Each consists of two separate tubes made up of rings of cast iron in the under-river portions. The oldest of these tunnels, which is the Montague Street, has now been in service since 1920, or nearly six years.

Until recently the dirt which collected in the tunnels was removed by "dry cleaning" methods; that is, by hand labor. But the tubes kept getting dustier and dustier, not only because of dust blown in from the land sections but from brake shoe dust, due to the application of the brakes on the down grades.

While the conditions were not bad from a merely transportation standpoint, they were serious electrically. The dust settled on and around the third rail insulators and cables. When dampened by moisture from water leaking into the tunnel it made a strong, dense coating which was hard to remove. As it could not be wiped off with rags, wire brushes were required to get it off. On account of the large proportion of brake shoe dust, these coatings were electrical conductors, and it was therefore necessary to remove them frequently and if possible to prevent their formation.

While very little trouble was experienced from this dust during the first few years of operation through the tubes and there was no serious delay, yet minor delays were caused by it, and the cleaning of the third rail insulators and other third rail equipment became an expensive item of maintenance. The insulators were gone over every three months, generally requiring the services of two third rail gangs for three consecutive nights in each tube each time they were cleaned. As it was generally possible for the men to work in the tunnels only between the hours of 1 a.m. and 5 a.m., the progress was slow and the costs comparatively high, as the men had to be paid for the entire night's work. Furthermore, the dust was not being removed as fast as it accumulated and, with the lapse of time, it was becoming more and more troublesome.

In order to secure a more nearly complete removal of the dust and dirt the building division of the railway installed two 2-in. pipes, one in each tube, the entire length of the under-river section, a distance of approximately 1¼ miles. These pipes were connected to the city water mains at each end and were provided with valves and hose connections at intervals of 200 ft. The cleaning was done by two gangs of men, one gang working from each side of the river and meeting in the center. Although the water pressure varied considerably at different points in the tunnels and under different conditions, it was found to average about 85 lb. With that pressure there was no trouble in washing down the roof, sides and bottom of the tunnel, the water after use flowing along a gutter in the center of the track to drains, from which it was pumped out into the river.

In the cleaning of each tube about 800,000 gal. of water was used and it took six nights for the gang to go through. But when the work had been completed there was a marked improvement in the appearance and conditions of the tubes. More than 125 bbl. of dirt was collected and carried out in addition to much that had remained in suspension in the water and had been pumped out. It was found that very little water had got into the lighting conduits or fixtures and only a few of the latter had to be replaced on account of the cleaning.

Tri-City Trainmen Sign After Reading Bulletins

UNTIL recently it was found almost impossible by the Tri-City Railway of Iowa to impress upon trainmen the importance of looking at the bulletin board for new bulletins before taking out their runs. Equally difficult was the task of seeing that they signed the report after having read the bulletin. A register sheet of the type shown in an accompanying illustration has solved both problems. When a new bulletin is

TRI-CITY RAILWAY COMPANY
OPERATOR'S REGISTER SHEET
Date_____

LINE	RUN NO.	CAR NO.	HAVE READ BULLETIN NO.	REGULAR	EXTRAS	OUT	IN	TOTAL
BRIDGE LINE	1		267					
	2		267					
	3		267					
	4		267					

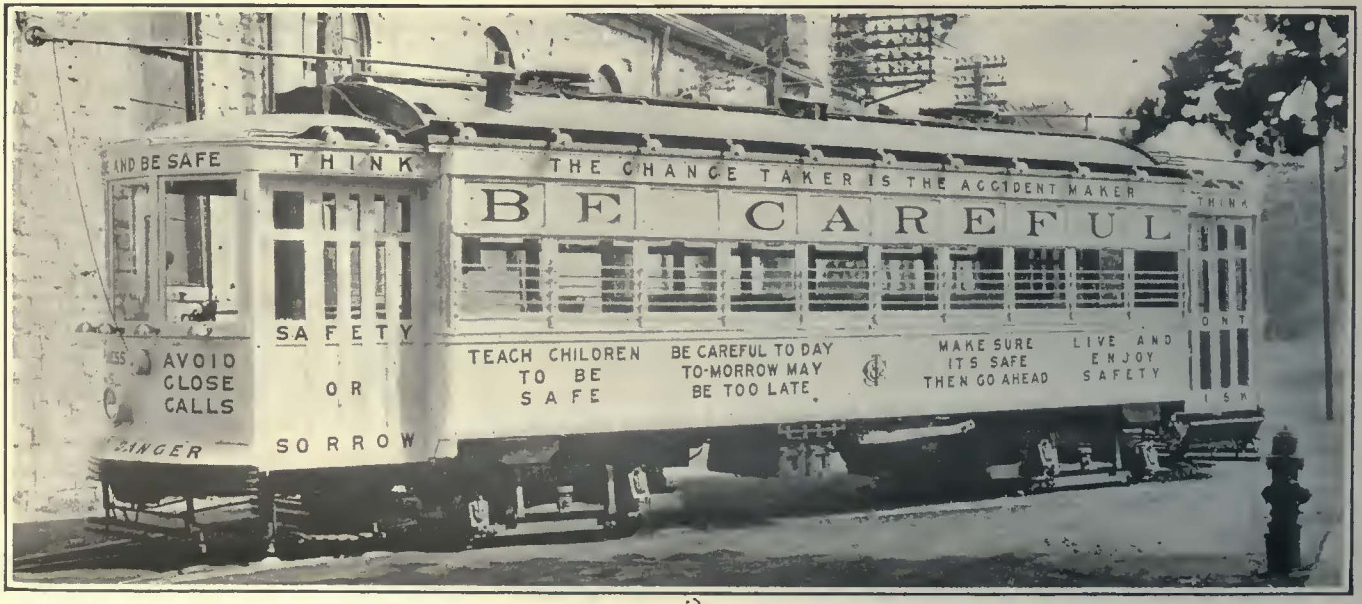
Trainmen Must Sign This Sheet to Show They Have Read the Latest Bulletin

posted the number of it is stamped opposite each run number on the sheet; when the trainman registers, his attention is called to the bulletin. It has been found that the bulletins are always read now. Trainmen must sign as having read it before they receive their pay. This column of the register sheet is left blank only when no new bulletins have been issued.

Railway Aids Safety Drive at Joliet

DURING the safety week held at Joliet, Ill., May 23 to May 29, the Chicago & Joliet Electric Railway co-operated by repainting one of its city cars and using it for the display of appropriate slogans. The background color was old ivory, while the lettering on the dashers, sides, etc., was black. This car was operated in regular service on various lines in the city and attracted much attention.

Police records show that only four persons were injured in Joliet during the several days of the campaign, which was considered a good showing.

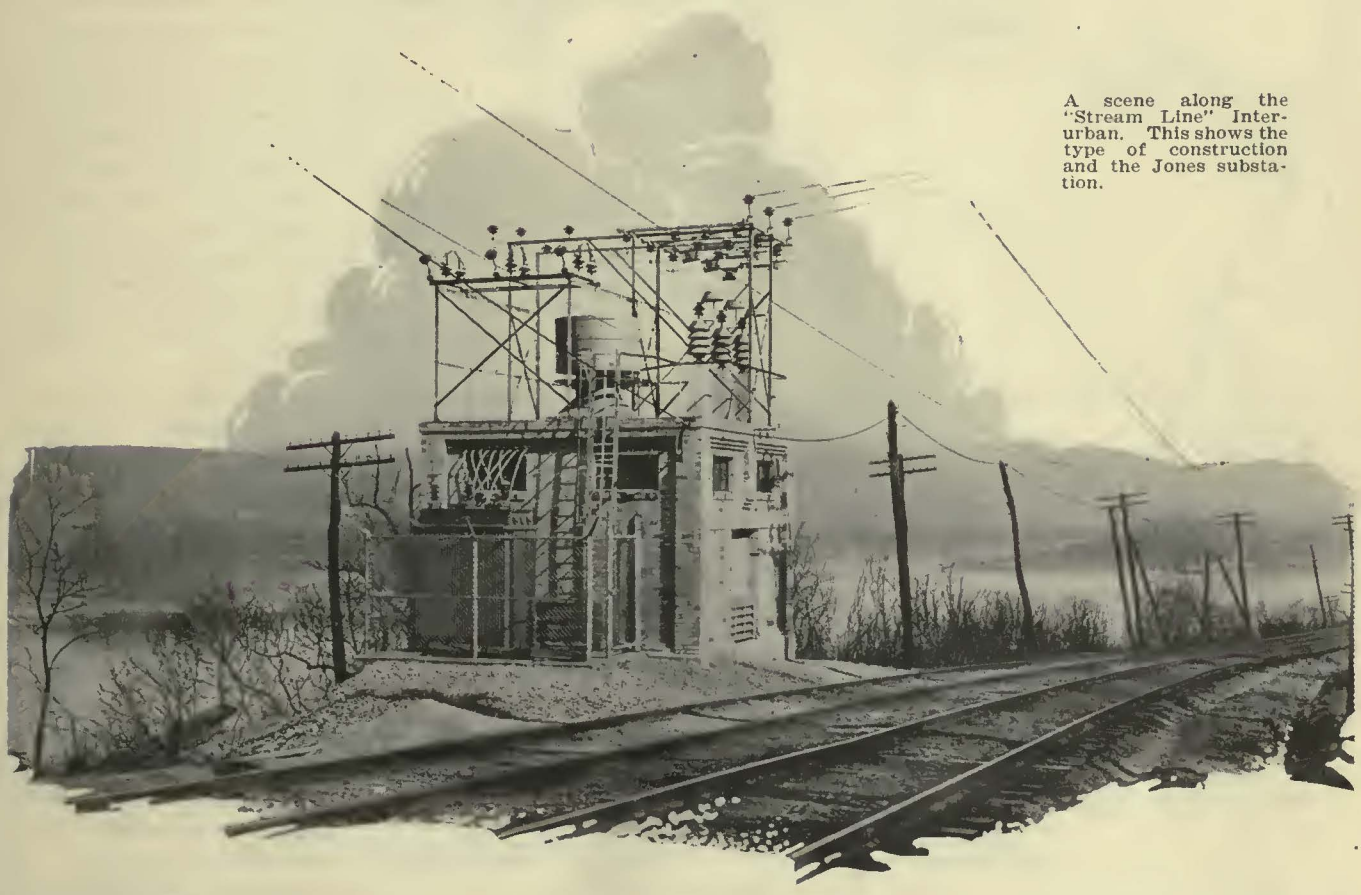


A Traveling Advocate In the Cause of Safety Operated by the Chicago & Joliet Electric Railway

One Owner's Faith in the Trolley

FIRST ARTICLE

After Others Lost Hope, C. A. Smith Made "Stream Line" Interurban Successful—Straighter Track, Higher Speed, Greater Safety and More Attractive Cars Have Helped Bring About the Improvement



A scene along the "Stream Line" Interurban. This shows the type of construction and the Jones substation.

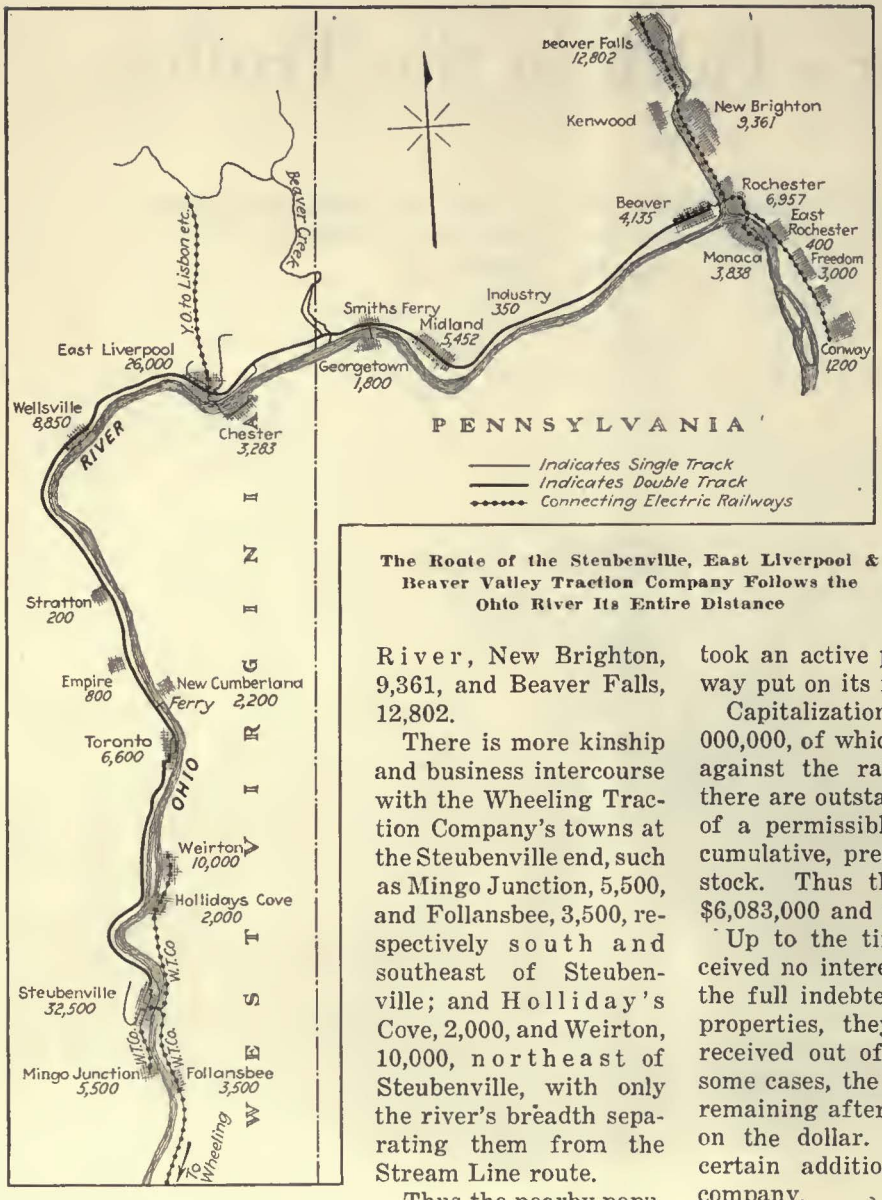
FURTHER proof that the electric railway is out of date only when it stands still or slides backward is found in the story of the rejuvenation of the Steubenville, East Liverpool & Beaver Valley Traction Company. For all its impressive length of title, the railway's interurban trunk line itself is of that shortness which has been declared hopeless in the face of automobile and motor-bus competition. Indeed, the property is but 43 miles long, between Beaver, Pa., and Steubenville, Ohio. Of this route, 2.5 miles between Vanport and Beaver forms a part of the Beaver Valley Traction Company, which operates city service over the joint section.

In addition to the interurban, city service is given in East Liverpool, Chester, W. Va. (opposite East Liverpool), Steubenville and, since Jan. 10, 1926, within Toronto on the main-line track. Other local services along the main line are given from Midland, Pa., as far as Wellsville, Ohio. The territory served, particularly around East Liverpool and Chester, is noted as the greatest tile and pottery district of America; but steel and tinplate mills, as well as coal mines, are also large employers of labor in this area.

One fortunate feature of the road itself is that it was built as a double-track interurban from the start. Of its 40 miles or so of directly-owned trunk line, less than 2 miles is single track. With the various route changes of recent years completed, the company will also be in the happy position of having 72 per cent of its interurban route on private right-of-way. Attainment of this proportion under the topographical conditions existing is a real achievement. The route follows the Ohio River very closely through a land full of steep bluffs that often come almost to the water's edge. Therefore, changes in route are not made so readily as on flat terrain. Even as it is, the railway is compelled to follow the one and only through highway for several miles through the longitudinal communities served.

Finally, before entering on the account of this railway's griefs and apparent salvation, it is well to summarize the population to secure some idea of the business opportunities. The number of inhabitants in each community is presented in an accompanying table.

It will be seen from the table that the population served along or near the company's lines exceeds 96,000. Adjacent to the Beaver terminus are a number of small communities which are not closely related to the activities between Beaver and Steubenville, such as: Rochester, 6,957; East Rochester, 400; Monaca, 3,838; Freedom, 3,000; Conway, 1,200; and up the Beaver



The Route of the Steubenville, East Liverpool & Beaver Valley Traction Company Follows the Ohio River Its Entire Distance

River, New Brighton, 9,361, and Beaver Falls, 12,802.

There is more kinship and business intercourse with the Wheeling Traction Company's towns at the Steubenville end, such as Mingo Junction, 5,500, and Follansbee, 3,500, respectively south and southeast of Steubenville; and Holliday's Cove, 2,000, and Weirton, 10,000, northeast of Steubenville, with only the river's breadth separating them from the Stream Line route.

Thus the nearby population of the Beaver Valley Traction Company's system totals 37,558 and of the Wheeling Traction communities 21,000—a total of 58,558 within likely commuting distance for jobs in this territory.

Troubles Began Before the World War

Up to the year 1911 the territory was served by three non-competitive railways, from Vanport to the Pennsylvania-Ohio state line; from the state line to the west end of Wellsville, Ohio; and from Wellsville to Steubenville, including local lines. In this year the railway and lighting properties of these three concerns were leased by J. G. White & Company under the corporate title of Tri-State Railway & Electric Company, a company formed to operate the lines.

The combination did not prove successful, bond interest of these three companies being defaulted on Nov. 1, 1912, and a formal receivership declared in March, 1913. The bondholders of the three companies instituted actions to secure cancellation of their leases, but operation of the property as a unit was continued except for the group of lines at East Liverpool, in which a local man, C. A. Smith, had acquired an interest.

The more active participation of Mr. Smith in the traction problem was due in large measure to his extensive property interests in the territory. He was not new to public utilities, having once held a substantial interest in the East Liverpool gas property, but he had turned to other activities. When he entered the railway field in the depression that was coincident with the opening of the war, he had no illusions about making money from that source. He did believe, however, that reliable transportation had to be given if his investments and those of his neighbors were to grow and prosper.

The first step was to merge the three railways. This was achieved by Nov. 1, 1917. In carrying out the merger two important changes were made: First, the light and power portions were sold, and, second, the capitalization was scaled down, partly to allow for the simplified conditions and partly to reduce the overhead charges per mile. In this reorganization Mr. Smith took an active part, as he was anxious to see the railway put on its feet as quickly as possible.

Capitalization of the original companies totaled $14,000,000, of which $9,000,000 to $10,000,000 was charged against the railway portion. In the reorganization, there are outstanding $1,483,000 bonds at 5 per cent out of a permissible $3,000,000; $2,600,000 in 5 per cent cumulative, preferred stock; and $2,000,000 in common stock. Thus the present actual capitalization is only $6,083,000 and the authorized capitalization $7,600,000.

Up to the time of the merger, the bondholders received no interest. As these bondholders had assumed the full indebtedness of the original light and railway properties, they were assigned whatever sums were received out of the sale of the lighting business. In some cases, the pro rata distribution of the cash assets remaining after liabilities amounted to but 7 or 8 cents on the dollar. However, these bondholders received certain additional values in securities of the new company.

This liquidation was not completed until about November, 1925. In the meantime the bondholders had run into other misfortunes. The merger company began well enough by paying interest regularly. This continued until May 1, 1922, but as higher expenses had come much faster than approval of higher fares, there was no reserve to meet the calamity of a 51 weeks strike.

Parenthetically, it may be recorded here that the same spirit of enterprise and loyalty to public interest shown by the management is reflected today in the rank and file—"the ride salesman."

POPULATION OF TOWNS SERVED BY THE STEUBENVILLE, EAST LIVERPOOL & BEAVER VALLEY TRACTION COMPANY

Beaver, Pa. Through riders from steam railroad and Beaver Valley connections, as well as local riders to industries along the interurban	4,135
Industry, Pa.	350
Midland, Pa.	5,452
Smith's Ferry, Ohio, and George Town, Pa., combined	1,800
East Liverpool, Ohio, and suburbs. Connections with Youngstown & Ohio River Railroad interurban	30,000
Chester, W. Va. Opposite East Liverpool	3,283
Wellsville, Ohio	8,850
Stratton, Ohio	200
Empire, Ohio	800
New Cumberland, W. Va. Opposite Calumet, Ohio	2,200
Toronto, Ohio	6,600
Steubenville, Ohio	32,500
Total served directly or by ferry	96,170

Resumption of bond interest was out of the question in the year or two following the reopening of the railway. Too much had to be done to make up for deferred maintenance and to meet the new menace of the ubiquitous automobile on rapidly improving highways. Bond interest assignments were far from adequate for the purpose, so C. A. Smith, the lone optimist among the owners, began to lend his personal credit to the rehabilitation program.

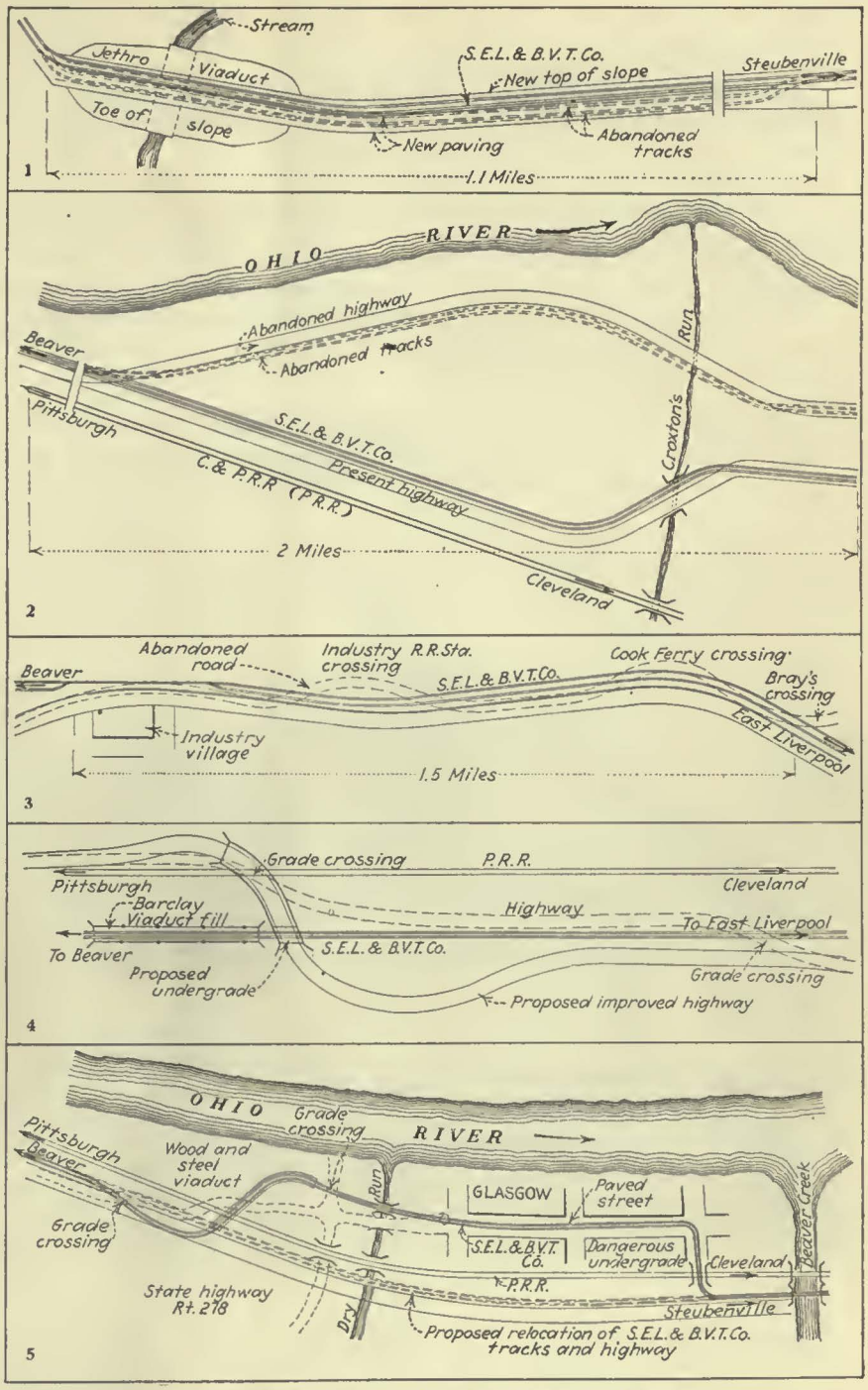
Thus it came about that by January, 1925, Mr. Smith was in a position to buy out enough partners in the enterprise to give him a major interest in the three forms of securities. From that time on the work of improvement was so accelerated that by last September he could say: "Now that I've got a good railway, I'd better get me someone to capitalize on these betterments in an operating way." Thereupon, he invited Garry S. Wills, then general manager of the neighboring Wheeling Traction Company, to manage the property with the title of general superintendent. While Mr. Smith retains the title of general manager, he plans to give most of his time to the direction of his other extensive interests.

A Quarter Million for Straighter, Safer, Faster Track

From the first, Mr. Smith's idea has been to get away from the expense of operating over paved streets or over viaducts when private rights-of-way constructed by cuts and fills can be made to pay better through lower upkeep, higher speed, more attractive service and fewer accidents through collisions.

So as early as 1921 the line was straightened at Jethro by leaving the highway for 1.1 miles and running over a fill instead of a viaduct. In 1923, 3 miles of paved highway between Jeddo (just south of Toronto) and King's Crossing was exchanged for private right-of-way. In 1923-1924, 2 miles of highway was left between Calumet and Myers Lane, adjacent to Jeddo. The paving charges here were met by arrangement with the Ohio River Edison Company, which had purchased land along the river, thereby causing transfer of the railway to a new and straighter right-of-way farther from the bank.

In 1924-1925, 1.5 miles of highway at Cook's Ferry was left. A trestle at Barclay, near Industry, was superseded by a fill. In 1925-1926, more than 1.5 miles of route east of Smith's Ferry was taken in hand. In this section, one viaduct, one trestle over-crossing and one under-crossing are being removed and 8,000 ft. of track altogether taken off of the highway.



Some Examples of Relocation Along the Line

1. Along West Eighth Street, East Liverpool, the tracks have been taken off the highway.
2. At Calumet both highway and tracks have been straightened.
3. Between Industry and Bray's Crossing several railroad crossings were eliminated.
4. At Barclay a viaduct and fill have permitted straightening of the line.
5. The proposed relocation at Smith's Ferry will improve operation greatly.

During 1926 about 1.4 miles of route will be taken off of the highway in the second zone out of Steubenville, viz., between Stop 7 and Castner's, thereby eliminating three highway crossings. Because of this change, the upkeep of about 1 mile of paving from Crawford Avenue, Steubenville, to Castner's (in Jefferson County) will be eliminated. The greater part of the improvements described will be found pictured in the accompanying group of five drawings.

To summarize: About 11.5 miles or approximately 25 per cent of the interurban route has been or is being improved at a cost of $250,000. The net result will be

a permanent reduction in paving obligations and of the troubles incident to unattractive speeds and the presence of accident-breeding vehicles.

Looking at these betterments from the standpoint of possible competition from motor buses in interstate operation, this can be said: Only the trolley will be able to give high speed with safety because about three-quarters of its operation will be on private right-of-way, whereas the motor bus must stick to the public highway and jeopardize its patrons to give really fast service and adhere closely to a schedule.

By December, 1925, also, the company completed the rehabilitation of its La Belle View line in Steubenville. By spring, a 1,400-ft. loop extension will be finished to take in a fine, new housing area.

In all paved work, the company's standard construction is 93-lb. T-rail on a concrete foundation with brick or concrete surfacing. Tracks of the company are standard gage, 4 ft. 8½ in., but a gauntlet rail is used between Vanport and Beaver because of the 5 ft. 2½ in. gage of the Beaver Valley Traction Company.

The Offices and Carhouse Are Located in East Liverpool

Improvements in Overhead, Signals, Etc.

On account of the many localities where corrosive smoke is prevalent, Copperweld strand wire has been adopted to replace ordinary steel strand span wire. The latter averaged a life of six months; Copperweld has already done better than two years in like situations. While the No. 00 trolley remains standard, it is being supplemented with additional feeders.

One of Mr. Wills' first moves to take advantage of the improved track and line conditions with maximum safety and for better speed was to install Nachod type CD automatic signals in place of those of the hand-throw variety. These signals are used not only on single-track sections, but also on double-track sections where they serve for car spacing. The single-track signals are intended to care for as many as fifteen cars in a block.

To the three Cheatham automatic track switches installed earlier two more have been added to speed up and simplify one-man car operation, and in one instance to eliminate two switchmen. Two of these switches are on local branch lines.

Telephone dispatching has been in use for twelve years past on the main line. Operators of local cars can secure instructions from the dispatcher by means of railway telephones in the downtown terminals, but they are also trained to make calls over the Bell system from any part of their runs.

Automatic Substations Produce Excellent Power Condition

Power had been purchased from the American Gas & Electric Company under a contract which was due for revision in 1922, but the matter was postponed until April, 1923, because of the strike. The railway was then served by four manually-operated substations owned by the power company and one automatic substation owned by the railway. As early as 1921 the Westinghouse Electric & Manufacturing Company had arranged with Mr. Smith for automatic operation of one of its two units at the Industry substation, the second remaining in reserve for manual operation. Eventually, the Westinghouse company secured a contract for the equipment of seven railway-owned automatic substations, the first of their kind with complete electro-pneumatic switching equipment. This important installation will be treated separately in a forthcoming issue. It need only be stated that the excellent voltage conditions now obtaining are also helping toward the goal of higher speed and brighter illumination of the cars.

Ample power is not inconsistent with safe and economical use thereof. It is of interest to note, therefore, that since August, 1925, Economy meters have been installed on all cars of the system and an energy saving campaign instigated.

Improved Training for Platform Men on Third Avenue System

Emphasis Is Laid on Methods of Instruction as Against Selective Work—Formation of Correct Habits Used as the Foundation of the Training School Effort—Apparatus in the Schoolroom Is of Simple but Effective Character

By Dr. Christian P. Segard
Assistant Secretary in Charge of Employee-Employer Relations, Third Avenue Railway System, New York City

CONDITIONS of the labor market must largely determine the procedure to be followed in the selection and training of platform employees. In New York City there never are enough applicants for this class of work to allow of the selection of only the highest grade men. While out of every hundred men who apply only 70 are accepted, perhaps only 50 are considered of a high grade. Hence the efforts of the employment department must be devoted more along the lines of training than of selection. Many of the men are fresh from the old country. Not only are they unfamiliar with street car operation, but have little knowledge of our busy civic life and conditions as well. For such men from five days to two or three weeks additional training is often necessary.

Basically, the philosophy back of the training methods of the Third Avenue Railway System is a study of the behavior of the applicants and the formation in them of correct habits. There are three primary behaviors in human nature: (1) manual; (2) verbal; and (3) visceral. The first is of basic importance to the position of motorman and the second of lesser importance. For conductors, the second, behavior, is of major importance and the first is of minor value. Visceral behavior is of course beyond our control and while important can only be observed and noted.

Formation of correct habits is considered a matter of prime importance and the first duty of the training school. Good training performs a service to the men and the company as well. It reflects itself in the attitude of the men toward the public and makes for a higher quality of street car service. A careful motorman (or conductor) may reasonably be said to be one who has relatively few accidents. A good conductor is one who performs his required duties with minimum friction with the public.

Six of the Bank of Nine Dummy Controllers Used in the Training School of the Third Avenue Railway System, New York. The Different Controller and Brake Types Used on the Property Are Set Up in the School

Knowledge that the condition of the applicant, mental as well as physical, meets the specifications of the job is the first essential. The training school's minimum requirement for admission is as important as any school examination. Shortage of men is the only reason for lowering the standard of acceptance. This involves far more intensive training methods and follow-up checks to be certain that no unfit men are retained in the service.

The instructors should, as a matter of course, be men who know operating conditions. But it is just as important that they have the ability to impart that knowledge to others. The theory that a good player makes a good coach is not always true. A stumbling block over which instructors sometimes fall is that the lecture or demonstration becomes an old story. They must realize that it is a new story to each student. Another

stumbling block is when road instructors and school instructors teach differently. For example—if four steps are necessary to perform a certain act and these are taught in the school in the order of first, second, third and fourth, then the same procedure must be followed by the road instructors. A habit can never be formed correctly by making changes in method during the process of its formation.

For the training school a well-planned and carefully-arranged course in theory and practice is of great importance and it should be detailed on paper so that everything is included that is useful. By this means repetitions are prevented, unavoidable changes in instructors, as due to sickness, do not cause loss of time or knowledge to students, and new ideas can be inserted in the text when it is found desirable.

The text of the instruction course used on the Third Avenue System is divided into two parts, those for conductors and motormen. Each of these is again divided into theory and practice. The amount of time allotted to each subject is prescribed, with the number of days and hours that an experienced or an inexperienced man is allowed to "break in" on each line of the division to which he is assigned. Curriculum schedules used are shown herewith.

The equipment of the school consists of four sep-

Abstract of Curriculum of Training School for Motormen and Conductors Used on the Third Avenue System, New York City

This definite program makes the work uniform and avoids changes or omissions due to a change of instructors

Student Conductors' Curriculum

Days—Tuesday and Thursday. **Time**—8:15 a.m. to 1:00 p.m.

Purpose	Fifteen minutes.	One period.	
Courtesy	Fifteen minutes.	One period.	
Miscellaneous Rules	Thirty minutes.	One period.	
Collecting and Registering Fares	Thirty minutes.	One period.	Theory.
Fare Boxes and Registers	Fifteen minutes.	One period.	
	Theory—five minutes.	Practice—ten minutes.	
Day Card	One hour.	One period.	
Transfers	Fifteen minutes.	One period.	
Free Riders	Five minutes.	One period.	
Accidents	Thirty minutes.	One period.	Theory.
Hand Brakes and Circuit Breakers	Twenty minutes.	One period.	
	Theory—ten minutes.	Practice—ten minutes.	
Car Equipment	Ten minutes.	One period.	Theory.
Stopping Car At Rear End	Five minutes.	One period.	Theory.
Hand Plow	Ten minutes.	One period.	
	Theory—five minutes.	Practice—ten minutes.	
Double-Throw Switch	Five minutes.	One period.	
Opening and Closing Doors	Five minutes.	One period.	

Approximately 60 hours actual work on a car on the lines of his division with a qualified instructor.

The topics discussed under the above headings are outlined in the attached supplement.

SUPPLEMENT TO STUDENT CONDUCTORS' CURRICULUM—TOPICS

Purpose—Knowledge of the rules.

Courtesy—The idea of selling the service by being polite at all times. Being agreeable, helpful, kind and considerate to all passengers. Seating passengers—cripples and infirm.

Miscellaneous Rules—Obedience; reporting for duty; uniform; bulletin board; personal appearance and habits; assignment of wages; time pieces; waiting at intersections; stopping places; making announcements; requesting passengers to move forward and leave by front door; transferring passengers from disabled car; conversation; lost property; bulky and objectionable packages; delivering newspapers; peddling and begging; smoking on cars; spitting; ventilation; passing obstructions; bell signals; route and destination signs; advertising signs; trimming cars; backing cars; pushing stalled cars; conductor's position on car; delays; keeping car clean; extinguishing lights.

Collecting and Registering Fares—Passenger must drop fare in box, and registered at that time. Conductor not allowed to drop fare in box for passenger. Making change: what to do when too much money is dropped in box; what to do when unable to make change. Three dollars in change when starting out and warning always to count and know exactly how much he has when starting out: what to do when over in money at end of day's work; children under four. Cash tickets. What to do when passenger refuses to pay for a child four years or over. Turning in receipts.

Day Card—How it should be filled out. Student making out a sample card.

Fare Boxes and Register—How they work, and what they register. How to ring up fares: proper setting of trip indicator; what totalizers mean; bunching fares; examining seal on box. Compare fare box and register reading with reading on record card. What to do when fare box or register is out of order. When register is reading wrong.

Transfers—Proper method of punching; punching twice; not punching; when to issue; proper returns; void transfers and what to do; wetting fingers and holding transfers in mouth. Emergency tickets. What to do when short.

Free Riders—Who they are—police, firemen, pass holders, mail carriers.

Accidents—Definition; different type; information; witnesses; business address; opening up line; emergency phone call; calling ambulance; notifying report clerk, starter, inspector; contributory negligence; the report; ejectments.

Hand Brakes and Circuit Breakers—How to use a hand brake. How to set and trip circuit breakers; their use.

Car Equipment—The trolley pole; plow; trolley catcher; dash; headlight; bumper; drawhead and drawbar; wheel guards.

Stopping Car At Rear End—How to cut power off from rear end—by opening door, tripping circuit breaker or by pulling down trolley pole, and putting on hand brake.

Hand Plow—What it is—its use and how to use it. How it should be connected to controller, ground plugs, or double-throw switch, with warning to trip front and rear circuit breakers when connecting hand plow leads to controller or ground plugs. How to connect hand plow to channel rail.

Double-Throw Switch—What it is, and where it is on the car. How to throw it and when. Warning never to throw same unless door is open.

Opening and Closing Doors—How to operate them. Warning not to open until car has stopped; to look out before closing, see if everyone is clear of step, never close door in passenger's face; getting handle back all the way so that step is down flat. Warning not to push with left hand on the glass; seeing that safety catch is over foot pedal on rear exit door.

Student Motormen's Curriculum

Days—Monday and Wednesday **Time**—8:15 a.m. to 12:00 n. 1:30 p.m. to 4:30 p.m.

Purpose	Ten minutes.	One period.	
Hand Plow	Twenty minutes.	One period.	
	Theory—ten minutes.	Practice—ten minutes.	
Door Sheet	Fifteen minutes.	One period.	
	Theory—five minutes.	Practice—ten minutes.	
Controller	Two hours.	One period.	
	Theory—one hour.	Practice—one hour.	
Hand Brakes	One hour.	One period.	
	Theory—thirty minutes.	Practice—thirty minutes.	
Double-Throw Switch	Ten minutes.	One period.	
	Theory—five minutes.	Practice—five minutes.	
Bell Signals	One hour.	One period.	
	Theory—thirty minutes.	Practice—thirty minutes.	
Car Equipment	Thirty minutes.	One period.	Theory.
Regenerative Emergency Stop	Thirty minutes.	One period.	
	Theory—fifteen minutes.	Practice—fifteen minutes.	
Emergency Stop	Thirty minutes.	One period.	
	Theory—fifteen minutes.	Practice—fifteen minutes.	
Circuit Breakers	Twenty minutes.	One period.	
	Theory—ten minutes.	Practice—ten minutes.	

SUPPLEMENT TO STUDENT MOTORMEN'S CURRICULUM—TOPICS

Purpose—Knowledge of car mechanism.

Hand Plow—What it is—its use and how to use it. How it should be connected to controller, ground plugs, or double-throw switch, with warning to trip front and rear circuit breakers when connecting hand plow leads to controller or ground plugs. How to connect hand plow to channel rail.

Door Sheet—What it is. When and how to sign up cars.

Controller—Definition. How to feed it. Type, points, difference between running and resistance points? Saving power.

Hand Brakes—How to use a hand brake.

Double-Throw Switch—What it is and where it is on the car. How to throw it and when. Warning never to throw same unless door is open and car at a standstill.

Bell Signals—What 1, 2, 3 and 4 bells mean and what to do.

Car Equipment—The trolley pole; plow; trolley catcher; dash; headlight; bumper; drawhead; drawbar; wheel guards; trucks; driving wheel; pony wheel; emergency door switch; sand bin; sand boxes.

Regenerative Emergency Stop—How to stop car without brakes and power off the line when going forward and when sliding backward.

Emergency Stop—Using power to stop car—not taking the time to trip circuit breaker but simply pulling reverse lever and throwing controller handle all the way around to the second running position.

Circuit Breakers—How to set and trip them; their use; where they are on the car.

arate and distinct units, all in the same room. A group of students using any one of the four units does not interfere with the use of another unit by a different group. The four units are:

One 42-ft. street car complete in operating condition but with wheels blocked up so that it does not move when the equipment is operated.

One platform having installed on it the entire mechanical and electrical car equipment in operating condition so that the working of each unit may be studied separately.

One platform with one-man car equipment installed.

One unit consisting of nine sets of dummy motorman's equipment. These sets can all be used at once or separately.

Before a student motorman is sent out on the road to break in he is given instruction on all four units. The standing car gives him the "feel" of being in charge of a car and being in the driver's position. The equipment is shown to him in operating condition and he sees what happens to the machinery with each action that he will perform. The dummy controller and brakes are used to give the man experience in feeding the controller, setting up hand and air brakes and in general to make him familiar with the knack of handling the control apparatus. Each movement is at first done at the instructor's command and its result explained. After considerable instruction of this nature the applicant then goes out for road instruction on equipment in service, but in charge of student trainers, who are motormen that have qualified for this work.

When the student motorman reports back to the school he is again put at the dummy controller and the degree of his improvement noted. Here is where the kind of road instruction that he received shows itself and gives a recheck both on the instructing motorman and on the division instructor who supervised the work. In this case the dummy equipment is invaluable.

Happenings that require the motorman to be on the alert may be classified in two groups. The first comprises events of a normal character that require habitually more than ordinary caution to guard against accidents. The second includes conditions that require instant response on the part of motorman in order to prevent an accident. The "Fire Stop" is an example of the first group, and an automobile cutting short in front of a moving trolley illustrates the second.

Each one of these likely situations is summed up in a brief statement of two to six words. Each statement is painted on a piece of frosted glass and fitted into grooves in a series of five boxes which are mounted at a distance ahead of the bank of dummy controllers. While each of the statements can be seen by the operators, each box is equipped with two electric lights so that any one can be illuminated as a signal to respond to that particular event. The control of this illumination by the operator who is instructing the class is invisible and consists of five knife switches that can be operated without any visible manual effort, so that the event cannot be anticipated by the students being tested.

When the "breaking in" period is half through the first or cautionary group of events is given. The students are lined up in front of the nine controllers and are instructed to make the proper response by movement of controller and brake handle when the signal is flashed on. Much practice is given with this equipment and considerable evidence is gained in regard to the progress the students are making. At the end of the "break-in" period, the second or emergency group of signals are given. Again, the students gain practice and the instructor is able to judge what improvement the student has made. With nine controllers any number from one up to nine may be instructed at the same time.

These Sets of Signs Face the Bank of Nine Motorman Positions

Immediately facing the bank of dummy controllers is a set of signs suggesting ordinary conditions that may happen. These may be illuminated individually. They are used during the early training. These signs represent emergency conditions and are used by students after they have had actual experience under the supervision of a student trainer. Note the use of the three lower signs, common on many properties but seldom explained in training schools.

Since installing this device the company is assured of one important thing, every man knows how to make a regenerative emergency stop with his eyes shut. It is a habit. He has done it so often that he knows how.

The device has helped us in many other ways. We formerly thought we knew who were the poorest motormen in the school group. Now we know. And while our judgment was pretty good and we still use it, the device verifies and assists it. We also find that the students come to the school ahead of time in order to practice with this equipment. Furthermore, we can shift from one situation to any other situation immediately. This cannot be done with the motion picture method, since it is always the same and the events happen in the same sequence.

Some of our older men have tried it and have voiced their approval. It acts as a check on habits. It is a

good thing to replace a bad habit with a useful one even though the old bad one is not easily shaken off. It can be done, and we are optimistic in this belief.

Each piece of equipment used by the motormen and conductors is reproduced in the training school and its use or meaning explained.

As to the conductor, his main job is handling people. If they were all one kind it would be easy. But this is not the case, so we are trying to train him into a realization of this fact. Can we get him into the habit of being courteous to all? I not only think so, but know so. We can in the training school give him a lesson in loading his car, being courteous and in not arguing with passengers. The most difficult job in the world is handling all kinds of people and handling them right. And the conductor can be taught the habit of courtesy.

Today I can point to a number of our platform men who, when I meet them on the car or at the office, tell me of how tactfully and courteously they met certain situations—and they were proud of it. The hardest job in the world becomes the easiest through courtesy, kindness and tact. And some of our platform men see it. Many times they get the worst of the bargain. Passengers forget themselves and are difficult to handle. The emotional bumps from words sometimes cause more damage than physical bruises and cuts. The greatest and most effective piece of public relations work that I know of is secured by courtesy and tact on the part of the uniformed employee. And it can be made a habit on his part by the training school.

Naturally, the proof of the pudding is in the eating. We feel sure that a better class of men is being turned out and that fewer accidents result. With the results showing only on the new men on the system and the pending accident cases extending back over months or even years, it is too early to claim tangible results in dollars and cents. Another year or two and results along these lines are sure to follow. Today we notice improvement in accident records and a great reduction in the number of complaints. That can be attributed to the work of the training school.

As often is the case in real accomplishment, the credit for success lies in co-operation. The improvement in personnel work here shows the close harmony of thought and action on the part of members of the transportation department and the personnel of the training school.

A Whole Convention Moved by Interurban

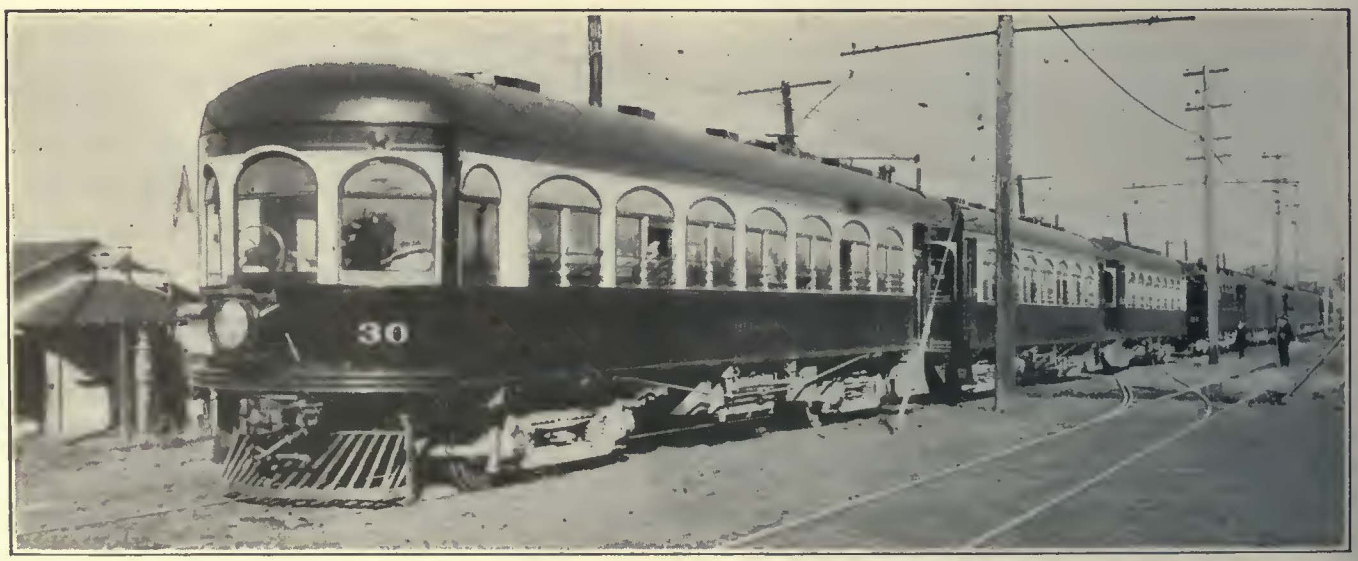
By A. J. Rowe
Northern Texas Traction Company, Fort Worth, Tex.

IT BECAME known to the Northern Texas Traction Company in June, 1925, that the Coca Cola Bottlers' convention was to be held in Dallas in March, 1926, coincident with the Southwestern Exposition, Fat Stock Show and Rodeo to be held in Fort Worth. This situation appealed to the commercial instinct of the Northern Texas officials, and after considerable negotiation with the Atlanta office of the Coca Cola Bottlers' Association, the Baker Hotel in Dallas and the Rodeo officials in Fort Worth, the company was successful in getting the contract to move the entire convention, consisting of 450 delegates, from Dallas to Fort Worth and back again the same day. After this was decided, the Fort Worth Coca Cola Bottlers decided that it would be a good plan to entertain the convention at the Fort Worth plant with an elaborate barbecue. This necessitated not only handling the crowd by special interurban cars from Dallas to Fort Worth, but on special city cars in the city of Fort Worth.

The movement was made at the lowest rate for round-trip service that the company could offer. The actual transportation required eleven interurban cars operated in three-car trains and one two-car train. In Fort Worth transfer was made to eleven city cars on a street where there was little other traffic. The transfer from interurban to city cars was made in ten minutes. The party then moved to the barbecue and from there to the Coliseum in North Fort Worth. After the Rodeo entertainment the interurban cars were waiting for the delegates and they were transported back to the Baker Hotel in Dallas without change.

Every transportation man will know the extensive details that have to be worked out in advance and the precision of performance necessary. This movement was further complicated by the heavier traffic during the week of the Southwestern Exposition.

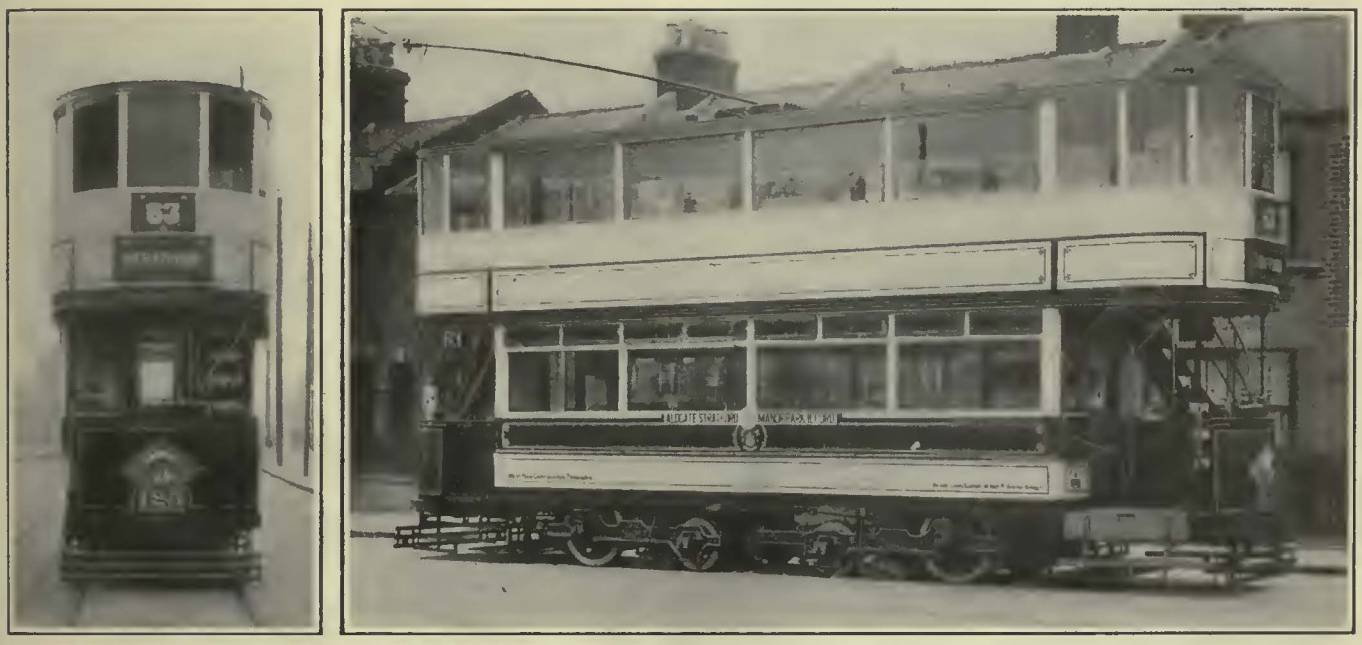
The company was complimented in several written and oral comments regarding the manner in which the convention was handled in the 80-mile round trip from Dallas to Fort Worth.



An Entire Convention of 450 Coca Cola Bottlers in Transit Between Dallas and Fort Worth, Requiring Eleven Cars on the Northern Texas Traction Company Lines

Improvement Made in Rolling Stock of British Tramways

More than Six Hundred and Seventy New Cars Included in Recent Orders—Much Reconstruction Has Been Done to Promote Passenger Comfort—Modernization of Motors Has Resulted in Greater Speed



New Car of the West Ham Corporation Tramways Is One of a Comparatively Small Number of Double-Truck Vehicles Included in Recent British Orders. At the Left Is the End View of This Car, Showing Collision Bumper That Is Backed Up by Strong Spiral Springs

REPLACEMENT of obsolete rolling stock has made rapid progress in Great Britain since the early part of last year, the proportion of new tramway cars ordered to the total number owned being considerably greater than in the United States during the same period. New buses also have been bought in large numbers by the tramways, but the extensive improvements made in the rail equipment reflect clearly the conviction of the managements that the latter will continue to be the principal means of mass transportation.

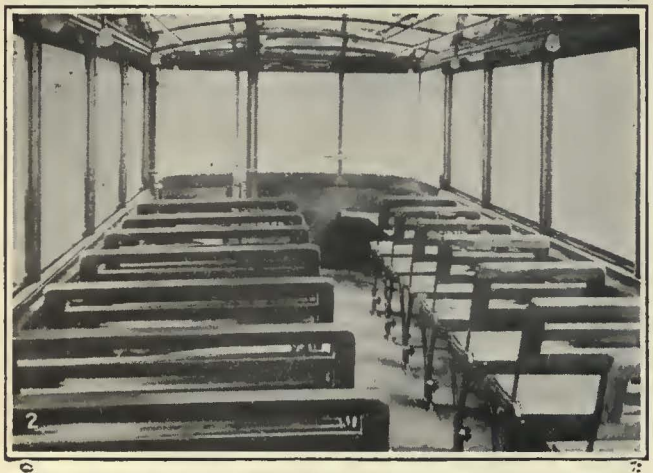
Recent orders for new cars for the tramways alone, not including the rapid transit lines, total 679, or more than half the number of new street and interurban railway passenger cars purchased here in 1925. This ratio is particularly impressive when operations in the two countries are compared. In England some 250 "undertakings," as they are called, operate about 14,500 cars on 4,400 miles of track. In the United States some 750 companies operate 80,000 cars on 46,000 miles of track. Thus the per cent of replacement of rolling stock on British tramways was more than twice that which occurred here.

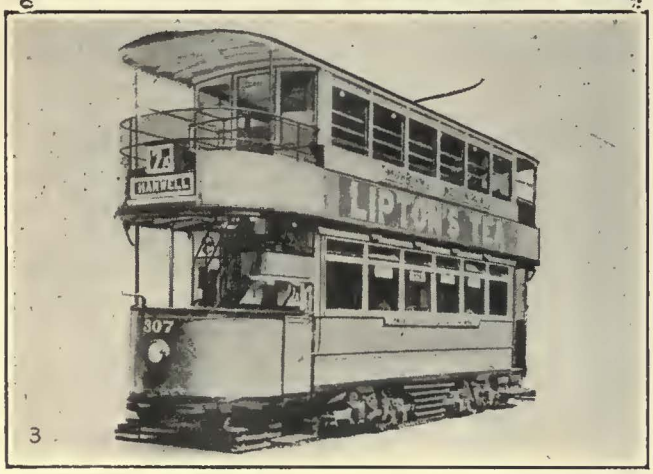
Several hundred rapid transit cars have been ordered recently by the London Underground system, and similar purchases have been made also in the United States. In the present article, however, attention will be confined to purchases of new rolling stock for the tramways.

In October, 1925, the largest purchase of new cars for British tramways in several years was made by the Leeds City Council. Many people urged buying buses to replace some of the rail lines rather than more cars, but the municipal authorities decided, after a thorough investigation of all phases of the problem, that best results would be obtained by adding to the tramway rolling stock. Accordingly, 200 new cars were authorized, 150 to be built by manufacturers and 50 to be built in the tramway shops.

Seats and Backs on the Upper Deck of the West Ham Car Are Spring-Cushioned and Attractively Upholstered

When these 200 cars are placed in operation in the near future a substantial





improvement will be made in transportation facilities. Leeds Corporation Tramways has approximately 117 miles of track and serves a population of about 560,000. The average number of cars in daily service is 255. The new equipment will be used in part to replace older rolling stock, and in part to give increased service.

All cars included in this purchase will be of the single-truck, double-deck type. The trucks have been so designed that the car will be able to negotiate a 29-ft. radius curve. Special care has been taken to reduce galloping motion and side oscillation to a minimum. Leather upholstered seats are provided for 72 passengers, 26 on the lower deck and 46 on the inclosed upper deck. Over-all length is 31 ft. 2 in. Teak is used for the lower part of the body, with pine and ash for the upper part. Motors are of 50 hp. capacity.

Another large order placed about the same time as that for Leeds includes 50 new cars for the Sheffield Corporation Tramways. The population served by this system is about the same as at Leeds, but the trackage is less by 83 miles, while 325 cars are used in daily operation. The new cars are of the single-truck, double-deck, top-covered type, but are slightly larger than those at Leeds, the over-all length being 32 ft. 6 in. Peckham pendulum trucks with an effective spring-base of 20 ft. are used. Motors are Metropolitan-Vickers light weight, 50 hp. rating. A great improvement from the standpoint of appearance has been made by the use of curved glass in the vestibule windows on both upper and lower decks.

Rearrangement of the seats on the upper deck has made them more roomy, but reduced the seating capacity from 48 to 40. Instead of having narrow cross-seats for two passengers on either side of the aisle, as has been the practice in the past, the new cars have a double seat, 38 in. wide, on one side and a single seat, 21 in. wide, on the opposite side of the aisle. On the lower deck seats are provided for 28 passengers, making the total capacity 68.

Last fall the Aberdeen (Scotland) Corporation Tramways put in service ten single-truck, double-deck, top-covered cars. These have a seating capacity of 64; 24 in the lower saloon and 40 in the upper. Protection for the motorman is provided by an inclosed vestibule. This practice is not yet very common in Great Britain, but such protection is particularly desirable at Aberdeen, the most northerly tramway town on the island, where the winter climate is frequently extremely rigorous. The upper half of the center vestibule window is hinged, as shown in an accompanying illustration.

Altogether 24 municipal tramway undertakings and one private company are included in the list of those which recently have bought new cars. Almost all of these are of the double-deck type, exceptions being one experimental car at Bradford, which is described in greater detail in this article, an experimental car at Glasgow, one at Halifax equipped with worm drive, and the new one-man car of the York Corporation Tramways. The single-truck type predominates to a marked

Inclosed Upper Decks Are Standard at Sheffield and London

1. Appearance of the new Sheffield cars is improved by the use of curved glass in both upper and lower vestibule windows.
2. This arrangement of seats on the upper deck of Sheffield cars has made them more roomy but has reduced the capacity from 48 to 40.
3. Standard double-truck car of the London United Tramways Company which has been re-equipped with modern motors.
4. Installation of upholstered seats in the cars of the London United Tramways is a recent innovation.

extent in recent car orders, although there have been a number of important double-truck designs built recently. Among the latter are the cars for Birmingham, Blackpool, Bournemouth, Bradford, Cardiff, Darwen, Manchester, Plymouth, Walthamstow and West Ham. Additional details are given in an accompanying table.

Double-Truck Cars for West Ham

Last fall the Town Council of West Ham, a borough on the eastern boundary of London, placed in operation six new cars of a much improved type. This borough being adjacent to the metropolis, the general design of these new cars naturally is similar to the London County Council standard double-truck, double-deck, top-covered car. The seating capacity is 78, 32 on the lower deck and 46 on the upper. In view of the high speed of operation on this property a particularly low center of gravity has been incorporated in the design. The under frame is of heavy steel and is equipped with collision fenders backed up by spiral springs. Seats on both upper and lower decks are attractively upholstered.

An interesting new car was recently brought out by the Plymouth Corporation Tramways. Although the new vehicle is of the double-truck type and seats 70 passengers as compared with 54 in the older single-truck cars, the weight has been reduced 2,500 lb. Over-all length is 32 ft. 8 in. and the total weight approximately 24,000 lb. Motive power is supplied by two 45-hp. motors of British Thomson-Houston type. The car is remarkable for its quiet operation.

Completely inclosed vestibules are a feature of this car. The open top deck has been adhered to, partly because of the mild climate at Plymouth and partly because the track gage is only 3 ft. 6 in., and there are many sharp curves and steep grades. Under these circumstances it was desired to keep the center of gravity as low as possible. Each upper seat has two waterproof aprons, one to cover the seat itself and the other for the protection of the passenger's legs. These aprons are fastened to the seats with a spring arrangement, which causes them to return automatically to their housings when released. On account of the narrow gage longitudinal seats are used on the lower deck. An innovation, however, has been made by equipping the car with pneumatic seat cushions on both upper and lower decks. Another novel feature is that the exterior of the body is not painted but is simply varnished so that the grain of the wood is clearly brought out. This type of car is to be the future standard for the Plymouth Corporation Tramways.

The Manchester Corporation Tramways has ordered 110 double-truck cars with inclosed upper decks.

London Cars Speeded Up by Modern Motors

The London County Council Tramways, the largest undertaking in the United Kingdom, serving an estimated population of about 4,500,000 with more than 2,000 cars on 325 miles of track, has recently taken two

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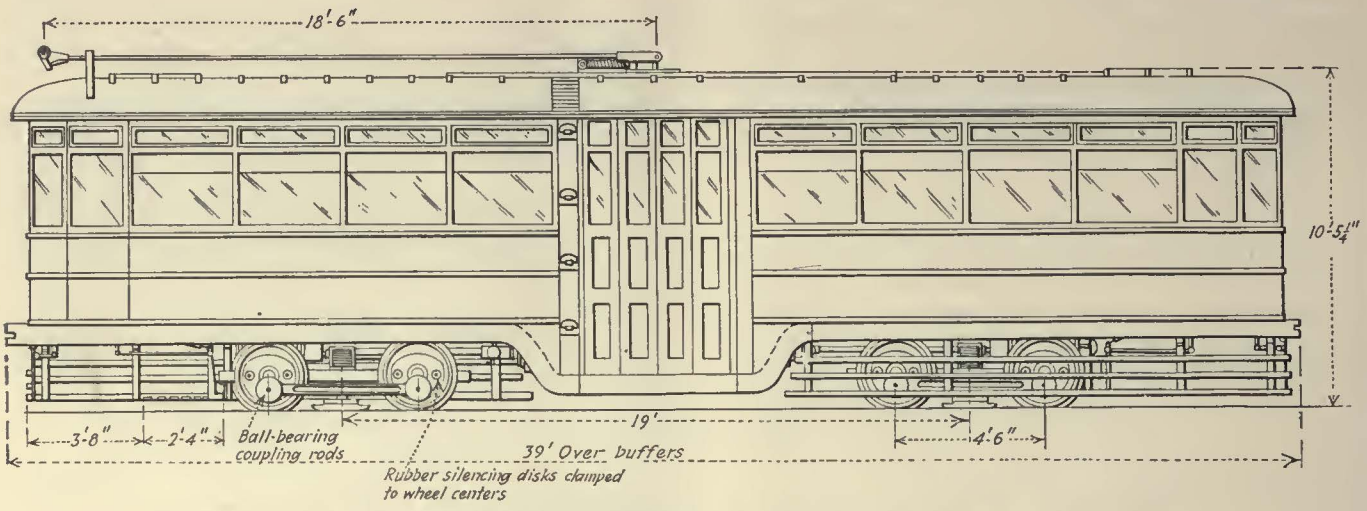
Plymouth and Aberdeen Show Effect of Climate on Car Design

5. Completely inclosed platforms are a feature of the new car of the Plymouth Corporation tramways. The exterior is not painted but is varnished to bring out the grain of the wood..

6. An open upper deck is provided in the Plymouth car because of the usually mild climate.

7. Narrow-gage track in Plymouth makes it necessary to use longitudinal seats downstairs. These are equipped with pneumatic cushions.

8. New car of the Aberdeen Corporation Tramways has been designed to afford the motorman protection from the inclement weather of that northern Scottish town.



Bradford Corporation Tramways Has Departed from British Precedent in the Design of a Single-Deck, Double-Truck, Center-Door Car, as Shown Here

important steps to improve its service. These consisted of equipping the cars with more powerful motors, and providing cushioned seats instead of wood-slat seats on the lower deck. The former improvement has now been practically completed, and the average speed of cars has been increased to 9½ m.p.h. This is the highest in the country, and is about 1 m.p.h. higher than the average speed of the buses of the London General Omnibus Company. This has been accomplished even though the buses stop less frequently than do the cars because their passenger carrying capacity is considerably smaller.

Installation of cushion seats has been carried out to only a limited extent so far. If they prove advantageous on the lower deck, however, it is likely that they will be installed also on the upper decks of cars. Such a move would be entirely feasible as all of these cars have covered upper decks. Recently the London General Omnibus Company received permission to place roof covers over the upper decks of its vehicles. Probably this will lead to the use of cushion seats and the tramcars will have to follow suit, although their smoother roadbed makes this less of a necessity than it is on the buses.

Similar improvements have been made on the cars of the London United Tramways, Ltd., the Metropolitan and South Metropolitan systems. These undertakings are subsidiaries of the London Underground system and are somewhat smaller than the London County Council Tramways. Some 40 cars have been fitted with new Metropolitan-Vickers motors, and 70 equipped with the latest type of magnetic brakes. A much higher rate of acceleration has been obtained, as well as increased speed on hills. The new motors have ball or roller bearings on the armature shaft, and weigh only 39 lb. per horse-power, as compared with 81 lb. per horsepower in the case of the older motors. Improved gears and pinions have done much to reduce noise of operation.

Passenger comfort has been promoted by the substitution of cross-seats for longitudinal seats on both the upper and lower decks. These have spring cushions, and are attractively upholstered in moquette, as shown in an accompanying illustration. Lighting and other interior fittings have been greatly improved. Favorable comment received as a result of these changes has resulted in a decision, on the part of the management, to equip additional cars in the same manner.

RECENT ROLLING STOCK ORDERS

Tramway	No. of Cars	Type	Seating Capacity
Aberdeen Corp.	20	Single-truck, double-deck, covered	64
Birmingham Corp.	80	Double-truck, double-deck, covered	63
Blackpool Corp.	12	6 Double-truck, double-deck, covered	78
		6 Double-truck, toast-rack	64
Bolton Corp.	3	Single-truck, double-deck, covered	56
Bournemouth Corp.	20	Double-truck, double-deck, open	66
Bradford Corp.	1	Double-truck, single-deck, center door	56
Cardiff Corp.	85	55 Single-truck, double-deck, covered	64
		30 Double-truck, single-deck	54
Coventry Corp.	5	Single-truck, double-deck, covered	55
Darwen Corp.	2	Double-truck, double-deck, covered	72
Derby Corp.	6	Single-truck, double-deck, covered	52
Edinburgh Corp.	12	Single-truck, double-deck, covered	60
Exeter Corp.	7	Single-truck, double-deck, open	54
Glasgow Corp.	1	Single-truck, single-deck	36
Halifax Corp.	3	1 Double-truck, double-deck	64
		1 Single-truck, single-deck, worm drive	36
		1 Single-deck, standard gear drive	36
Lanarksbire Tramways	12	Single-truck, double-deck, covered	66
Leeds Corp.	200	Single-truck, double-deck, covered	72
Manchester Corp.	110	Double-truck, double-deck, covered	80
Nelson Corp.	3	Single-truck, double-deck, covered	55
Oldham Corp.	12	Single-truck, double-deck, covered	64
Plymouth Corp.	3	Double-truck, double-deck, open	70
Preston Corp.	1	Single-truck, double-deck	60
Sheffield Corp.	50	Single-truck, double-deck, covered	68
Walthamstow Council	12	Double-truck, double-deck, covered	71
West Ham Corp.	7	Double-truck, double-deck, covered	78
	1	Single-truck, double-deck, covered	60
	*10	Double-truck, double-deck, covered	69
York Corp.	1	Single-truck, single-deck, one-man	24
Total	679		

*Tenders have been invited for these ten cars, but orders have not yet been placed.

RADICAL INNOVATION AT BRADFORD

Departing altogether from established British precedent, the Bradford Corporation Tramways has designed a single-deck, double-truck, center-entrance car. The principal features of this design are shown in an accompanying illustration. In many respects the new car resembles center-door cars used in the United States. It differs from the most recent designs followed in this country, however, in that no end doors are provided and passengers must use the center doors for both entrance and exit.

The motors are spring-suspended under the center of the car body. A propeller shaft and worm gearing arrangement drives the outer axle of each truck. Wheels are connected by side coupling rods. Hand braking is accomplished by means of drums on the inside axles, while the track brake is operated by air. It is expected by the management at Bradford that this type car will prove speedier in operation than the type heretofore used.

The Readers' Forum

Restrictions in Zion Not Illegal

THE CITY OF ZION
Lake County, Illinois

ZION, ILL., June 15, 1926.

To the Editor:

Your issue of June 12, Vol. 67, No. 24, carries the following article:

Commission Over-rules City's Bus Ordinance

An attempt to interfere with the state regulation of public utilities by the city of Zion, Ill., when it issued an order on March 29 prohibiting buses of the Chicago, North Shore & Milwaukee Railroad from stopping for passengers within its corporate limits on Sundays, was recently overruled by the Illinois Commerce Commission. That body decided that the charter granted to the utility by the state denies the right of a municipality to pass ordinances or take other measures to alter features of service as set forth therein. In response to the protests of more than 400 inconvenienced Zionites, the North Shore line appealed to the commission on May 18 for authority to renew the Sunday service. It was then that the commission issued its over-ruling order. Accordingly, an attempt was made by the company to restore bus service on the original schedule. The driver of the first bus to stop within the city limits was arrested, however. Pending a promised action against the company by city officials, Sunday service in Zion has again been suspended.

As a consistent reader of your publication and representing the city of Zion in this matter, I cannot allow to pass unchallenged this erroneous and unfair statement. The statutes of the state of Illinois concede certain rights and duties to cities and villages in the matter of streets. It is the position of this city that no buses may operate within a municipality without prior consent of the municipality. The Illinois Commerce Commission recognized this fact in the North Shore certificate case No. 12498 when it said: "Of a certainty, any order of this commission must be construed in relation to the local power and authority of any municipality involved."

The commission gave the North Shore company a limited certificate in 1922 to operate "through" the city of Zion—it did not and could not, in the absence of permission first had and obtained from the city of Zion, authorize the bus company to operate "in" the city of Zion. Later the city of Zion by franchise and resolution granted the bus company restricted permission to operate in the city. Still later, i.e., some months ago, the Council directed by appropriate resolution that the buses should not stop in the city on Sundays. This was due to the religious nature of the city and the general desire of the citizenry to keep that day in accordance with our faith. The North Shore readily consented to this restriction—there was only a very limited Sunday patronage.

About six weeks later, due to political influences in our county, the bus company was cited to appear before the commission and "show cause why it does not observe its schedules." The North Shore did not appeal to the commission for authority to renew the Sunday service—your statement to that effect is in error. The relations between the city of Zion and the North Shore company are most cordial. No 400 citizens have been inconvenienced nor protested. There were, it is true, a few names signed to a petition, but practically none of them ever used the bus and many signatures represented young children.

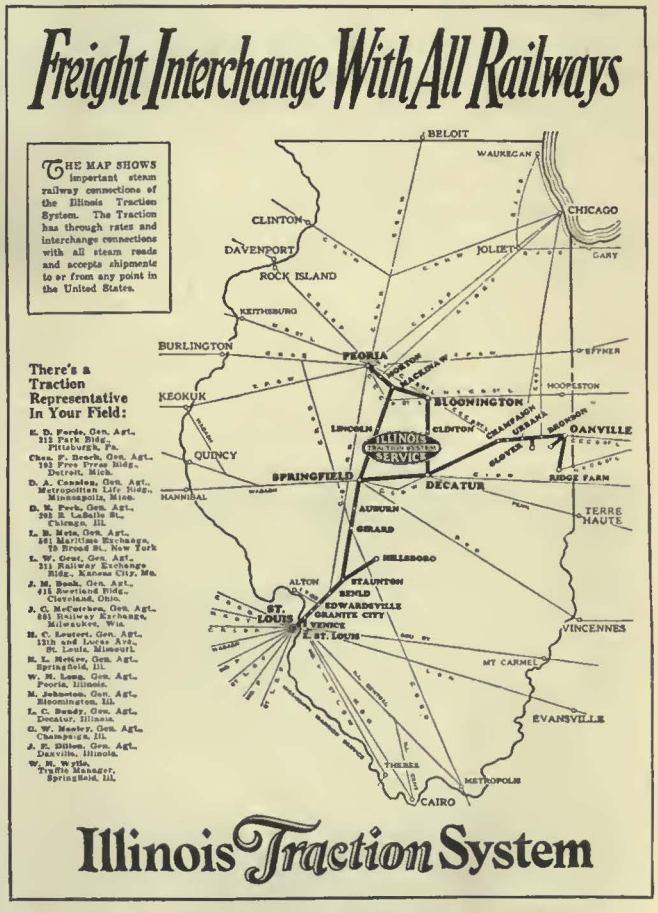
There has been no attempt made by the city to interfere with state regulation as authorized by law; we do contend, however, it is the city's right under our statutes to say when and where the buses may and shall stop on public streets. There is much legal support for this view; I may add this issue is now pending before our Supreme Court in an action brought by the city of Chicago against the Chicago Motor Bus Company.

I should appreciate the courtesy if you will print this letter, to offset the incorrect and unfair statement which appeared in your June 12 issue.

A. E. HUENERYAGER,
Commerce Counsel.

A Good Selling Job on a Single Page Circular

SELLING a freight service on the theory of "express service at freight rates" is appreciated by many interurban lines in the Middle West. The Illinois Traction System has recently issued a one-page circular as illustrated. In this the prospective shipper is shown



One-Page Advertisement of Freight Service Offered by Illinois Traction System

at a glance the possibilities of routing merchandise to and from the many steam roads intersected by this 556-mile system of interurban lines. Names and addresses of the traction representatives at all important points are included.

Interurbans in the central West are well situated to provide a real service in the rapid distribution of commodities.

Maintenance Notes

Spray-Painted Signs Produce Economies

WHEN the New York, Westchester & Boston Railway opened its extension from Larchmont to Mamaroneck, New York, a large number of destination signs were required. It was desired to produce these quickly, and as economically as possible, and also to perfect methods so that they could be maintained cheaply. Several methods were tried and a spray-painting method using lead stencils was finally found to give best results by J. T. Hamilton, master mechanic of the railway.

Preliminary tests of different methods showed that the spray method using lacquer paint was most economical. Difficulty was experienced, however, in regard to the stencils. Several different materials for these were tried, including brass, steel and paper. Trouble was experienced in keeping the stencils tightly against the sign to be lettered. If any of the edges of the stencil at the letters were raised slightly from the sign a wavy and blurred edge was produced which required considerable time of the painter to touch up.

Lead Stencils with Loose Parts Held in Place by Wires Raised from the Surface

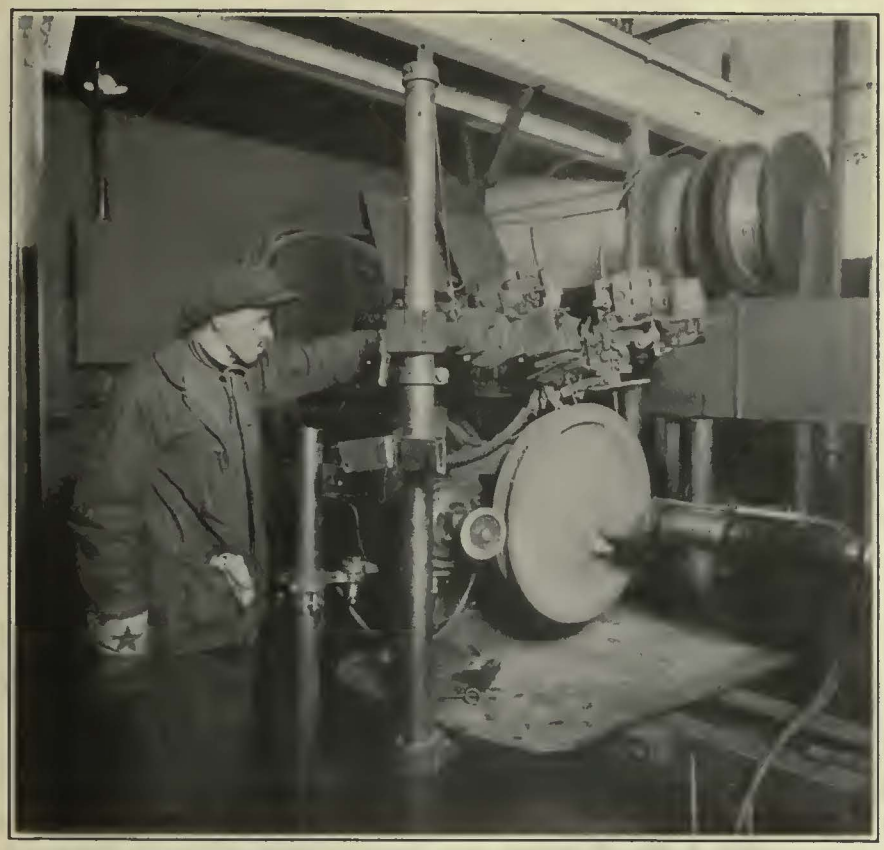
In Relettering Decalcomania Signs the Old Paint Is Removed and a Black Body Color Is Sprayed Over the Old Lettering. An Old Sign Is Shown at the Bottom, Next Above Is the Sign with Paint Removed, Next Is Sign with Body Coat Applied, and Finished Sign Is at Top

Also as several of the letters required supports for the center opening and loose parts, a form of stencil with flat supporting sections made it necessary to hand paint out several lines in the finished sign. These problems were finally solved by using a lead stencil, $\frac{1}{8}$ in. thick, and by supporting the loose sections by brass wires, which were raised up from the surface of the lead so that the spraying would not be interfered with. To bring the edges of the stencil at the letters into good contact with the sign the lead is pressed down by the workman as the letters are sprayed. Accompanying illustrations show the construction of the stencils and also examples of signs done by this process.

The signs are lettered on $\frac{1}{16}$-in. spring steel plates. In order to provide distinguishing marks when the signs are placed in a rack, and also for convenience in locating the stencil accurately, lugs are arc welded to the sheet steel. These extend out from the main body of the sign. The material used for painting consists of a ground color in Japan. The surface of the sign is first sprayed with a black color, then the letters are sprayed on, using chrome yellow,

Spray Painting a Sign in the Shops of the Railway

Attractive Appearance Results with the Signs in Position



A Motor-Driven Wire Brush Mounted so as to Provide for Convenient Adjustment Cleans the Flanges of Wheels Preparatory to Welding

and uncolored lacquer is applied over all as a final coat. A Paasche type of air gun is used for all of the spraying operations.

In experimenting regarding best methods of cleaning up the edges where these become blurred, it was found that gasoline rubbed lightly along the edge will remove the last layer of paint applied without damaging the surface of the undercoat. This saves time also as the painter does not need to retouch the edges of the letters with a brush and paint.

In the maintenance of signs lettered with the lacquer paint process no attempt is made to remove the material, but the sign is cleaned thoroughly with steel wool and then a body of black is sprayed over the letters and the same method of lettering is then used as for new signs. In relettering decalcomania signs which were previously used all of the old paint is removed.

Wire Brush Cleans Ahead of Weld

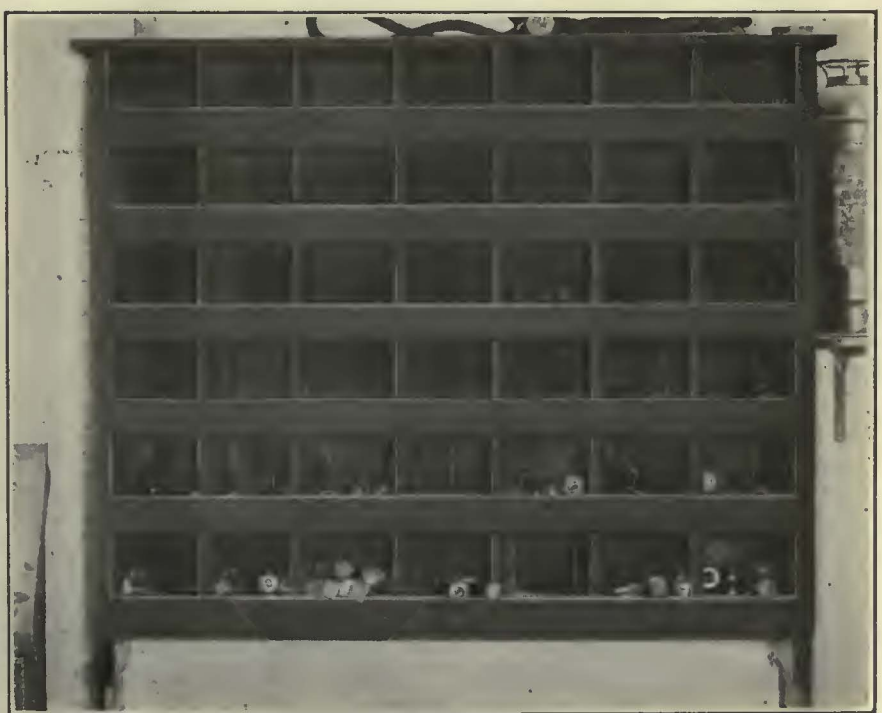
FLANGES of rolled steel wheels used by the Department of Street Railways, Detroit, Mich., are built up by automatic electric welding. To provide a clean surface for the layer of metal which is deposited, a motor-driven circular wire brush has recently been added to the welding equipment. The methods employed for building up the flanges of wheels by means of a double-head welder were discussed in ELECTRIC RAILWAY JOURNAL, issues for Jan. 17, 1925, and March 21, 1925.

The circular wire brush used for cleaning ahead of the point where the welding takes place is mounted on an extension of the shaft of a ¼-hp. motor. The motor in turn is mounted on a bracket with a hinged adjustment. The supporting bracket is clamped to an upright pipe of 2 in. diameter. Vertical adjustment of the brush is obtained by moving the clamp up or down on the supporting pipe. Sidewise and in-and-out adjustment is made by the swiveling action of the supporting bracket, which in addition to having a hinge connection in the center also turns about the upright pipe support.

Cleaning of the flange ahead of the welding has proved of particular advantage for this work, as much more satisfactory welding is obtained without danger of the welded metal scaling off. Some steel wheels, instead of wearing to a sharp flange which requires building up, wear to a thick flange with a square back. In order to bring these flanges back to a standard contour, an oxyacetylene burner is mounted on the bracket for the wire brush motor. The backs of the flanges are then cut to the desired shape by this outfit.

Bolt Rack in Overhauling Section

SUPPLIES of bolts and nuts most used in truck overhauling by the Grand Rapids Railway, Grand Rapids, Mich., are carried in a rack

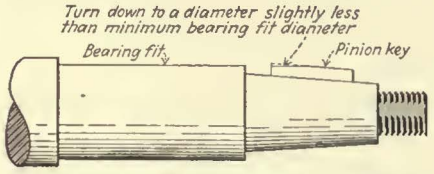


A Rack for Keeping Bolts Handy to Truck Overhauling Work Has Been Found Useful in the Shops of the Grand Rapids Railway

provided in its truck overhauling section of the shop. This rack has 42 small compartments each labeled with the particular size of bolts which is kept therein. Truck overhauling workmen can thus be sure of getting a bolt of the proper size and can obtain this quickly without the necessity of going to the storeroom each time one is required. An accompanying illustration shows the rack in place in the shop.

Pinion Keys Made Permanent with Shafts

TO RENEW pinion end armature bearings it is necessary to remove the pinion, and in many cases the keys for the pinion also must be removed in order to get the armature bearing off. A few removals of the key from its keyway will destroy proper fit, and a loose keyway results in breakage of the pinion and destruction of the armature itself, which often costs several hundred dollars to repair with new materials and keeps equipment from service.



Pinion Keys for Armatures of the West Penn Railway Are Rusted to the Shaft and the Top Edge Is Turned Down to a Diameter that Will Permit the Pinion End Armature Bearing to Pass Over

This problem has been effectively solved by Daniel Durie, superintendent of equipment for the West Penn Railways, Connellsville, Pa. Pinion keys on the armatures of this company's railway motors are made permanent with the armature shaft by rusting them into position. When a key is installed it is dipped in salammoniac water, and by allowing the shaft to stand for a few days rusting takes place so that the key is anchored solidly in position. In order to provide clearance, so that the pinion end armature bearings will pass over the top of the key, armature shafts are placed in a lathe and the tops of the keys are turned off to a diameter slightly less than the minimum diameter to which the pinion end bearing fits are allowed to reach as a minimum. After the pinion keys are once in position and turned down to proper dimensions, they need not be removed and so there is no danger of loose keys.

Ruled Board and Straight Edge Used by Beaver Valley Traction Company in Cutting Window Glass

Board Aids Glass Cutting

EASE in the cutting of glass has been obtained by the Beaver Valley Traction Company, New Brighton, Pa., with a cutting board specially designed for this work. It is ruled laterally and longitudinally at intervals of 1 in. and a straight edge, operating in guides at either side of the board, is used to mark the panes of glass for cutting. A particular feature of this straight edge is the ratchet arrangement provided at top and bottom so that fractional adjustments from side to side may be made, thus giving any desired measurement.

New Equipment Available

All-Copper Rail Bond

HEAVY copper terminal sleeves to hold securely the cable in a tight strip are features of a new rail bond being placed on the market by the Electric Railway Improvement Company, Cleveland, Ohio. This is an all-copper bond, and no molds, dams, or other special devices are required to install it on the rail when using the manufacturers' special coated pure copper arc-welding rod. The sheath and cable are forged to a thin flat section, which is sheared at an acute angle. The surface exposed to welding is therefore of greater area than the cross-section of the cable. Due to the thin flat welding face, a smaller amount of applied welding metal will give a rail contact of maximum area.

Improved Riveter

IMPORTANT improvements have been incorporated recently in the construction of Thor pneumatic riveters, made by the Independent Pneumatic Tool Company, Chicago, Ill. The handle is not subject to bending cracks, being drop forged with a heavy section at the bend. All portholes are drilled full and clear and spiral inlet ports to the throttle valve allow easy regulation.

A positive ratchet lock is provided between the barrel and handle, the octagonal milling on the sliding collar giving a large bearing surface to hold the collar rigid. The odd number of ratchet teeth combined with the even number of sides in the octagon give eight positions for perfect mesh on each ratchet tooth.

The main valve is a hollow sleeve of heavy section with no portholes. The lower end of the valve bore is ground tapered and larger than the bore in the barrels, preventing the piston from striking the valve.

New Type Rail Bond Applied to Rail by Means of Copper Welding Rod

American Association News

Traffic Congestion

ATTENDING a meeting of the committee on traffic congestion held at Toledo, Ohio, June 4, were Messrs. Miller and Schorn, of Detroit, originators of the Miller-Schorn rapid transit plan, who outlined the plan as proposed for that city. Mr. Miller stated that he expected to see it in operation within twelve months. Considerable discussion followed his talk, but the committee took no definite action. R. W. Emerson presented an analysis of the report of the Hoover conference on highway safety, and explained how the sub-committee studying this subject had reached its conclusions.

Additional items to bring the model traffic ordinance up to date were suggested by A. J. Fink, as follows:

1. Vehicles coming out of alleys, garages, or any private property or driveway shall come to a full stop, sounding horn immediately before crossing sidewalk into the street.

2. In the congested district in any traffic restricted area, or on any main artery, no gasoline, oil, tire service or air shall be served on the roadway, but only from within the private property.

3. Parking shall be prohibited within 25 ft. of any exit for fire apparatus or other emergency equipment, also along the corresponding portion of curb on the opposite side of the street.

4. Parking shall be prohibited at street crossings within 20 ft. of the intersection of the curb lines, or within a distance so as not to interfere with the turning of street cars.

5. Parking shall be prohibited at any taxicab stand, hack stand, freight trucking stand or bus stop, except for the vehicles for which these stands have been set aside.

6. Parking shall be prohibited on main street car arteries on which heavy automobile traffic passes through.

7. Parking shall be prohibited along main car line throats in the congested district from 7 o'clock a.m., and on others from 8 a.m. to 9:30 o'clock a.m., and from 4 o'clock p.m. to 6:30 o'clock p.m.

8. Parking shall be prohibited within 50 ft. of a grammar or high school or playground property, or in the corresponding section of the curb on the opposite side of any such street, between the hours of 8 o'clock a.m. to 8 o'clock p.m.

9. No loading or unloading rubbish, ashes, garbage, coal, building materials, barrels or kegs within the congested area between 8 o'clock a.m. and 9:30 o'clock a.m. or between 4 o'clock p.m. and 6 o'clock p.m.

10. In the congested district in any traffic restricted area, or on any main artery between the hours of 8 o'clock a.m. to 6 o'clock p.m., no vehicle shall load or unload except parallel to the curb, at a place where written request has been made to the city official and a temporary written permit has been issued. Where and when end or angle loading is permitted, the vehicle shall remain backed to the curb only long enough to be expeditiously loaded or unloaded, and every precaution shall be taken to restrict traffic as little as possible.

11. On any street where parking is permitted during the hours when the parking limit applies, there shall be set aside upon approval of written request to the city officials a space designated as a loading zone in which passenger vehicles may stand for not over ten minutes, and in which vehicles shall stand only long enough expeditiously to load or unload merchandise.

12. No large girders, steam shovel or large tractor shall be moved during the daytime if it affects the movement of traffic; in such event it shall be done at night. In all cases a written permit of the city officials governing the route it shall take to get to its destination shall be required.

13. No manhole shall be opened up on busy thoroughfares without a permit, and in some cases manholes shall be permitted to be opened only during off-peak hours.

14. Vehicles shall make no lefthand turns in the delivery district during peak hours, wherever possible.

15. Traffic officers shall divert vehicular traffic when necessary in order to avoid congestion or to promote safety and convenience, and no person having charge of a vehicle shall refuse or neglect to obey the direction of a traffic officer.

16. Any police or traffic officer shall cause to be impounded any vehicle left without an operator that interferes with the general regulation of traffic, and the owner or operator thereof can only repossess himself of such vehicle by first paying any and all towing and storage charges resulting from such violation.

After discussion, it was recommended that these new items be included in the committee report.

Synchronized and co-ordinated traffic signals were considered. It was the consensus of opinion that co-ordinated lights of the general type used in Chicago were desirable, and it is planned to include such a recommendation in the report.

Investigation being made to determine the means of transportation used by customers patronizing department stores in congested districts has not been fruitful of results. J. A. Greig stated that Cleveland and Chicago were the only cities where checks of this kind have been attempted. In Cleveland, Mr. Emerson said that a three-day check has been made. C. H. Evenson brought out the fact that in Chicago $50,000 has been appropriated for traffic surveys. Information obtained from these investigations is to be included in the final report of the committee.

COMING MEETINGS OF *Electric Railway and Allied Associations*

June 28-July 2 — Central Electric Railway Association, summer meeting, S. S. South American, Buffalo, N. Y., to Chicago, Ill.

July 8-10—Midwest Electric Railway Association, annual convention, Brown Palace Hotel, Denver, Colo.

July 22—New England Street Railway Club, annual outing, Portland, Me.

July 23-24—Central Electric Railway Accountants' Association, meeting, Drake Hotel, Chicago, Ill.

August 12-13 — Wisconsin Public Utility Association, Railway Section, La Crosse, Wis.

Oct. 4-8—American Electric Railway Association, annual convention and exhibits, Public Auditorium, Cleveland, Ohio.

October 25-29—Annual Congress and Exhibit—National Safety Council —Detroit, Michigan.

Accident Prevention

MEMBERS of the joint committee on accident prevention of the Claims and Transportation & Traffic Association will recommend at the convention in October: (1) safety education of the public and school children; (2) co-operation with all local accident bodies; (3) indorsement of the so-called Hoover plan. They will further recommend that the work of the committee be made continuous. This was decided in New York on June 4. At that meeting the members present went over the answers to a questionnaire on accident prevention work which was sent out some time ago. Answers received to this questionnaire represented 60 per cent of the companies doing outstanding work. In the report of the committee the high lights of the answers will be picked out, and the names of the companies which replied to the questionnaire will be presented. The answers in detail will not be given. The idea is to recommend or call attention to methods employed by other companies. It was agreed that one of the best means toward progress in accident prevention was by lining up the association behind the Hoover plan. This contemplates efforts to secure general acceptance of the model Hoover law so modified as to meet any purely local needs. This would be a great step toward uniformity. Members were urged to turn in their advanced report comments by July 1. Among those who attended the meeting were A. W. Koehler, Milwaukee; R. R. Hadsell, Rochester; E. J. Paige, Baltimore; G. B. Powell, Louisville; A. G. Jack, Wilmington; Seth Baldwin, New Haven; T. E. Lawrence, Brooklyn; M. W. Bridges, Chicago, chairman for the T. & T. Association, and H. K. Bennett, Providence, chairman for the Claims Association.

Merchandising Transportation

FINAL consideration of the report of the merchandising transportation committee of the Transportation & Traffic Association was given at the last meeting of the year held in Cleveland on June 22. Drafts of practically all sections of the report had previously been read and passed on.

Only the final revisions and discussions of the last sections of the report remained.

Members present were: R. W. Emerson, H. L. Brown, E. A. Palmer, A. C. Spurr, S. E. Emmons, J. D. Donley, C. D. Smith and R. N. Graham, chairman.

New England Outing Planned

PORTLAND, Me., will be the meeting place of the New England Street Railway Club's annual outing, which will be held on July 22.

The News of the Industry

Commission Won't Oppose Local Council

The Public Service Commission in the matter of the application of the United Traction Company, Albany, N. Y., for an increase in its fares from 7 to 10 cents decided that it had not jurisdiction to enforce increased fare in the cities of Troy and Rensselaer in opposition to the terms of local franchises. The action of the commission is viewed by officials in the cities affected as opening the way back to the original 5-cent fares in Troy and Rensselaer. The commission's action also serves to advance the demands of Albany city officials that in requesting a fare increase the traction company should not seek to make Albany pay deficits incurred in other cities of the Capitol district.

John E. MacLean, counsel for the United Traction Company, said that the decision would be appealed. This probably means that the entire matter of increased fares for the United Traction Company will be taken out of the hands of the Public Service Commission and determined in the courts.

Use of Chicago's Idle Traction Funds Sought

Two resolutions seeking to compel the Chicago Surface Lines to invest its damage claims reserve fund in good bonds and to use its depreciation and renewal fund for the construction of at least 60 miles of new track and the purchase of 350 additional cars, were presented to the local transportation committee of the City Council on June 17 by Alderman C. F. Nelson.

The author of the resolutions declared that the company's damage claims fund, which now amounts to nearly $6,000,000, is in the banks and drawing only 3 per cent interest. He proposes to have the fund placed in the custody of a board of trustees, composed of representatives of both the city and the company, who will invest as much of the sum as is not required for the settlement of damage claims in bonds yielding a higher rate of interest.

More than $16,000,000, which has accumulated in the company's renewal fund since the unification ordinance of 1911, should be expended for better transportation facilities before the franchise expires next February, the Alderman urged. Although track construction and additional equipment do not legally constitute renewals and replacements, he believes that a precedent for such a proposal was set when the 100 new cars recently ordered by the company were paid for out of this fund. Invested in these much needed facilities, he added, the fund will earn 8.25 per cent instead of only 3 per cent.

Pursuant to Alderman Nelson's suggestion, Corporation Counsel Busch was instructed to confer with surface lines immediately and to draw up a petition to the Illinois Commerce Commission asking authority for such expenditures.

The failure of surface lines officials to appear before the committee was explained by the Alderman as being due to their interest in receivership. They want to control the first mortgage bonds and, therefore, the companies, by a receivership for three or perhaps five years, he said. Their attitude of indifference, however, is not regarded by the committee as a bar to further progress. The latter has threatened to complete the franchise draft without the companies' co-operation if it is found to be necessary. Mr. Leonard Busby, president of the Chicago City Railway, is the only traction executive who has so far agreed to discuss the problem with the committee.

Intensive Advertising Drive

Milwaukee Company, Through Newspaper Medium and Employees' Talks, Informs Public of Purpose of One-Man Car Service—Uniformity of Appearance Meets with Public Approval

IN CONNECTION with the recent installation and operation of one-man cars on its Walnut Street line, the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has launched an intensive advertising campaign in all Milwaukee newspapers to acquaint the public step by step with what the company is trying to accomplish as well as what the new service will mean to patrons of this line in the way of speedier, more reliable service.

Three of the series have already appeared. Each occupied a quarter page of space. These good-will ads are placed before the public in the form of letters signed by S. B. Way, president of the company. The ads follow:

May 21, 1926.

TO OUR PASSENGERS:

This company is authorized to operate one-man cars on the Walnut Street line, and will begin on Sunday, May 23.

That line will so operate as to provide you with safer, better and more frequent service.

This company does not profit by the change in method of operation. It hopes, ultimately, to gain some benefit, because this more ample and more convenient service should attract more car riders.

The cars to be placed in service on this line are newly painted and furnished. They are equipped for electric heat, and have the latest and best safety appliances.

They will run on schedules as fast as the two-man cars. There will be more cars in operation.

Our trainmen are careful and skillful. You will find them considerate in their service.

Use this new line and judge of the comfort and convenience of the service for yourselves.

S. B. WAY,
President.

(This is Number One of a series of letters to be published here.)

May 24, 1926.

TO OUR PASSENGERS:

The cars in the new Walnut Street service were on the line yesterday.

These cars have new equipment for your safety, comfort and convenience. These new features are fully described and illustrated in a leaflet to be distributed today to passengers on all of our city lines.

But these cars require no new or extra effort on your part when you ride in them. Use them as you do all other street cars.

You can tell one of these cars as far as you can see it. You will notice that it is newly painted in distinctive colors. Also it is newly furnished inside, and is equipped for electric heat.

It is a front-entrance car. The front entrance sign is in plain sight and brightly lighted.

It is a safety car. It has all the best safety equipment yet devised. It is the type of car certified by official authority in all the states, as safe, convenient and practical. We have confidence in this safety car.

It is you that the company desires to please because we want your business, and more of it.

You may judge this car for yourselves. We shall appreciate your comments.

S. B. WAY,
President.

(This is Number Two of a series of letters to be published here.)

May 26, 1926.

TO OUR PASSENGERS:

The new Walnut Street service was put in operation last Sunday.

There are now in use on that line, during the busiest rush periods, 21 one-man cars with 1,134 seats; instead of sixteen two-man cars with 832 seats—31 per cent more cars and 36 per cent more seats. In addition, during the heaviest rush hours, seventeen two-car trains are operated.

During other periods of the day, except for "owl schedules," there are proportionate increases of service.

The running time of the one-man cars between terminals is just as fast as before the change was made.

You get the benefit of more service, with no loss of speed, and the advantage of newly furnished cars equipped for electric heat and for greater safety.

The trainmen on these cars earn 5 cents more per hour. They have been carefully trained for this service. You will find them skillful and courteous.

There is no mystery and no secret about this "one-man car" business. It is the sensible, safe and widely used method to improve street car service by increasing its frequency. It is the *only* way to do so at practically the same cost.

Use these cars and judge this service for yourselves. Your comments will be welcome.

S. B. WAY
President.

(This is Number Three of a series of letters to be published here.)

No stone apparently is being left unturned by the company in its effort to acquaint—this time in an entirely new and novel way—patrons of its Walnut Street one-man car line in the fundamentals of the one-man car so that a better understanding of their operation and use may be gained. The company adopted the plan of having street car employees trained in public speaking present a short talk to passengers from the front of the car, after loaded cars were boarded, telling them in well-chosen words how to leave the car through the back door rear

treadle and explaining the mechanism of its operation with a view to its full use by patrons, particularly when cars are crowded. Five conductors have been transferred from their regular work for this special duty, which will continue until the company believes it has reached nearly all patrons under this new educational plan.

Uniformity of appearance will mark the use of one-man cars hereafter in Milwaukee. According to plans set in motion by R. H. Pinkley, assistant general manager of the company, all cars of the one-man type now in operation on the 27th, 35th, Center and Clybourn Streets lines are to be repainted an orange and cream color and equipped with imitation suede seats so that they will be easily distinguished from the two-man cars. The orange and cream colored one-man cars on the Walnut Street line have met with such favor that the company decided to standardize this color for its one-man cars.

Survey Suggested

In connection with the subject of transportation and transit matters in general the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has placed before the Common Council a request covering a comprehensive survey of Milwaukee's transportation needs, the cost of which will be met by the company providing it does not exceed $50,000. According to the outline of the survey contained in President S. B. Way's letter to the Council, this transportation check would be conducted by qualified engineers under the direction of a joint committee representing city officials, citizens, Railroad Commission and the company. The survey is to obtain an impartial insight into street transportation needs so as to make possible better co-ordination of transportation facilities, consideration of transportation needs in city planning and general improvement in transportation service.

Mr. Way explained that his survey plan is prompted by a similar check recently completed in Washington, D. C. He suggested that McClellan & Junkerfeld, the engineers who had charge of the survey there, be retained for the work in Milwaukee.

One-Man Car Case at Des Moines Argued

Oral arguments in the appeal of the Des Moines City Railway, Des Moines, Ia., from the decision of Judge Joseph Meyer in the Polk County District Court in favor of the local street car men's union have been presented to the Iowa Supreme Court. Ralph L. Read of Sargent, Gamble & Read represented the company, and C. C. Putnam the union.

Several months ago Judge Meyer held that a contract between the company and the union requiring that every car shall be in charge of a motorman and a conductor was valid and binding. The company maintained that an agreement of this kind is against public policy in that it prevents the company from instituting economies which would result in the reduction of fares. The contract was signed in 1915, and has nearly fifteen years more to run.

The railway has four one-man cars in operation in Des Moines. Pending the outcome of the appeal, two men are kept on each car, although the "conductor" has no duties. The company contends that if it were permitted to change to one-man cars a saving of nearly $200,000 annually could be effected in trainmen's wages alone.

No decision from the Iowa high court is expected before fall.

Test Period Likely at Tacoma

Plans for the settlement of the Tacoma transportation problem, undertaken by the new Mayor, Melvin G. Tennant, and the City Council, may not be submitted this fall to the people. This was indicated at the second conference between city officials and representatives of the Tacoma Railway & Power Company. It is proposed now that any plan worked out by the conference for possible adoption shall first be put into effect for a test period. R. T. Sullivan, general manager of the company, pointed out that the summer months are the poorest of the year for street car earnings, hence a reliable test might not be obtained during three summer months. In consequence there may be a six months test. In that event the plan would be submitted at the spring election.

Mayor Tennant asked the company officials for figures on the way in which a 7-cent fare would affect the earnings, following submission of figures on what the earnings would probably have been during the past year if the conditions of operation of 1920-21, with 10-cent cash and 8-cent token fare, universal transfers and no jitney competition, had been in force. Other figures on depreciation charges for ten years past were asked by E. K. Murray, city attorney, who is studying company reports. Manager Sullivan did not have a figure of valuation upon company property upon which he would expect a 6 per cent return in any proposed settlement, as was requested at the first meeting. He explained that inasmuch as the value of the property has been fixed by the State Department of Public Works, it will be simpler to retain this valuation and alter the return figure to whatever is deemed proper. Mayor Tennant suggested a figure lower than 6 per cent as proper upon the state valuation of about $7,000,000.

Many factors of street car operation were discussed, including the possibility of inducing the public to use the street cars for transportation, particularly to and from work, instead of operating automobiles and parking them all day.

The Mayor said:

> I think that before we are finished we will arrive at the point where we will hold that the man who drives his own automobile should pay a part of the cost of maintenance of railway service. Property is valued more if we have street car service than if we have none, or if we have good service rather than poor service. I think that at some point, somewhere, the auto driver should help pay for the service for the man who rides the street cars.

Mayor Tennant again went on record as against the city purchasing the railway system.

Two-Cent Increase for Detroit Municipal Men

An advance in wages of 2 cents an hour for platform men of the Detroit Department of Street Railways, without any increase in fares, has been tentatively agreed upon by the D.S.R. management. Announcement to this effect was made on June 21. It is expected that the new wage agreement will be approved by the Street Railway Commission. The increase was accepted by the men at a meeting held under the auspices of Division No. 26 of the Amalgamated Association.

It is estimated the increase will cost the city approximately $210,000 a year. The 7-cent increase asked by the men would have cost the department more than $1,955,000 a year.

If the agreement is ratified by the commission, the increase will be made in two steps, one of 1 cent an hour on July 1 and another like increase to become effective on Aug. 1.

A number of meetings were held, at which the committee representing the men and the D.S.R. officials discussed the changes in wages and in working rules asked by the men. The men included in their request the provision that all scheduled weekday runs of more than six hours and under eight hours shall be considered as regular runs and shall be allowed eight hours time. Of scheduled weekday runs 50 per cent must be completed within eleven consecutive hours. Forty per cent of all runs must be straight runs, as nearly equally divided as possible between day and night runs.

Thirty-five per cent of the total number of runs are to be completed within thirteen consecutive hours. Not to exceed 15 per cent of all runs may be extended to exceed thirteen consecutive hours to complete. Runs requiring more than thirteen hours to fourteen hours to complete will be allowed an additional ten minutes bonus.

It was further provided that runs requiring from fourteen hours to fourteen and one-half hours to complete will be allowed an additional twenty minutes bonus. Runs requiring from fourteen and one half to fifteen hours to complete will be allowed thirty minutes bonus, with one hour additional bonus for each additional hour thereafter.

Rates that apply to motormen, conductors and motor coach operators follow:

Two-Man Cars	Cents an Hour
First six months	67
Second six months	71
Thereafter	75

Rates that apply to one-man car motormen, also to operators of motor coaches or buses seating 35 passengers or more follow:

One-Man Cars	Cents anHour
First six months	72
Second six months	76
Thereafter	80

Owl car men, except one-man car motormen, will be paid 85 cents an hour. The one-man car operators will get 90 cents.

New York Warned Against Scrapping Trolleys

Eloquent Plea Made for Them by Railway Official Who Gave Facts and Figures

Decision was reserved on June 22 by the Board of Estimate of New York on former Comptroller Charles L. Craig's proposal to sell the Fourth and Madison Avenue, Eighth Avenue and Ninth Avenue surface lines to the city. At the hearing formal notice was received from the holders of receiver's certificates of the Second Avenue Railroad that that property was for sale.

In addition, Borough President Joseph A. Guider of Brooklyn offered a resolution for an inquiry to determine whether the Fulton Street elevated railroad in Brooklyn from Ashland Place to the East River should not be torn down, and Edward P. Doyle of the New York Real Estate Board, on behalf of the recently formed Third Avenue Association asserted informally that the city should buy and tear down the Third Avenue elevated line, which he said he believed could be purchased for about $28,000,000. No action was taken on Mr. Guider's resolution, which will be considered at a future meeting of the board.

The hearing on Mr. Craig's proposal was merely on the question whether the surface lines he offered for sale for $7,000,000 constituted obstructions to traffic and misuse of the streets. Representatives of a dozen civic organizations favored the Craig proposal. Mr. Craig confined himself to a short explanation of the technical situation, which requires the consent of the Transit Commission to the abandonment of the operation of the three lines, even if the city should purchase them.

The principal speaker against the Craig proposal was Gerhard M. Dahl, chairman of the board of directors of the Brooklyn-Manhattan Transit Corporation. His argument was more in the nature of a general plea for the retention of the surface lines, which carried more than 1,000,000,000 passengers last year, than a direct argument against the city buying the Craig lines. Mr. Dahl declared that it had been shown by the experience of many cities that the motor bus could not handle "mass" transportation. He added that it would require five buses to carry as many passengers as three surface cars, and asserted that if buses were substituted for cars the congestion would be increased.

Incidentally, Mr. Dahl declared that buses, on anything but short routes, could not be operated for a 5-cent fare, and said that no responsible applicant for the bus franchise had offered a 5-cent fare.

Mr. Craig said he believed that it had been shown that the surface lines in question did constitute obstructions to traffic, and that the purchase of the lines would enable the city to clear two arteries for traffic, one from the Post Office to the Harlem River by way of Madison and Fourth Avenues and the other from Vesey Street to the Harlem River by way of Eighth Avenue. The only north and south street in Manhattan now clear, he said, was Fifth Avenue, and this was blocked by Washington Square on the south and Mount Morris Park on the north.

John D. Fearhake, counsel for the holders of receiver's certificates of the Second Avenue Railroad, informed the board that the property of that company could be purchased by the city and that the certificate holders, the owners of the property, would be pleased to open negotiations. Upon suggestion of Mayor Walker, Mr. Fearhake said he would file a written offer.

It is hoped to present a summary of Mr. Dahl's remarks in an early issue of the ELECTRIC RAILWAY JOURNAL.

850 Car Stops to Be Eliminated at Detroit

The Common Council of the city of Detroit on May 28 unanimously approved a plan submitted jointly by the Mayor's committee on traffic and H. U. Wallace, the general manager of the Department of Street Railways, for the elimination of 850 car stops on the municipal railway system.

	Present Stops	Proposed Stops	Saving	Present Running Time, Minutes	Proposed Running Time, Minutes	Saving, Minutes
Jefferson	111	86	25	76	70	6
Grand River	173	136	37	130	118	12
Woodward	135	111	24	112	106	6

At the present time the Department of Street Railways is using the skip-stop plan outside of the business district, the stops on an average being approximately 600 ft. apart. Under the plan submitted to the Council the general scheme outside of the business district is to skip two blocks between stops, making an average distance of approximately 900 ft.

There are 3,400 stops on the Detroit system and the plans call for reducing this number to 2,550. The general manager in submitting the plan to the Council pointed out that reducing the number of stops would permit the department to cut the round-trip running time for the system by 212 minutes, and would also lessen the time of travel for passengers on street cars, speed up vehicular traffic in general and reduce to some extent the accident hazard. In laying out the proposed stops, the location of churches, schools and heavy loading and unloading points were all considered. It is estimated that the plan will result in a saving to the Department of Street Railways of approximately $600,000 a year.

An example of results which will be obtained through the elimination of some of the stops on three of the main lines of the system is shown in the accompanying table.

At the same meeting of the Common Council Mr. Wallace and Commissioner John W. Reid of the Department of Public Works presented a plan for the installation of approximately 100 protected safety zones to be constructed along several of the lines this year.

In addition to the elimination of stops and the construction of safety zones, it is planned to install traffic signals approximately 2,000 ft. apart in the outlying sections of the main lines for the purpose of breaking traffic sufficiently to permit passengers to enter and leave safety zones or for pedestrians to cross streets.

Paving Made an Issue in Ohio Cities

Disputes between municipalities and electric railways over the cost of paving between tracks are now attracting considerable attention in the section of Ohio near Springfield. On the heels of a battle between the Indiana, Columbus & Eastern Traction Company and the City Council of Bellefontaine over the paving of North Main Street in that city, a suit was filed in the Clark County Common Pleas Court by the city of Springfield against the Springfield & Xenia Traction Company seeking to obtain a judgment representing the cost of paving a street between the tracks of the company, and on top of this the city on May 25 served notice on the Springfield & Xenia Company that unless it agreed to pay the cost of paving between the tracks in another street the city would take steps to oust the tracks from the street.

The latest action in the Bellefontaine case was the issuance of a statement by Bellefontaine city officials charging that the traction company was delaying the paving work in North Main Street in an effort to "force through a franchise favorable to its own interests." The traction company recently, under instructions of Federal Judge Killits of Toledo, withdrew a car that was being used solely for local service in Bellefontaine and substituted instead stops by the regular interurban cars.

In the suit filed against the S. & X. by the city of Springfield the city had proceeded with the paving work and now seeks to collect for the traction company's share of the proceedings.

The threatened ouster action aimed at the company in the proposed paving of another street is being taken calmly by company officials, who declare that the company is not in a financial position to pay for the paving even if it is allowed to pay for it in ten annual installments as proposed by the city.

The railways are contending that street paving work is done solely as a benefit to motorists who are, in effect, competitors of the traction companies.

Drama in Grand Rapids Screened

A screen version of the railway pageant in Grand Rapids, Mich., was enacted at the office of Hodenpyl, Hardy & Company, New York, N. Y., on June 25 before several spectators, who were both edified and delighted—edified at such a demonstration of civic pride on the part of the residents of Grand Rapids and delighted with the proof of transportation progress in that city. How the young and old turned out on June 12 to welcome the 27 new electric rail coaches, ushered into service by the Grand Rapids Railway, is now a part of the history of the West, the details of which were given in the ELECTRIC RAILWAY JOURNAL, issue of June 19, page 1069.

Banker Opposes Pending Traction Ordinance

In a communication to the local transportation committee of the Chicago City Council, Albert W. Harris, chairman of the Harris Trust & Savings Bank and of the protective committee representing the Chicago Railways' first mortgage bondholders, has declared that the kind of enabling legislation that is suggested in the proposed traction ordinance would neither be acceptable nor would it restore credit. It would vest the regulation and control of one of the contracting parties in the hands of the other and is unsound financially, he said.

Mr. Harris did not speak for the bondholders officially, but intimated that investors will not buy the new traction securities if the city of Chicago, through some agency created by itself, is to regulate local transportation under a terminable permit. He said:

> I do not consider this the time to discuss the details of a franchise. The ordinance as submitted, even if approved by the voters, would not be a contract or an operating agreement because the necessary legislation is lacking.
>
> In addition, whatever agreement might be reached at this time would not be binding upon either the city or the surface lines and, therefore, I would not regard this draft of an ordinance in the nature of a franchise but as a memorandum of what must be done before a franchise can be granted.

Mr. Harris insisted that legislation must first be obtained before a solution of the traction problem can be attempted. Henry A. Blair, president of the Chicago Surface Lines, expressed substantially the same opinion in an earlier letter to the framers of the present draft.

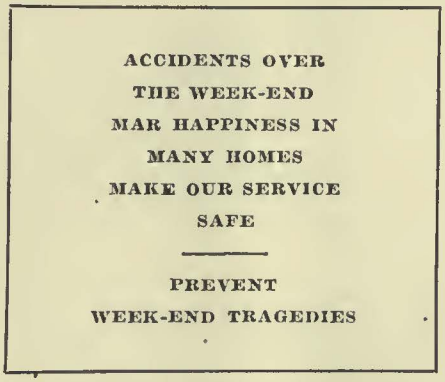
The banker approved, however, the suggestion of the City Council that the Surface Lines be consolidated into one company and expressed satisfaction with the plan for an operating agreement between the surface and elevated line.

Operation Resumed Over Cincinnati, Milford & Blanchester

The Cincinnati Street Railway, Cincinnati, Ohio, which recently purchased the Cincinnati, Milford & Blanchester Traction Company for approximately $50,000, has resumed operation over the route. Sale of the company's assets to the Cincinnati Street Railway was approved several weeks ago by Edgar Dow Gilman, Director of Street Railroads and Buses. The cars of the Cincinnati, Milford & Blanchester Traction Company are in the shops of the street railway for overhauling. Pending their repair large one-man cars are being operated over the line, between Madisonville and Milford, but later cars will be operated through between Government Square and Milford. In the meantime the Madisonville car line will be used between Madisonville and Government Square. Walter A. Draper, president of the Cincinnati Street Railway, said that some of the Cincinnati, Milford & Blanchester cars would run only between Madisonville and Mariemont, while others would go through to Milford. The newly bought line serves Mariemont particularly, one of the fastest growing suburbs in Hamilton County.

Week-End Safety Drive in Baltimore

With the coming of weather which takes the people out of doors at every opportunity, Baltimore has its quota of week-end accidents of all kinds. The newspapers on each Monday morning usually chronicle a long list of accidents that occurred the day before while the public was seeking recreation from the weekly grind. It is with the view of reducing these week-end accidents to the minimum that the United Railways & Electric Company has launched an unusual campaign. Although the company continues with its regular safety work, which is being carried on all the time, it has started the drive against week-end accidents as a supplementary campaign.



The new work has been undertaken by the safety department of the company, and the Baltimore Safety Council also is expected to join the United in bringing about a reduction in the number of week-end tragedies. Although the company is bringing its work prominently before the attention of the public in general, it is spending much effort in impressing the idea upon the operating employees of the company. Car cards also are being used by the company to bring the objects of the campaign to the attention of the public.

To Operating Employees

All of us know the week-end toll from accidents. Monday's newspapers carry columns about these mishaps. In many cases lives are lost. Untold suffering and economic waste lie in the wake of accidents. A program of prevention is entitled to the earnest thought of every one in this community.

People want to be in the open at this season to enjoy the beauties of nature. Automobiles increase on the streets every day, and all who can seek the out of doors.

This means more situations requiring your timely and proper judgment to prevent accidents.

In the interest of public safety, we are co-operating in efforts throughout the city to

Prevent Week-End Accidents

We have the utmost confidence that every man in this company will lend his full assistance to this worth-while effort.

The responsibility is placed squarely upon you and we know you will be equal to it.

"Help Prevent Week-End Accidents," they read.

Large posters, measuring 24 by 32 in., have just been placed in each of the company's 23 carhouses. They are signed by the safety department. Three-inch letters in green ink are used. The poster is reproduced herewith.

Further to impress the campaign upon the minds of the operating employees more than 4,000 cards have been distributed to motormen, conductors and bus drivers. The text of this card accompanies this account. Its wording shows how great a responsibility the company places upon every employee in its drive for safety.

Raymond S. Tompkins, assistant to the president of the United, said that he feels confident that the drive to cut down the number of tragedies that occur over every week-end during the nice weather will have good results. He emphasized, however, that the regular safety work conducted by the company, which is being carried on at all times, is not being slackened.

New York State Railways Entertains School Children

School children of Rochester, N. Y., have no better friend in all the city than the New York State Railways. For, thanks to the trolley company, more than 40,000 kids will frolic this summer at Sea Breeze Park, the big amusement resort owned by the railway. Transportation to and from the park, tickets of admission and for all amusement devices are provided free by the company. The railway will play host at a series of five outings, entertaining about 8,000 at a time. The picnics are in the nature of a reward for the co-operation of the school children in making the streets of Rochester safer. The movement is part of the safety program being carried on by Leon R. Brown, safety director of the company. The railways opened Sea Breeze Park, with its new $1,000,000 natatorium and salt water pool, on Memorial Day with a record crowd attending. The resort is in charge of Bertram E. Wilson, general passenger agent of the railway.

St. Louis Books Under Investigation

The Missouri Public Service Commission at Jefferson City, Mo., has decided to audit the books of the United Railways, St. Louis, for 1925 and part of 1926 before finally passing on the application of Receiver Rolla Wells for increase in fares from 7 to 8 cents. The company proposes to sell two tokens for 15 cents and not to disturb the present fare for children, 3 cents. The decision of the commission to go over the books, effective within ten days, means that it will be at least three months before it can get to the question of whether the company is entitled to more fare. Experts estimate that it will require at least three months to make the audit, and it is very uncertain how soon the accountants on the commission's staff can visit the car company's headquarters.

Hearings Soon on Proposed St. Louis Franchise

Provision for a $1,000,000 revolving fund is embodied in the incomplete franchise ordinance in favor of the United Railways, St. Louis, Mo., which Mayor Victor J. Miller will soon present for public consideration. This fund is an integral part of the service-at-cost principle on which the franchise will be based. If this fund gets too low fares will be raised; if it increases too much, fares will be reduced.

The tentative franchise draft also provides for a traffic commissioner who will look after the city's interests in the operation of the railway system. The salary of this director and the expenses of his office are to be paid by the company, but the total of both must not exceed $50,000 annually.

Members of the reorganization committee of the United Railways do not wish to have included in the grant a provision against the use of one-man cars and other regulatory measures sought by the car men's union; also the reorganization committee wants a 7 per cent return to the company before the payment of taxes.

Other points at issue are the continuation of the mill taxes and other special taxes, such as street improvement and repairs, now assessed against the company. The City Board of Estimate and Apportionment, which has considered the desires of the company officials in this regard, realizes that under the service-at-cost system the car riders pay the taxes, but pleads the necessity for maintaining the taxes as the city cannot increase its tax revenue in the regular channels.

Mayor Miller plans to leave these points open in the draft of the measure to be submitted for public consideration so that he can obtain the reaction of the citizenry.

Stagger System Suggested for Smoky City

The stagger system of spreading rush hours to relieve congestion in the downtown triangle has been officially approved by the Better Traffic Committee at Pittsburgh, Pa., and definite steps have been taken to bring about the cooperative use of the system.

Adoption of the stagger system was proposed by Frank L. Duggan, as chairman of the sub-committee on traffic flaws, which voted unanimously a few days ago to approve and recommend the system for adoption. The outcome of a rather brief discussion was that the committee members passed a motion which entitles Mr. Duggan's subcommittee to continue in a campaign which it is hoped will result in the general use of the system.

Proponents of the system, led by Mr. Duggan and Mr. Marsh, pointed out that the worth of the system might be studied in cities where it is now in use, such as New York, Cincinnati and Chicago. It was also cited that the stagger system is being used successfully by several large Pittsburgh concerns and in some of the larger office buildings. The Pittsburgh Building Owners and Managers' Association's approval and indorsement of the system was used as a favorable argument. It was made clear that the committee was not rushing blindly into the matter, but was merely approving the idea, without taking any rash action. This swayed the skeptics and the motion was passed.

Deadlock Over Toledo Wages

Representatives of the Community Traction Company, Toledo, and the car men's union have been deadlocked for nearly a month on the wage issue in the new contract between company and employees. The wage scale June 1 was 50 cents for the first three months, 52 cents for the next nine months and 55 cents thereafter, with 5 cents an hour added for one-man or bus service.

The men asked a flat increase of 10 cents an hour and the company prepared to grant them 2 cents an hour with certain arrangements for part rebate on new uniforms. J. Frank Johnson, vice-president and general manager of the company, following the rejection of the company offer, wrote Mayor Fred J. Mery and the members of the Board of Street Railway Control that the increase asked by the men, if granted, would mean a sure advance in token fares on the railway lines. This announcement apparently drew no comment from those officials and the situation has remained with no agreement.

The old contract provided for arbitration of differences in case an agreement could not be reached. So far neither party appears to desire to submit the problems to arbitration.

Talk of Terminal Electrification Renewed at Chicago

The promise of electrified operation of suburban trains of the Illinois Central Railroad by July 15 has revived talk in Chicago of universal electrification of the city's railway terminals. Clamorous editorials based on recent news articles describing the results of similar undertakings in New York and Philadelphia are appearing in Chicago newspapers almost daily.

Sentiment in favor of this civic improvement was first actively aroused in 1915, when the railroads that enter Chicago, under the guidance of the Association of Commerce, compiled and published an elaborate report on terminal electrification after four years of investigation. The report estimated the cost, including parallel betterments that would be necessary, at $274,440,630. The railroads announced that under existing conditions the project was financially impracticable and the matter presently languished.

Mayor William E. Dever thinks that it is now opportune to reopen negotiations. He has asked the City Council to appoint a committee to learn the attitude of the various railroads and navigation companies toward a program looking to reasonably prompt replacement of their existing smoke-producing locomotives and tugs by electric or oil-electric equipment. He suggests, further, that the committee prepare legislation similar to that passed in New York requiring the elimination of smoking railway and navigation equipment after a fixed date.

They Rented the Entire Trolley System

Down in Jacksonville, Fla., Cohen Brothers wanted recently to put on a big sale. In order to be certain that all the Kellys who desired to come down town to shop on the opening day would get there they chartered the entire railway system, with excellent results.

The Jacksonville Traction Company has a peak hour from 7:30 in the morning to 9. After that traffic is light until the evening peak hour. This starts around 4 in the afternoon. The entire trolley system was Cohen Brothers' for two hours from 9 in the morning until 11. During that time everybody, regardless of where they boarded the car and regardless of where they were going, rode free. Circus days had nothing on the two hours of the opening day of this sale. Free trolleys were a great success.

In renting the system to the department store the railway took the number of cars on schedule and the seating capacity and arrived at the total seating capacity for those two hours. Then the management multiplied this number by 6.7 cents, which is the average fare in Jacksonville. The nearest even product of this multiplier and multiplicand was accepted as the flat rate to charge the department store for the rental of the system. In this case it was $350. This was the price that Cohen Brothers paid for the rental of the entire trolley system for two hours.

In checking up after the day's business it was found that after deducting the $350 rental paid to the railway by Cohen Brothers the revenue for the day was just $20 less than the total business done on the similar day of the previous week. Adding the $350 rental fee the day's gross revenue was more than $300 greater than on the similar day of the previous week. So from the viewpoint of the railway the sale by Cohen Brothers was a financial success.

Officials of Cohen Brothers report that their lease of the railway was one of the best advertising stunts that they ever "pulled." They used liberal newspaper space, but the total cost of all of the advertising was less than 1 per cent of the volume of business done, a figure considered remarkably low. Much of the success of the sale they attribute to the free trolley idea.

Large Sums Paid Into Welfare Fund

The Twin City Rapid Transit Company, Minneapolis, Minn., paid $63,232 into the welfare fund for employees in 1925, while the employees paid $34,618. For the year the budget was $100,123. Payments to beneficiaries of employees who died in the year were $71,000. Insurance for total disability was $5,600. Among other payments were $1,687 for 58 accident disabilities and $19,379 in 940 cases of illness. At the end of the year the total in the thrift fund was $291,615. Among the activities conducted for employees are mentioned operation of a 40-piece band, trainmen's clubrooms, trainmen's baseball league and entertainments for families.

Experts Will Make Surveys in Cincinnati

The sub-committee of the City Council of Cincinnati, Ohio, named to negotiate a lease for the rapid transit system to the Cincinnati Street Railway has agreed to engage experts to make traffic surveys before entering into any definite agreement with the railway for the operation of the system. The experts will be employed as soon as the committee can reach an agreement as to who shall pay the cost of making the survey. Some members of the committee are of the opinion that part of the expense should be defrayed by the street railway, car riders and taxpayers. Others contend that it should be a 50-50 proposition between the railway and the city.

The experts to be employed, it was agreed, must determine three major questions: What changes are to be made if any in the plan of the rapid transit system to co-ordinate its use with the surface lines to insure operating success? What patronage reasonably may be expected for the system? How can traffic be diverted from the surface cars and what would be the effect upon the fare now being charged on the present system?

The committee is in receipt of letters from a number of experts regarding making the survey. E. P. Goodrich, former vice-president of the New York Technical Advisory Corporation; Ross W. Harris, Madison, Wis.; the Beeler Organization, New York, and Kelker, De Leuw & Company, Chicago, have applied for the contract to make the survey, the cost of which is estimated at $50,000.

Rehabilitation Promised in Boise

The immediate rehabilitation of the lines and equipment of the Boise Street Car Company, Boise, Idaho, was promised the City Council recently by W. E. Pierce, president of the company. Mr. Pierce said he expected to pay all tax delinquencies, repair the lines and go ahead with the transportation system as it is at the present time. It is likely there will be a bus connection with the railroad station carrying passengers from the station to some downtown point. For many months the Council has been discussing the transportation problem in Boise with Mr. Pierce and, until recently, with W. E. Young, Portland, who wanted to put buses on the streets of Boise.

Voters Not Likely to Have Franchise Question This Summer

No hope for submission of a franchise amendment to the voters of Toledo, Ohio, at the August primary election is held out by those in close touch with municipal affairs.

The supplementary report of Prof. H. E. Riggs, furnished a few weeks ago, containing the memoranda of agreements on engineering matters connected with a solution of Toledo transit problems between Professor Riggs and engineers representing Henry L. Doherty & Company, has been ordered printed by the City Council and the Mayor has been authorized to negotiate further with Mr. Doherty. Members of the Street Railway Board of Control expressed the opinion that Mr. Doherty should easily be able to agree to everything in the supplementary report, but that there were other fundamental problems in connection with a settlement of issues in Toledo that have not been touched.

Difficulties of writing off a portion of the capital, adjusting the deficit in the stabilizing fund and the sinking fund and the problem of raising new money for the $2,000,000 or more capital required are all matters to be worked out before any proposal may be submitted to the voters.

Wage Agreement Renewed at Ottawa

The Ottawa Electric Railway, Ottawa, Canada, renewed its wage agreement with its trainmen on June 11. The present agreement, which will remain in force until May 1, 1928, provides for the following wages in cents an hour: For first year conductors and motormen 45 cents; second year, 47 cents; third year, 48 cents; fourth year and thereafter, 50 cents; for one-man car operators 5 cents in excess of the regular rate.

The phraseology of this agreement permits an understanding with any individual employee or any group of employees. It is a strictly open shop agreement, but it guarantees no discrimination against membership in a union or other association.

Labor Question at Indianapolis in Courts

Dismissal of a suit filed by the Indianapolis Street Railway, Indianapolis, Ind., against the Amalgamated Association, Robert Armstrong and John M. Parker, vice-presidents, was asked in two motions filed in the federal court on June 16 by Frank P. Baker, attorney for the defendants. The motions were filed on behalf of the organization and the two officials. The first declared there is no diversity of citizenship and the other alleged that a statute cited prohibits the court from granting a permanent injunction against the organization to prevent it from attempting to unionize the employees of the local utility. A temporary injunction recently was granted by the court to prevent the Amalgamated from continuing its work of organizing the employees.

Third Arbiter Named.—After more than two months of negotiations Judge Malcolm R. Patterson, former Governor of Tennessee and now Circuit Court judge, was selected as the third arbitrator in the wage dispute existing between the trainmen and officials of the Memphis Street Railway, Memphis, Tenn. The two other arbitrators are Lovick P. Miles for the company and A. B. Galloway for the motormen and conductors. The men seek an increase of 12 cents an hour. The company has a counter proposition calling for a decrease in wages.

Lower Rates in Effect.—Special excursion tickets at a fare of $2 for the round trip between Los Angeles and Mount Lowe, Cal., were placed on sale by arrangement of the passenger traffic department of the Pacific Electric Railway, Los Angeles, Cal. Tickets at this reduced fare are sold for use on Wednesdays and Saturdays only, the regular fare of $2.50 remaining in effect during other days of the week. Return limit of the tickets is seven days from date of sale, which allows passengers an opportunity to stay over at Mount Lowe Tavern and cottages, should they so desire. The rate from Pasadena in connection with this Wednesday and Saturday special excursion fare is $1.75 for the round trip, in place of the regular fare of $2.10.

Service to White Plains Increased.—Leverett S. Miller, president of the New York, Westchester & Boston Railroad, announced on June 20 that trains would be operated between New York and White Plains every twenty minutes, 24 hours a day, beginning July 1. At present only one or two trains are run to White Plains between midnight and 6:30 a.m. The increase in the passenger traffic of the road caused the change in the schedule, it is said. In 1925 the passenger traffic increased 14 per cent.

Wage Scale Renewed in Youngstown.—The wage scale for the trainmen and bus operators of the Pennsylvania-Ohio Electric Company and the Youngstown Municipal Railway, Youngstown, Ohio, was continued recently by agreement for another year. The wage scale for two-man operation is 48 cents an hour for the first three months of employment, 51 cents an hour for the next nine months and 57 cents an hour after the first of the year. For one-man operation 5 cents an hour additional is paid on each of these classifications. However, the company has virtually no two-man operation, so that the dominant rate is 62 cents an hour.

Music Lovers Given Special Service.—The United Railways, St. Louis, Mo., has put on special service on its Delmar division to accommodate patrons of the Garden Theater, which opened its season on June 14. At the terminus of the Delmar division in University City extra cars transfer the operagoers direct to the theater.

Asks 15 per Cent Rate Increase.—Declaring that the average increase in cost over 1914 prices has been more than 110 per cent, compared with an increase in rates over the same period of only 24.4 per cent, the Chicago, Aurora & Elgin Railroad, Aurora, Ill., filed a petition on June 15 with the Illinois Commerce Commission in which permission was asked to increase passenger rates 15 per cent. The new rates would become effective July 15. The petition contends that the rate increase would bring fares up to the existing commutation rates of the steam railroads. Suburban rates on several of the steam railroads entering Chicago were raised, last January, 15 per cent, and on others approximately 20 per cent. Britton I. Budd, president of the company, points out that the earnings on the company's investment are grossly inadequate.

Recent Bus Developments

Steam Road Not Disposed to Test Minnesota Bus Act

The railroads have, for the time being at least, dropped their legal fight against the Minnesota law, passed by the last Legislature, controlling the operation of buses over public highways. On the eve of the hearing of a suit on June 15, brought by the Chicago Great Western Railroad against the Jefferson Highway Transportation Company in the Hennepin District Courts to test this phase of the law, giving the Minnesota Railroad and Warehouse Commission charge of bus routes and rates, the railroad dropped the action. The Jefferson company runs a bus line parallel to the Great Western tracks to Rochester, Minn., and each carries thousands of passengers annually. The steam line's contention was that when a steam road served between two points a bus line should not have permission to operate also. The road is now expected to try to win its point by competition.

The steam road runs regular service between the Twin Cities and Rochester and has a special daily round-trip Red train to serve especially patrons of the Rochester hospitals. The bus company has been operating parlor coach buses and contended that there was a public demand, both as a necessity and a convenience, for this service over one of the most heavily traveled rural routes in the state. The commission granted the certificate and held in abeyance the route and rate of fare. This supplementary order was delayed on account of the suit in court. E. F. Zelle, president of the Minnesota Motor Bus Association, said:

> We regard the decision of the Great Western as far reaching, since it indicates the railroads recognize the highway motor bus as a fixed institution in the transportation system and a service the public demands as necessary and convenient.

A. G. Briggs of counsel for the railroad said:

> We believe we will be able to obtain our share of the business. The railroad now proposes to fight it out with the Jefferson on the basis of competitive service, rather than by litigation.

The action as brought by the railroad was the first appeal, as permitted under the new law, from a decision of the commission. It was filed April 21 from the commission's order of March 26. On May 26 the court issued an order setting the trial for June 15 and before that time a stipulation of dismissal was filed.

Chester Lines Absorb Cab Service

Charles B. Cooke, Jr., president of the Chester Valley Lines, which includes the Westchester Street Railway, West Chester, Pa., has announced the acquisition of all the holdings of the Wilmington Yellow Cab Company from Frank V. du Pont, J. A. Montgomery, G. Dare Hopkins and Hollyday S. Meeds, Jr. Effective on July 1 the new management will operate the cab service in conjunction with the Chester Valley Lines system. This system includes more than 200 miles of bus routes in the Schuylkill Valley section, southeastern Pennsylvania and the upper part of the State of Delaware.

Employees Fail to Stop Bus Operation

Judge Sanderson in the Massachusetts Supreme Court has dismissed the petition of the Amalgamated Association in which it sought to enjoin the Boston & Worcester Street Railway and its receiver, Franklin T. Miller, from operating buses between Boston and Worcester.

According to the petition, the Amalgamated employees contended the railway was under agreement with it not to institute new methods of transportation not covered by the agreement without first submitting the question to a conference. The railway and its receiver argued that the receiver could not be sued without express permission from the court, of which he is an officer.

This action by the union was the subject of an item in the ELECTRIC RAILWAY JOURNAL for June 5, page 990, in which it was brought out that the union contended that bus transportation jeopardized positions held by members of the association and that the agreement between the union and the railway provided that at the introduction of a new method of transportation the matter of the status of the employees would be settled by a conference between the union and the company.

Utilities Commission Should Regulate Utah Buses

The question as to whether the Public Utilities Commission has the right to control the operation of auto stage lines, or other motor vehicles which use the public highways for transporting either freight or passengers as common carriers was settled by the Utah Supreme Court on June 2. The opinion, handed down in the case of T. M. Gilmer against the Public Utilities Commission and others, and written by Justice J. E. Frick, held that such control and regulation are within the right and power of the commission. The judge declared that the purpose of the utilities act is to prevent one public utility from destroying another.

The difficulty arose when T. M. Gilmer petitioned to increase the service of the bus line between Salt Lake and Fillmore after he had obtained it from the original owner, Joseph Carling, who operated only one round trip between the two points each week. Among the protestants were the Orem line and the Los Angeles & Salt Lake Railroad. The commission denied the application and also denied a request for a rehearing of the case.

Rhode Island Demands Bonds

Suspension of the public service registrations of 33 buses operating in interstate commerce out of Providence, R. I., was announced on June 17 by the State Board of Public Roads. Following this, Deputy Chief Inspector Harold W. Shippee and several assistants started to remove the public service plates from the vehicles involved as they appeared at the bus terminals in Eddy Street on their regular schedules.

The suspension and removal of registration of the buses was based on the failure of the owners of the vehicles to file bonds with the State Treasurer for the protection of the public in case of accident.

As each bus drove into the terminal Mr. Shippee told the driver that he could either put his bus in a garage or run it out of the state and keep it there, the alternative being arrest. One of Mr. Shippee's assistants would remove the public service plate from the front of the bus. That ended the process.

Twenty concerns operate the 33 buses banned from the roads. About 135 buses remain in interstate traffic.

Hearing on Western Motor Coach

Because of insufficient evidence the hearing on the application of the Western Motor Coach Company to operate buses between Chicago, Ill., and western suburbs in competition with three steam railroads was continued from June 15 to June 30. This company recently applied for a certificate of convenience and necessity to operate buses on four main routes out of Chicago following in general the line of the Chicago, Aurora & Elgin Railroad and supplementing that service.

More Bus Substitutions in Akron

Application has been filed with the city of Akron by Northern Ohio Power & Light Company for the abandonment of three of its Akron city car lines. The company desires to substitute buses on these lines. The lines are the Bowery Street, North Howard Street, and Grant Street. A conference between officials of the company and city officials was held on June 23. Action probably will be taken on June 29.

Line in Olean Approved.—The Public Service Commission authorized on June 18 the Olean, Bradford & Salamanca Bus Line, Inc., subsidiary of the Olean, Bradford & Salamanca Railway, to operate a bus line in the city of Olean, N. Y., and from that city to the village of Richburg. The proposed route will be about 21 miles in length. Four round trips will be operated daily and the through fare each way will be $1.10. It is understood that the Olean, Bradford & Salamanca Railway will now undertake proceedings to abandon that part of its trolley line extending from Portville to Bolivar, and thereafter the residents of this territory will receive service from the new bus line. The proof presented to the commission on the application in this case was to the effect that the operation of the trolley line to Bolivar was unprofitable.

Financial and Corporate

Companies in Middle West to Be More Closely Affiliated

Changes have been announced in the North American Light & Power Company which will result in the Studebaker interests being joined by the North American Company and the Middle West Utilities Company, the latter a Samuel Insull group, in the common stock ownership. Clement Studebaker, Jr., will remain as president of the company.

The North American Light & Power Company, serving 700 communities in Illinois, Iowa, Missouri and Kansas, through subsidiaries, is the holding company which owns the common stock of the Illinois Power & Light Corporation, of which Senator William McKinley of Illinois has been chairman of the board. The latter company is the Studebaker-McKinley operating company which owns the McKinley Bridge at St. Louis and the Illinois Traction System, the longest electric trunk line railroad in the world.

A large share of the common stock of North American Light & Power will be taken over by the Middle West company and the North American Company, the oldest and largest utility holding corporation in the Middle Western States. The operating staff of the North American Light & Power will remain unchanged.

The subsidiaries, Illinois Light & Power, Missouri Power & Light and other operating companies, will not be affected by the reorganization.

Certain new financing of the North American Light & Power is in prospect, Mr. Studebaker said, but the plans are not completed.

Interconnection with power lines of the Middle West Utilities subsidiaries will be one of the chief benefits of the reorganization. The consolidations will enable the plants of the two groups to unite high voltage, long-distance transmission lines over a greater part of the Central West.

Protective Committee for Indianapolis & Northwestern

A committee has been formed to protect the interests of holders of the 5 per cent twenty-year first mortgage bonds of the Indianapolis & Northwestern Traction Company, Indianapolis, Ind. The members are D. P. Abercrombie and George Treat of E. H. Rollins & Sons, B. L. Allen, vice-president Irving Bank-Columbia Trust Company; C. F. Mills, vice-president First National Bank of Boston; E. W. Stout, vice-president Fletcher American National Bank of Indianapolis, and Oscar Haussermann, 1 Federal Street, Boston, secretary.

The committee purposes to act in the proposed merger by consolidation or sale of the Terre Haute, Indianapolis & Eastern Traction Company and subsidiaries with the Terre Haute Traction & Light Company, the Indiana Electric Corporation and the Central Indiana Power Company and subsidiaries.

The committee has announced that when the readjustment plan and agreement have been perfected and approved, depositing bondholders will have the right to inspect the plan or to withdraw bonds without expense within two weeks.

$5,000,000 from Receivers

This Amount Turned Over to Special Master by the Kansas City Railways Operators

Funds in the hands of the receivers of the Kansas City Railways, Kansas City, Mo., aggregating more than $5,000,000 were turned over to John T. Harding, special master commissioner, on June 19. Of this amount, $5,038,109 was in United States securities at the market value of June 16, 1926; $39,131 —the accrued interest at June 16 on the securities; $148,902 representing the final payment on court order of Sept. 3, 1925, providing for the partial distribution to bond and note holders in the sum of $1,599,788; and $21,356 in cash. A sum amounting to $250,000 was left in the hands of the receivers for working capital, assuring operation until the transfer of the property is complete.

In confirming the sale of the Kansas City Railways to the new Kansas City Public Service Company during the week ended June 19, Judge Kimbrough Stone expressed the opinion that the receivership should be terminated and the property transferred to the new owners about Sept. 15.

An appeal from the confirmation was taken by Blatchford Downing, attorney for the second mortgage bondholders. His appeal will have no effect on the ending of the receivership. It will be heard in the Eighth Circuit Court of Appeals, probably at the December term in St. Louis. One of Mr. Downing's main contentions is that his clients were circumvented illegally when the first mortgage bondholders settled with the personal injury claimants and lawyers, whose claims were junior to the second mortgages.

The allowances made by the court to the receivers and to those connected directly and indirectly with the receivership, as announced in ELECTRIC RAILWAY JOURNAL for June 19, page 1076, aggregated $700,000 for the full period of the receivership. Frank P. Sebree, attorney for the stockholders of the old company, voiced the only protest to the allowances. Judge Sebree has 60 days in which to appeal from the confirmation. However, the case of the second mortgage bondholders now is severed from that of the stockholders.

The biggest task remaining before the property is turned over to the new owners is the assembling and indorsement by Mr. Harding of about $23,000,000 in first mortgage gold notes on deposit in bank vaults in several large cities. These bonds will be assembled in a vault in the Federal Reserve Bank in Kansas City within the next 30 days. They will be turned in as payment for the company and new securities issued to the holders.

Gross and Net Earnings Increase on Illinois Power

During 1925 the gross earnings from operation of the Illinois Power & Light Corporation, Chicago, Ill., after eliminating inter-company items, increased about 9 per cent and the net earnings on the same basis, after maintenance and taxes, increased approximately 16½ per cent over the previous year. At the same time the ratio of operating expenses to gross income was bettered by 2.36 per cent. The ratios of earnings available for bond interest and preferred stock dividends were well maintained and the company's securities continued to enjoy a good market and a steady demand. These statements were included in the annual report to the stockholders of the company.

In the railway division many improvements and extensions of service have been made. One hundred freight cars have been added to the rolling equipment, a new storehouse has been built at Decatur and a new passenger and freight terminal completed at Joliet.

Throughout the entire Illinois Traction System new ballasting was steadily going on and much new heavy rail laid, with the result that the roadbed is in good condition. Seven new automatic substations have been placed in operation, six new 1,000-hp. electric locomotives have been put into service and connection made with the St. Louis, Troy & Eastern Railroad, tying the two together as an operating unit. The first group of twenty-two 1-ton trucks, for use in extending the growing express business to include a daily pick up and delivery at terminals, has been installed with marked success.

From an insurance and protection standpoint the showing has again been very creditable. Every employee is covered by the $500 policy of group insurance provided by the company and

COMPARATIVE STATEMENT OF EARNINGS OF THE ILLINOIS POWER & LIGHT CORPO RATION

Gross Earnings	1925	1924
Electric light and power	$15,817,324	$13,871,432
Electric and steam railroads	6,763,656	6,032,489
City railways and bus lines	4,248,821	4,258,005
Gas	3,191,720	2,973,364
Heat	672,394	685,777
Bridge	589,691	591,240
Ice	254,670	169,027
Water	88,303	101,125
Miscellaneous	21,816	1,239
Combined gross earnings	$31,648,398	$28,683,702
Less inter-company	2,566,345	1,984,273
Gross earnings from operation	$29,081,553	$26,699,429
Expenses and taxes	18,472,214	17,592,058
Net earnings from operation	$10,609,339	$9,107,380
Other income	203,445	500,585
Total net earnings	$10,812,784	$9,607,966

on Dec. 31, 1925, 3,826 were members of the death benefit division of the Hospital Association. Forty-seven deaths occurred among the employees during the year and more than $50,000 was received by their beneficiaries. Attention was paid to the educational, safety and accident prevention work.

$1,250,000 North Shore Bonds Sold

Halsey, Stuart & Company, New York, and the National City Company, New York, recently offered for subscription at 96½ and interest, yielding about 5.75 per cent, $1,250,000 of first and refunding mortgage 5½ per cent gold bonds, series B, of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill. The bonds come due April 1, 1956. The bonds were issued on account of the construction of the extension of the company's line from Niles Center to a point on the main line near Lake Bluff, Ill.

Railway's Revenue Decreased.—The Barcelona Traction & Power Company, Ltd., Barcelona, Spain, reports a revenue of $3,678,234 in 1925 against $2,999,287 in 1924. The balance realized in 1925 is $1,248,096 against $74,672 in 1924. The revenue of the railway department for the year showed a considerable decrease, resulting partly from an accident on the railway of the Ferrocarriles Cataluna between Las Planes and Sarria, which resulted in many deaths and injuries. Revenue was also decreased because of the lower spending power of the working classes. The company carried 17,527,373 passengers in 1925.

New Jersey Earnings Increase

For the first four months of 1926, net income of the Public Service Corporation of New Jersey available for dividends was $4,989,998, an increase of $2,127,093, or 74.3 per cent over the corresponding period of last year. After preferred dividend requirements, this was equivalent to $3.14 a share on 1,192,371 shares of common stock outstanding April 30, against $2.16 a share earned on 886,774 shares outstanding April 30, 1925.

Net income for the year ended April 30, after all charges, including depreciation, totaled $12,122,418, a gain of $4,214,336, or 53.3 per cent over the preceding twelve months, and equivalent, after preferred dividends, to $7.27 a share on the above amount of common, as compared with $6.03 in the preceding twelve months.

Railway and bus earnings in April showed further improvement. Combined operating revenues were $2,721,053, an increase of $337,133 over April of last year, while operating expenses of $2,197,275 were $211,389 greater. The Public Service Railway net income for the month was $85,631, against $11,407 a year ago. The Public Service Transportation Company, which operates the buses, reported net income of $18,663, compared with a deficit of $24,459 in April, 1925. Combined net income was $104,294, against a deficit of $13,051 in the corresponding month last year.

For the first four months of this year, the consolidated statement of trolley and bus operations showed a deficit of $317,715, against $898,698 for the corresponding period of 1925. For the twelve months ended April 30, the deficit was $124,198, against net income for the preceding twelve months of $1,122,647, which resulted from the intercompany sale of the Public Service Newark Terminal and real estate adjacent thereto.

More Properties Taken by Southeastern Power & Light

The Southeastern Power & Light Company has acquired the Georgia Light, Power & Railways, Athens Railway & Electric Company, Georgia Southern Power Company and the Georgia Utilities Light Company. These companies serve 42 municipalities. They will be supervised by the Georgia Railway & Power Company, which recently was acquired by Southeastern.

Georgia Light and Athens Railway were acquired from the Henry L. Doherty interests. An issue of $12,500,000 of debentures offered this week by Southeastern will be used in part to pay for the purchase and to finance additions which will increase the output of the system by 100,000 hp.

Net on Havana Railway Division, $486,275

The railway department of the Havana Electric Railway, Light & Power Company, Havana, Cuba, during the year ended Dec. 31, 1925, used 33.2 per cent of the power plant output, against 32.3 per cent in 1924, and operated 8.44 per cent more car-miles. The gross earnings from operation increased 5.65 per cent, forming 40.9 per cent of the total for the company, and the net earnings decreased 6.10 per cent and were 23.4 per cent of the total for the company. The decrease in net earnings compared with 1924 is due largely to the increase in car mileage required by the track extensions over which operation was begun late in 1924 and early in 1925, where the traffic has not yet had time to develop. These statements were contained in the annual report to the stockholders for the year ended Dec. 31, 1925.

The number of passengers carried in 1925 was greater each month than in 1924. The gain in revenue, however, was more than offset by the cost of additional car-miles operated plus the increase in wages of car, shop and trade employees. More attention was given to the regulation of street traffic by the police, and the number of collisions, although somewhat reduced, 829 compared with 957 in 1924, was still an evidence of the difficulties of operation in the crowded streets of the business districts, where nearly all the collisions occur.

The main line was increased by 1.66 miles of single track, the yards by 0.4 mile, and 1.95 miles of existing track was reconstructed. These track extensions, together with those completed in 1923 and 1924, brought about an increase in traffic which has necessitated the additional equipment. Seventy-three new model passenger cars were built, equipped and put in service, 24 old type cars were retired and dismantled and the bodies were scrapped, but all

Conspectus of Indexes for June, 1926

Compiled for Publication in This Paper by
ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.84	June 1926 7.37	May 1926 7.36	June 1925 7.27	June 1926 7.37	May 1923 6.88
Electric Railway Materials* 1913 = 100	June 1926 154.4	May 1926 153.1	June 1925 152.4	Sept. 1920 247.5	Oct. 1924 148.5
Electric Railway Wages* 1913 = 100	June 1926 225.5	May 1926 225.4	June 1925 222.4	Sept. 1920 232.0	March 1923 206.8
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	June 1926 201.9	May 1926 202.4	June 1925 200.0	July 1920 256.4	May 1922 167.4
Eng. News-Record Construction Cost (General) 1913 = 100	June 1926 204.8	May 1926 207.3	June 1925 204.6	June 1920 273.8	Mar. 1922 162.0
U. S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	May 1926 151.7	April 1926 151.1	May 1925 155.2	May 1920 246.7	Jan. 1922 138.3
Bradstreet Wholesale Commodities 1913 = 9.21	June 1 1926 12.80	May 1 1926 12.86	June 1 1925 13.62	Feb. 1 1920 20.87	June 1 1921 10.62
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	May 1926 161.1	April 1926 162.4	May 1925 151.6	July 1920 219.2	Mar. 1922 138.7
Nat. Ind. Conf. Bd. Cost of Living 1914 = 100	May 1926 167.8	April 1926 168.4	May 1925 165.3	July 1920 204.5	Aug. 1922 154.5
Steel Unfilled Orders (Million Tons) 1913 = 5.91	May 31 1926 3.649	Apr. 30 1926 3.868	May 31 1925 4.050	July 31 1920 11.118	July 31 1924 3.187
Bank Clearings Outside N. Y. City (Billions)	May 1926 18.17	April 1926 18.65	May 1925 17.21	Oct. 1925 20.47	Feb. 1922 10.65
Business Failures Number	May 1926 1640	April 1926 1743	May 1925 1572	Jan. 1924 2231	Aug. 1925 1353
Liabilities (Millions)	32 61	47.34	39.75	122.95	27.22

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 137 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads. Previously the wage index applied to 144 railways. The change is due to dropping some roads where the number of trainmen has been reduced to a total of less than 100.

STATISTICS OF ELECTRIC RAILWAY SERVICE, HAVANA ELECTRIC RAILWAY, LIGHT & POWER COMPANY

	1924	1925
Kilowatt-hours used	34,139,235	38,485,913
Total number of passengers carried	114,872,616	121,625,500
Passenger car-miles	18,028,046	19,550,302
Passenger earnings	$5,743,630	$6,081,275
Passenger earnings per car-mile	$0.3186	$0.3111
Gross earnings from operation	$5,924,606	$6,259,208
Operating expenses and taxes	$4,120,948	$4,565,601
Net earnings from operation	$1,803,657	$1,693,606
Operating expenses and taxes per car-mile	$0.2285	$0.2335
Operating ratio, per cent	69.56	72.94

STATEMENT OF OPERATION OF THE RAILWAY DIVISION FOR THE YEAR ENDED DEC. 31, 1925, HAVANA ELECTRIC RAILWAY, LIGHT & POWER COMPANY

Earnings:		
Cars	$6,185,647	
Miscellaneous	73,560	
Gross earnings		$6,259,208
Operating Expenses and Taxes:		
Maintenance	$859,984	
Transportation	3,128,492	
General, including taxes	577,124	
Total operating expenses and taxes		4,565,601
Net earnings from operation for 1925		$1,693,606
Deductions for Division:		
Interest	$585,265	
Reserved for depreciation and contingencies	622,065	
Total		1,207,330
Net income for the division for 1925		$486,275

of the equipments and fittings worth salvaging were repaired for use again. The net gain was 49 new cars.

The fourteenth annual report of the Havana company includes the report of the general manager for 1925, as well as a statement of Warren Bicknell, consulting engineer to Frank Steinhart, president of the Havana properties. The accompanying table shows the statistics of the electric railway department in 1925 compared with 1924.

Alton Properties Sold Under Foreclosure

All properties of the Alton, Granite & St. Louis Traction Company and Alton Gas & Electric Company were sold under foreclosure at the Madison County Court House in Edwardsville, Ill., on June 16. The properties were sold in five parcels and brought a total of $1,965,000. The only bidder at the sale was Louis H. Egan, president of the Union Electric Light & Power Company, St. Louis, a member of the bondholders' committee. The other committee members are F. J. Boehm, St. Louis, and Allen Van Wych, New York City. Like the property sold at auction, the Union Electric Light & Power Company is controlled by the North American Company. The latter company controlled the Alton, Granite & St. Louis Traction Company and the Alton Gas & Electric Company through the East St. Louis & Suburban Railway, another of its subsidiaries. It is understood that the bondholders plan to reorganize the properties into three companies, each to be operated separately.

The sale was held by Louis Clements, Danville, Ill., special master of the United States District Court for the Eastern District of Illinois, under an order issued by Judge Lindley on a petition of the trustee for the bondholders. The companies had not paid interest on the $3,500,000 bond issue since February, 1920. The Alton, Granite & St. Louis Traction Company's interurban lines between St. Louis and Alton brought $700,000 and the city lines in Alton, Venice and Brooklyn, $180,000. The railway has been in receivership since 1920. T. W. Gregory, East St. Louis, was receiver.

Net Income Higher.—The total operating revenues of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., for the eleven months ended May 31, 1926, was $40,974,038 against $39,550,536 for a similar period in 1925. Total operating expenses increased from $25,930,098 to $26,657,437. After the consideration of income deductions, a net income remained of $5,221,837 in the 1926 period and $4,643,080 in the 1925 period.

Reports Indicate Ohio Traffic.—City and suburban electric railways in Ohio in 1925 carried 871,509,382 passengers, according to a compilation of annual reports submitted to the Ohio Public Utilities Commission. This compilation shows that the total revenue of 110 interurban lines and sixteen city lines in the state was $65,405,795. The operating expenses of these companies aggregated $55,439,846, in addition to taxes of $6,098,010. The estimated investment of electric railway property alone, excepting the property not used for electric railway purposes in the case of dual service companies, was $316,035,385 as of Jan. 1, 1926. The total mileage operated in the state in 1925 was 3,038.

Deficit in Toledo.—A deficit of $14,960 resulted from May operations of the Community Traction Company at Toledo, Ohio, in spite of a better average daily business than in May of last year. The company carried 4,178,773 revenue passengers, collecting $292,037 passenger revenue, compared with $286,904 for May, 1925. Operating charges were $225,204, or $6,751 increase over May a year ago, while there was a loss of revenue from interurban track rentals. Feeder bus lines of the traction company carried 55,368 passengers. Revenue was $2,013 and cost of service $3,685. The Oak Street line operated at only a slight profit.

New Director Fills Vacancy.—Alfred F. Pillsbury, treasurer of the Pillsbury Flour Mills Company, Minneapolis, has been elected director of the Twin City Rapid Transit Company, Minneapolis, Minn., succeeding the late E. Pennington, chairman of the board of the Minneapolis, St. Paul & Sault Ste. Marie Railroad.

Taxpayers Pay in Seattle.—An assertion that the failure of Seattle, Wash., to rehabilitate its Municipal Railway system by "rapid transit" is adding about 10 per cent to the taxpayers' bill is made by William Pitt Trimble, chairman of the rapid transit committee of the Seattle City Planning Commission. Mr. Trimble presents figures to show that if the Stone & Webster interests now operated the lines their franchise tax would be $120,000 a year, which, with other costs placed on the taxpayer, brings the figure up to $650,000 a year. "Figured at this rate for the seven years the city has owned the lines," Mr. Trimble said, "the taxpayers have assumed a total burden of $4,500,000. The lines have paid Stone & Webster $4,200,000 on the principal, so the taxpayers have paid $300,000 more than the lines have paid Stone & Webster.

Trustees Appointed to Sell Property.—Walter C. Capper and J. Elmer Carter, Cumberland attorneys, were appointed on June 17 trustees to sell the property of the Cumberland & Westernport Electric Railway, Frostburg, Md., by Judge William C. Walsh of the Circuit Court. The order was made on a petition signed by the Real Estate & Trust Company, Philadelphia, which alleged that the company defaulted in payment of interest and principal on the $660,000 bonds secured by a mortgage on the property. The defendants to the suit admitted the allegation and the road will be offered for sale as three separate companies and also as a whole. The road, which operates 21 miles, went into the hands of a receiver on June 29, 1925. Reference to the receivership was made in ELECTRIC RAILWAY JOURNAL, issue of July 11, page 73.

Invitation to Purchase Additional Shares.—The reorganization committee for the United Railways of St. Louis, Mo., in connection with subscription receipts for common stock of the St. Louis Public Service Company, which are now being traded in on the St. Louis Stock Exchange, notices of which are now being mailed out to holders of record June 15, 1926, invites the holders to purchase on or before July 1, 1926, at $12.50 per share such additional shares as have not been subscribed by holders of certificates of deposit for the St. Louis Transit Company's 5 per cent bond. The right to purchase additional shares is on the basis of one-tenth of one share for each 1½ shares represented by the subscription receipts.

Sale Approved.—The Public Service Commission of New Hampshire has approved the sale of the Laconia Street Railway, Laconia, N. H., to Guy Tetley and Howard Byse. The owners were also given permission on their recent petition to issue capital stock to themselves to the amount of $25,000, which represents the railway's capitalization. Reference to the new ownership of the property was made in the ELECTRIC RAILWAY JOURNAL, issue of May 29, 1926, page 948.

South Shore Line Petitions for Equipment Certificate Approval.—Approval of an issue of equipment trust certificates in the principal amount of $1,060,000 as part of the plan of financing the purchase of 43 new cars and locomotives has been asked in a petition filed with the Indiana Public Service Commission by the Chicago, South Shore & South Bend Railroad, Michigan City, Ind. The equipment, which was ordered last year at a cost of $1,333,787, consists of two dining cars, two parlor cars, 35 electric motor cars for passenger and baggage service and four 80-ton Westinghouse electric locomotives.

Personal Items

J. K. Buchanan Resigns

J. K. Buchanan, vice-president and general manager of the West Virginia Utilities Company and the Wheeling Public Service Company, of Morgantown and Wheeling, W. Va., resigned recently. The resignation was announced from the office of the Southern Cities Utilities Company, parent organization.

Mr. Buchanan has been identified with the Wheeling concern since April, 1904, when he entered the employ of the Union Utilities Company, then directed by Harry Warfield as executive officer. The Union Utilities Company then became the West Virginia Traction & Electric Company, at which time its ownership passed into the hands of Eastern interests. During the war-time period there was a receivership, but this was lifted on April 1, 1920, and the property, along with that of Wheeling, was purchased in 1921 by Anderson & Company, Providence, R. I. Mr. Buchanan rose steadily in the ranks until he reached the position of general superintendent, which he held up to 1925, when he was elected vice-president and general manager. The Morgantown properties of the West Virginia Utilities Company are conservatively valued at $4,000,000. The Wheeling properties are estimated at $3,000,000.

Northern Ohio Changes Announced

Howard L. Farmer, veteran trainman in the employ of the Northern Ohio Power & Light Company, has been made superintendent of the Canton and Massillon city divisions and of the interurban division south of Akron. He succeeds Frank J. Conklin, who has held the position for the last seven years. Mr. Conklin goes into the freight department.

Charles Stottler, who has had charge of the Massillon shops for ten years, has resigned. He is succeeded by Harry Bucher, formerly of the Dover shops of the company.

W. A. Carlisle has been put in charge of a branch office in New York City of the Georgia Railway & Power Company, Atlanta, Ga., organized as part of the campaign to bring new industries to Georgia. Mr. Carlisle is personally familiar with conditions of interest to industrialists in the section served by the company. In addition to distributing literature and answering inquiries at the Eastern headquarters, Mr. Carlisle is personally calling on executives of various industries in the East in an effort to attract more factories to Georgia.

J. R. Dew has been made division passenger and freight agent of the Union Traction Company of Indiana in the territory comprising the cities of Marion, Kokomo, Logansport, Peru, Wabash, Tipton, Elwood and Noblesville, with his headquarters at Kokomo. The appointment is in line with the company's policy to provide service and counsel to all shippers and travelers who desire it. With the rapid extension of the first, second and third morning deliveries to points in Indiana, Ohio and Michigan and the addition of bus service to interurban passenger service the need has become acute for intensifying the various contacts maintained between the company and the public.

C. C. Gillette Promoted

C. C. Gillette, research manager of the Pittsburgh Railways, Pittsburgh, Pa., has been named vice-president and general manager in charge of operation of the Wheeling Public Service Company, Wheeling, W. Va. This announcement, emanating from the office of the Southern Cities Utilities Company, parent organization. Mr. Gillette

C. C. Gillette

succeeds J. K. Buchanan. He has already assumed charge of the Wheeling properties.

Mr. Gillette has been identified with the Pittsburgh property since September, 1921, when he became a special investigator for the Pittsburgh Railways. He was made traffic agent in the commercial department in 1923 and held this position up to the time of his appointment as research manager in 1925. Before his affiliation with the Pittsburgh Railways Mr. Gillette was associated with the Westinghouse Electric & Manufacturing Company. With that company he took the graduate students' apprentice course and special engineering course under B. G. Lamme. He also worked one year in the railway project section of the general engineering department. In May, 1917, he entered the military service and was connected with the Fourth Infantry, Third Division, as a first lieutenant and captain from September, 1917, to December, 1919. Mr. Gillette is a graduate of Bucknell University with the degree of electrical engineer. He was born in Rochester, N. Y., in 1895.

The new vice-president had the honor of being one of the four especially resourceful young men who were appointed to posts at the time of the creation of a commercial department on the Pittsburgh Railways, following the reorganization of that property. Mr. Gillette as traffic agent, J. E. Davis as special investigator, F. R. Cogswell as director of traffic promotion and J. B. Donnelly as director of public relations were all chosen to have a hand in the destiny of the newly-resurrected property because of their technical training and because temperamentally they were considered fitting overseers of such assignments.

George D. Wilcox, automotive engineer of the Department of Street Railways at Detroit, Mich., has resigned, effective July 3. Mr. Wilcox was engaged in work in connection with mechanical developments in the automotive department of the municipal system. The type of bus which the Street Railway Department recently contracted to purchase was designed by Mr. Wilcox and the specifications were drawn under his direction.

Clarence M. Lewis has been appointed counsel to the New York Transit Commission, effective July 1, to succeed General Louis W. Stotesbury, resigned. The salary is $15,000. The appointment of Mr. Lewis was announced by John F. Gilchrist, chairman of the commission. The new counsel was educated in the public schools of New York, at the College of the City of New York and the New York Law School. He was admitted to the bar in 1903.

W. T. Young, general manager of the Dundee Corporation Tramways of Scotland, has been appointed general manager of the Halifax Corporation Tramways of England. In this capacity he succeeds B. Hall, who has been appointed to a similar position in Portsmouth. During the past 27 years Mr. Young has held important posts in a number of British municipal tramway undertakings.

George A. Prichard, an attorney for many years in the train service of the Los Angeles Railway, Los Angeles, Cal., has been designated special legal adviser for employees requiring such service. Except when trials in court are necessary this advice and service, like preparing papers, such as deeds, mortgages and contracts, will be given without charge to employees. In matters involving purely domestic affairs and relations with the police traffic department, such as traffic violations, employees of the transportation department may continue to call upon that department, which will assign the cases to the special counsel if it be found advisable or necessary to do so.

Oakley Baskin has been appointed superintendent of power and lines of the International Railway, Buffalo, N. Y., according to announcement made by Bernard J. Yungbluth, president of the company. In this capacity he succeeds Joseph Mack. Mr. Baskin became affiliated with the International Railway in 1911 as assistant electrical engineer. He formerly was with the Flint Electrical Company as manager and also has been associated with the Astoria Electrical & Power Company,

Astoria, and the departments of maintenance and testing of the General Electric Company, Schenectady. He is a graduate of Pratt Institute.

Obituary

John E. Duffy

John E. Duffy, general superintendent of the New York State Railways in Syracuse, Utica and Oneida, died at his home in Syracuse at the age of 65. His death followed a long illness. He had not been at his office since February.

Mr. Duffy was one of the best-known railway men in the East. He had been connected with the New York State Railways for the last 33 years.

He was born at Herkimer, and went to Syracuse with his parents in 1873. He was educated in the public schools and in 1879 began work as an apprentice in a shoe factory. He stayed at that trade for fourteen years. He was appointed a conductor on the Syracuse Consolidated Railway in 1893. At that time there were several competing lines in Syracuse. In 1896 he was made an inspector, and a year later was appointed night foreman

John E. Duffy

at the Tallman Street shops of the People's Line.

In 1898 he became inspector again and in 1899 was made day foreman. In June, 1900, he became chief inspector of all lines of the newly consolidated companies. The following October he was placed in charge of the transportation department and a year later was appointed superintendent of the Syracuse lines, New York State Railways.

Eleven years later he was promoted to the general superintendency of the Syracuse, Utica and Oneida lines.

Bernord D. Booker, an attorney in the legal department of the Philadelphia Rapid Transit Company, Philadelphia, Pa., died recently in the Casualty Hospital, Washington, following an automobile acident in Riverdale, Md. Mr. Booker was graduated from the University of Virginia in 1919 and afterward was admitted to the Pennsylvania bar. He became associated with the Philadelphia Rapid Transit Company in 1922. He was 31 years old.

Manufactures and the Markets

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

Cars in Outdoor Space

Comprehensive Street Car Exhibit Planned for Cleveland, Exemplifying Every Modern Type for All Kinds of Service

Extraordinary facilities are to be provided at Cleveland for cheaply and conveniently exhibiting street cars. This will permit probably the most gigantic and spectacular street car display ever held in the world. These facilities will be available as a result of arrangements made with the Cleveland Railway and the official drayman for handling cars received from the steam railways and the interurban railway track connections.

John J. Stanley, president of the Cleveland Railway, has addressed a communication to railway operators and manufacturers asking that 100 cars be displayed. The manufacturers will exhibit the latest cars, both city and interurban, which they are building today. The operators will exhibit cars now running which represent the developments of the last few years. It is expected that there will be a complete display of every modern type of city and interurban car, with all the variations in car body design, trucks and accessory equipment to meet varying service requirements. This one feature alone of the exhibit will be well worth careful study by railway men. To the public at large it will afford a convincing demonstration of the way in which electric railways are meeting changed conditions in the transportation field and serve as proof that as a vehicle for rapid, safe and comfortable transportation service the modern electric street car cannot be surpassed.

If the committee's plans are successful, one of the association's newly designed standard cars developed during the year by the special manufacturers' committee and built by one of the member companies will be on view. Among other exhibits, it is hoped that there will be one of the new streamline body cars. This car will illustrate the results of efforts to enhance the architectural grace and proportions in body design. In addition there will be standard one-man cars, double-truck one-man, two-man cars of the center entrance and exit type, cars for heavy rush-hour traffic and lighter cars for supplemental service; in other words, big cars and little cars, for various kinds of city service. In the interurban field exhibits of recent designs in heavy Pullman type cars intended for operation at 75 to 80 m.p.h. are being planned. Contrasting with these will be the light-weight simplified types for speeds up to 50 m.p.h., and still further, the lighter weight one-man type of interurban car; special interurban cars, including the latest developments in interurban sleepers, and dining cars.

In the work car class, all types of dump cars, crane cars and other types of work cars will be exhibited.

Closely allied with the car exhibit will be a display of heavy track machinery and tools. Among these, the committee plans to secure sweepers, snow plows, concrete breakers, car wheel trucks and tractor devices, track digging plows, earth borers, tie tampers and other maintenance of way tools. The facilities to be provided at the convention will permit many of these to be put in actual operation so that their effectiveness can be demonstrated.

To date association headquarters has received requests from 144 exhibitors for 68,693 sq.ft. of space, not including track space, for which applications have been received for more than 500 linear feet.

Twin City Company Is Testing Gas-Electric Buses

Tests of two makes of gas-electric buses are being conducted by the Twin City Rapid Transit Company, Minneapolis, Minn., and the Northland Transportation Company, bus subsidiary of the Great Northern Railroad. These buses, furnished by the International Motor Company and the Yellow Truck & Coach Manufacturing Company, are said to be practically noiseless in operation and are equipped with electric brakes for hill braking and emergency stops. It is planned by the Twin City Rapid Transit Company to operate gas-electric buses on its proposed Nicollet-Hennepin bus line in Minneapolis. T. Julian McGill, vice-president of the company, said:

> The new type of gasoline-electric bus is as noiseless as possible, and that is of great importance when operating bus service through the residential districts. This type is particularly desirable for service on Nicollet Avenue. Actual bus operation probably will begin in September of this year.

Much Interest Shown in Gas-Electric Rail Cars

Four additional railroads have recently ordered gas-electric rail cars from the J. G. Brill and Westinghouse Electric & Manufacturing companies. The contracts as placed by the respective roads include four 71-ft. combination baggage and passenger cars for the Lehigh Valley, two standard 60-ft. cars for the Central of Vermont, two standard 60-ft. cars for the Pennsylvania Railroad and four 60-ft. cars for the St. Louis & San Francisco. The first named four cars, however, instead of the standard 250-hp. gas-electric generator units, will be equipped with double units giving each car a total of 500 hp. This will make them the heaviest engined passenger gas-electric cars ever built anywhere in the world.

American Car Earnings Hold Steady

President Woodin Reviews Affairs in Annual Report and Discusses Entrance Into Bus Building Field

Lament is expressed by W. H. Woodin, president of the American Car & Foundry Company, New York, at the volume of new equipment buying by the railroads during the fiscal year of that company ended June 30, 1926. Such buying was not in the volume that reasonably might have been expected. Export business was good; in fact, much better than the year before, and in the manufacture and sale of miscellaneous products the company did a business satisfactory both as to quantity and profit. The year closed with a fair amount of business booked, and he sees no reason to complain with respect to the share of business obtained by the company.

Net earnings of the company and its subsidiaries in the fiscal year ended April 30, 1926, were $6,102,898, equivalent, after preferred dividends, to $6.67 a share on 600,000 shares of common stock. This compares with $6,164,104, or $6.77 a share, in the preceding twelve months.

Total earnings in the last fiscal year were $9,274,572. After allowing $3,171,674 for renewals, replacements, etc., dividends of $2,100,000 on 7 per cent preferred stock and $3,600,000 dividends on common stock, a surplus of $402,898 is shown. This brings the consolidated surplus as of April 30, 1926, up to $41,245,296.

Of particular interest to readers of the ELECTRIC RAILWAY JOURNAL are the remarks by Mr. Woodin about the entrance of the company into the bus, truck and electric railway fields. He says that the management for some time past has been giving careful study to the problems in transportation both of passengers and of freight presented by the growing use by the electric and steam railroads of automotive vehicles, including buses, motor trucks and motor-driven rail cars—vehicles which have demonstrated their value in service supplementary to that of many street and interurban electric railways and for use by branch lines of steam railways where under present day costs the available traffic has not been sufficient to permit of profitable operation by the older methods. As Mr. Woodin sees it, these vehicles unquestionably will play an increasingly important part as factors in the improvement of the railway earnings.

Recognizing these conditions, the management concluded some time ago that in the manufacture and marketing of such automotive equipment there lay a legitimate and profitable field for an extension of the company's activities and during the year just closed it entered that field by the organization of American Car & Foundry Motors Company and the acquisition of a controlling interest in the newly organized Brill Corporation.

In commenting on the general conditions Mr. Woodin said in part:

> The railroad buying of new equipment during the year has been done spasmodically and at prices that have made a profit possible only by keeping costs to a minimum, this calling for the practice of the utmost economy and efficiency in all departments of the company's activities.
>
> The railroads generally are in good financial condition. There is hanging over them no threat of legislation adversely affecting their interests. Undoubtedly there is need of additional equipment if they are to discharge adequately their functions as carriers of the products of the country's industry. These conditions justify the expectation of increased buying activity, and when that comes there is no reason to doubt that the company will get its fair share of the business.
>
> There has been a very noticeable and progressive lessening of the volume of business done in the rebuilding and repairing of old equipment. This is due in part to a more or less insistent demand that the railroads should in their own shops rebuild and repair their worn equipment. Such demand is not justified on the score of cost.

The consolidated income account compares:

	1926	1925
Earnings	$9,274,572	$9,781,085
Renewal and replacement*	3,171,675	3,616,982
Net income	$6,102,897	$6,164,103
Preferred dividends	2,100,000	2,100,000
Common dividends	3,600,000	3,600,000
Surplus	$402,897	$464,103
Previous surplus	40,842,399	37,278,466
Profit and loss surplus	$41,245,296	$37,742,569

*Repairs, new patents, flasks, etc.

Ten New Cars Ordered by Suburban Road

New York, Westchester & Boston Railway, New York, N. Y., has ordered ten additional electrically equipped passenger cars. The new units will be built by the Pressed Steel Car Company, Pittsburgh, Pa., and the electrical equipment supplied by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Installation of the electrical equipment will be made at the Harlem shops of the New York, Westchester & Boston Railway.

The cars will cost approximately $450,000 and are being provided to accommodate a rapidly increasing burden of traffic which during the first five months of 1926 has gained nearly 14 per cent over a similar period in 1925, and promises to reach a total of 11,500,000 for the current year, according to Leverett S. Miller, president of the road. The cars will be 72 ft. in length, weigh 66 tons, and seat 80 passengers. Each car will have the "dead man control" feature. Two 340-hp. motors are provided per car and the overhead pantograph feeder system will be used for current collection. The six entrances of each car will be of electro-pneumatic operation. The ventilating system will be of the Garland high-speed vacuum type.

Inasmuch as the New York, Westchester & Boston passenger schedule was recently revised to provide twenty additional trains daily, making a total of 245, there will be no immediate further addition. The new cars will be used in lengthening trains already scheduled, according to Mr. Miller. He indicated that further orders for passenger car equipment might become necessary by fall of this year, when an extension from Mamaroneck to Harrison, N. Y., now under construction is to be completed.

Metal, Coal and Material Prices

Metals—New York	June 22, 1926
Copper, electrolytic, cents per lb	13.95
Copper wire, cents per lb	16.00
Lead, cents per lb	8.25
Zinc, cents per lb	7.46
Tin, Straits, cents per lb	61.50
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.25
Somerset mine run, Boston, net tons	1.925
Pittsburgh mine run, Pittsburgh, net tons	1.75
Franklin, Ill., screenings, Chicago, net tons	1.80
Central, Ill., screenings, Chicago, net tons	1.575
Kansas screenings, Kansas City, net tons	2.425
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.25
Weatherproof wire base, N. Y., cents per lb	18.00
Cement, Chicago net prices, without bags	2.10
Linseed oil (5-bbl. lots), N. Y., cents per lb.	11.70
White lead in oil (100-lb. keg), N. Y., cents per lb	15.00
Turpentine (bbl. lots), N. Y., per gal	$0.89

Italian Engineers Study American Railroad Electrification

Following the meetings of the International Electrotechnical Commission, a commission consisting of several engineers from the Italian State Railways who are interested in railroad electrification availed themselves of the opportunity to study American electrified systems. Included were Oresti Jacobini, manager of electrification in Italy; Guiseppe Bianchi, in charge of electric locomotive investigations; Enea Virgili, in charge of overhead transmission and substations; Gino Minucciani, in charge of operation investigations, and Eugenio Dupré of the electrification office in Rome. Accompanying them were Ugo Ferella of the Compagnia Generale di Elettricita of Milan, Italy, and J. J. Linebaugh of the railway engineering department of the General Electric Company.

Among the electrified railroads inspected were the Chicago, Milwaukee & St. Paul and the Butte, Anaconda & Pacific Railway. In addition, Mr. Bianchi spent three days inspecting the shops and test tracks of the General Electric Company at Erie, Pa., where most of this company's railway apparatus is built and tested. Several types of locomotives were being assembled at the time, including oil-electrics, the new motor-generator type for the New York, New Haven & Hartford and the New York Central gearless passenger locomotives.

In addition, the commission visited the Schenectady plant of the General Electric Company. F. C. Pratt, vice-president of the General Electric Company in charge of engineering and manufacturing; G. Faccioli, works engineer of the company at Pittsfield, Mass., and Mr. Jacobini of the commission were speakers at a dinner in Schenectady given by the International General Electric Company in honor of the visitors.

Bus Exports in 1925 Showed Big Increase

Exports of 58,624 automobile trucks and buses, valued at $37,703,302, were made from the United States in 1925, as compared with 27,332 units, valued at $19,199,344, in the preceding year. This showed an increase of more than

100 per cent, while the domestic production increased by only 32 per cent, from 360,625 in 1924 to 475,941 in 1925, according to the Automotive Division of the Department of Commerce.

New Haven to Receive Newest Type of Electric Locomotive

The first of the new type electric locomotives for the New York, New Haven & Hartford Railroad has been shipped from the Erie Works of the General Electric Company. The locomotive is one which combines the economic advantages of both alternating and direct current—alternating current for transmission and distribution and direct current for operation of the traction motors. Power is received from a single-phase trolley and reduced from 11,000 volts and 25 cycles to direct current at 600 volts.

The new type locomotive is a joint product of the American Locomotive and General Electric Companies. The New York, New Haven & Hartford Railroad is obtaining seven of them, five for freight service on the main line between Oak Point and New Haven and two for switching purposes in general yard service. When double-heading, these locomotives will function in multiple with the present single-phase locomotives. A preliminary description of these locomotives was published in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 18, 1924, page 705. The present units differ from this description only in the matters of over-all length, which is 53 ft. 2 in., and rigid wheelbase, which is 8 ft. 3 in.

New Haven Has Placed Newest Electric Locomotive in Service

Yellow Truck Earnings for Second Quarter May Break Record

Net earnings of the Yellow Truck & Coach Manufacturing Company, Chicago, Ill., for the quarter ended March 31, 1926, were $209,966 in excess of dividend requirements, according to a statement issued on June 14 by John A. Richey, president. Net profits available for dividends amounted to $580,466. The showing made during April and May, together with orders on the books for June, indicates the second quarter will be the greatest in the company's history.

Francis Hodgkinson and A. D. Hunt Honored

Slightly more than a year after he was awarded the Elliot Cresson Gold Medal by the Franklin Institute in recognition of his scientific achievements, Francis Hodgkinson, for many years chief engineer of the South Philadelphia Works, Westinghouse Electric & Manufacturing Company, was appointed consulting mechanical engineer for the organization as a whole, taking effect on June 7. Simultaneously an order discontinuing the position of chief engineer of the South Philadelphia Works and creating instead the position of manager of engineering was announced. Appointed to the new position is A. D. Hunt, well known in engineering circles and for many years a member of the engineering staffs of the Westinghouse organization.

Mr. Hodgkinson's prime duty will be to act as consulting engineer in all design problems and other engineering activities at South Philadelphia. During his noteworthy career he was associated with the Chilean Navy, the telephone company and electric light company at Lima, Peru, and C. A. Parsons & Company, the famous turbine designers and builders. When, in 1896, the Westinghouse Machine Company acquired the American rights for the manufacture of the Parsons type turbines, Mr. Hodgkinson, upon the recommendation of Sir Charles Parsons, became connected with the Westinghouse Machine Company, which subsequently became the turbine building section of the Westinghouse Electric & Manufacturing Company.

In 1916 he was made chief engineer of the South Philadelphia Works, being advanced to his present position exactly ten years later.

A. D. Hunt, the new manager of engineering, has been connected with the Westinghouse company for a number of years, occupying the position of manager of steam service at the South Philadelphia Works. Mr. Hunt was graduated from Cornell University in 1905 with the degree of mechanical engineer. Later the same year, he joined Westinghouse, Church, Kerr & Company in an engineering capacity, and eventually joined the Westinghouse Electric & Manufacturing Company, being assigned to the South Philadelphia Works in September, 1919, in the marine service section. He remained in that capacity until Jan. 1, 1920, when he was appointed manager of steam service. He was born in Tarrytown, N. Y.

Buses Ordered in Seattle—Cars Will Be Purchased Soon

It would appear that the long-deferred action in the matter of buses and street cars for the Municipal Street Railway, Seattle, Wash., is at last coming to a head. The city purchasing agent has issued an official call for bids on 80 light-weight street cars of the front-entrance, center-exit type, with a seating capacity of 58 passengers. In addition to this action, the City Council recently passed an ordinance appropriating $75,600 to purchase fourteen new buses for use on the Tenth Avenue Northeast Line to replace the privately-owned buses that are now operating.

The ordinance provided that five 21-passenger buses and two chassis will be bought from the Garford Motor Truck Company, two chassis from the White Company, and five Reo buses from the Lamping-McDonald Motor Company. For more than a year the City Council has been trying to reach an agreement as to what type of buses should be bought for this service. The bus manufacturers will take railway department warrants at par in payment.

Rolling Stock

San Francisco, Cal.—The Board of Public Works has been authorized to furnish and deliver fifteen street cars for the municipal railroad. The board is also authorized to approve plans and specifications for these cars.

Des Moines & Central Iowa Railway through its bus operating subsidiary, the Des Moines & Central Iowa Motor Transportation Company, has entered the field of bus operation with three Mack parlor car units, and is now operating an interurban service between Des Moines and Newton, Iowa, a distance of 30 miles. The three new units are equipped with Lang parlor car bodies mounted on Mack 230½-in. bus chassis.

Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, is rebuilding fifteen center-entrance steel cars for use on the city lines in the East Liverpool and Steubenville districts, it was recently announced by C. S. Wills, general superintendent. The first of these cars has just been completed and is now in service. Among the improvements being made on the equipment are the addition of electric heating coils, double thickness flooring, and a new steel inner lining. The trucks have been rebuilt and extensive renewals made in the air brake equipment.

Municipal Railway of St. Petersburg, St. Petersburg, Fla., recently received eight X-21 city service buses from the Yellow Truck & Coach Manufacturing Company, Chicago, Ill. With these units bus operation was inaugurated by the St. Petersburg company, and on

June 4 hundreds of residents of the town accepted the invitation of Mayor Blanc for a free ride through the suburban part of the community. Beginning on June 8 five of the buses were placed in operation on the north side loop through Granada Terrace and Fourth Street. Two buses are providing service to the south side residents on Fourth Street South and Lakeview Avenue, while the eighth bus is being held in reserve.

Track and Line

New York, N. Y. — The Board of Transportation recently received seven bids for completing the Times Square station of the Queensboro subway extension, now under construction under 41st Street from the Fifth Avenue station at Bryant Park to Eighth Avenue. The informal totals of the bids were: M. F. Kelly Building Company, $179,708; Ascher Engineering Company, $180,357; Norman A. Desier, $197,000; John B. Roberts & Company, $199,000; D. C. Serber, Inc., $202,252; Werner-Mitchell Company, $205,000; Joseph Colon Construction Company, $218,809.

Chicago & West Towns Railway, Chicago, Ill., is rapidly pushing the reconstruction of its line on 52d Avenue, Cicero, between Roosevelt Road and 22d Street. New rails and ties are being laid and close to 1 mile of second track added. Grooved, city type rails will replace the former T-rail construction. The city of Cicero has announced its intention of completing the paving of that portion of the street which the company is not required to pave.

Minneapolis, Northfield & Southern Railway, Minneapolis, Minn., which operates gas-electric passenger trains and steam freight, will spend $1,500,000 in extension work, including 6 miles to connect with the Minneapolis, St. Paul & Sault Ste. Marie road between Golden Valley and Crystal. This will give that line direct connection with every steam road entering the city.

Power Houses, Shops and Buildings

Columbus Electric & Power Company, Columbus, Ga., has received a permit for the enlargement and remodeling of the carhouse at Seventeenth Street and Second Avenue. The cost of the work will be approximately $6,000.

Wisconsin Gas & Electric Company, Kenosha, Wis., has completed work on the construction of its new garage, costing approximately 80,000, which will provide more adequate facilities for its rapidly growing bus business.

Trade Notes

Trico Fuse Manufacturing Company, Milwaukee, Wis., has recently appointed J. T. Sudduth & Company, 229 Brown-Marx Building, Birmingham, Ala., as sales representatives for the states of Alabama and Georgia. F. J. Keller & Company, Fort Worth, are sales representatives for the state of Texas. The Coast Electric Supply Company, 222 South San Pedro Street, Los Angeles, is a new Trico sales representative for the state of California.

Botsfield Refractories Company, Philadelphia, Pa., manufacturer of Adamant fire brick, cement and refractory furnace lining, announces that the Standard Asbestos & Cork Company has been appointed distributor of Adamant fire brick cement in Tulsa, Okla.

Charles B. Phelps, Paterson, N. J., announces that he and Charles J. Schmid, his associate, have been appointed metropolitan New York and northern New Jersey representatives for the Uehling Instrument Company of Paterson, the Williams Gage Company of Pittsburgh, the Combustion Control Division of A. W. Cash Company of Decatur, Ill., and the National Boiler Protector Company of Dayton, Ohio. Mr. Phelps still retains his former connection with the Uehling company as treasurer. Mr. Schmid was formerly the Boston representative of the Uehling Instrument Company.

Sullivan Machinery Company, Chicago, Ill., announces the appointment of Charles B. Officer, hitherto assistant to the president on engineering matters, to the position of chief engineer of the company, in charge of engineering matters with regard to new machinery or changes in existing designs. Mr. Officer is a graduate of Yale University, from which he received his Bachelor of Science degree from Sheffield School in 1912 and his M.E. degree in 1915. He has been connected with the Sullivan company ever since his graduation.

Cecil R. Lambert Company, Inc., Detroit, Mich., specialists in the design, manufacture and installation of conveying and handling equipment, announces that in order to identify its products and service with its name, it has changed its name to Mechanical Handling Systems, Inc. The company's facilities for service are being increased by additions to its plant and personnel, but there is no change in ownership, management or executive staff.

The Burr Company, Champaign, Ill., sold its plant and other physical equipment at a master's sale to D. C. Dobbins and Mrs. E. B. Rothgeb, daughter of Ellis Burr, founder of the company, for $27,200. Patent rights and drawings on the dynamometer car, manufactured by the company, were taken by the Baldwin Locomotive Company for $15,000. This company will pay about 50 cents on the dollar to its creditors, it is reported.

A. Milton Buck has joined the sales force of the Bridgeport Brass Company, Bridgeport, Conn. Mr. Buck will have his headquarters in Washington, covering Washington, D. C., and the states of Maryland, Virginia and West Virginia. He will specialize on sales of Bridgeport-Keating flush valves and Plumrite brass pipe.

Chemical & Vacuum Machinery Company, Inc., Buffalo, N. Y., has acquired from the Judelson Evapo-Dryer Corporation, New York, N. Y., all rights to build and market exclusively the apparatus known as the Judelson Evapo-Dryer under process patent 1,527,193, dryer patent 1,527,192, and insulator patent 1,513,595.

Roller-Smith Company, New York, N. Y., announces that the states of Maryland, Virginia and North Carolina are now covered by C. R. Speaker, Evening Star Building, Washington, D. C. The former arrangement with W. A. McCombs & Company, Westinghouse Building, Pittsburgh, Pa., has been transferred to a newly-formed organization, the D.-B. Sales Engineering Company at the same address. The Tennessee Engineering & Sales Company, Knoxville, Tenn., has added to its territory the states of Georgia, Florida and South Carolina, which, together with eastern Tennessee, form the section in which it represents the Roller-Smith company.

Leon L. Wolf Waterproof Fabric Company, Cincinnati, distributor of Kemi-Suede, the waterproof material for roofs, upholstering, flooring and curtains, has elected B. A. Colker secretary. He succeeds Leon Lederer, who remains a member of the board. Mr. Colker has been associated with the company as sales manager and assistant to Leon L. Wolf, president, for some time.

New Advertising Literature

Crouse-Hinds Company, Syracuse, N. Y., has issued a novel folder which graphically illustrates the manner in which traffic conditions have increased in the past 30 years and suggests the use of Crouse-Hinds traffic signal installations to meet the present situation. On the inside of the folder is pictured a large map of the United States showing the cities where these traffic installations have been made.

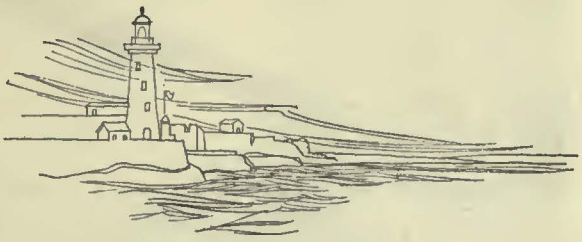
The Alexander Milburn Company, Baltimore, Md., has issued a miniature catalog illustrating quite comprehensively the complete line of Milburn welding and cutting equipment. Copies of this booklet may be obtained from the company upon request.

Duff Manufacturing Company, Pittsburgh, Pa., has issued a new leaflet on the Duff pinion puller. This device has been developed in conjunction with the engineers of the Westinghouse Electric & Manufacturing Company particularly for use in repair shops and power houses. The manufacturer describes the Duff pinion puller as "the simplest, quickest and most positive tool ever developed for its purpose."

Spicer Manufacturing Corporation, South Plainfield, N. J., has issued bulletin No. 44, giving price lists on genuine Spicer parts for type G grease-lubricated joints. Information is also contained in the bulletin on correct lubrication of Spicer universal, together with suggestions for removing, repairing and assembling type G universal joints and propeller shafts.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has released the first of a series of railway maintenance charts believed to be very interesting and helpful to maintenance men. The intention of the company is to get out these charts regularly. The first chart of the series covers armature and axle bearings. The second, to be released in about a month, will have for its subject armature insulation.

Bankers and Engineers



Cast Iron and Cast Advertising

Ordinary run-of-foundry iron will not work as well in brake shoes as a specially developed metal, melted for this purpose only, poured around a bundle of expanded steel, chilled at the ends and reinforced at the back. One is plain cast iron. The other is iron which has been definitely *organized* to do more and better work.

Railway men, therefore, do not expect as much from one form of brake shoe as from the other. Is it any more logical to expect similar results from two different forms of advertising?

Both equipment and public-relations advertising sometimes bear the stamp of an ordinary run-of-the-office job. In other instances the advertising clearly has been cast from especially selected words, poured around a bundle of experience, sharpened at the ends and reinforced with an attractive illustration or typography. It is advertising definitely *organized* to do more and better work.

Just as the specialist, moreover, casts a better brake shoe than the general jobbing foundry, the specialist in transportation advertising should accomplish the best work for the equipment manufacturers and railways. Transportation is a business unlike any other in existence. So is transportation advertising and the man who thinks that general advertising knowledge is all that is required in the advertising of a brake shoe is no closer to the truth than one who thinks he needs to know the brake shoe only.

We are not a general advertising agency which casts its metal in a hundred different moulds. The lighthouse trademark—symbol of our workmanship—appears exclusively on transportation literature. We hope that transportation men will learn to look for it and, while we are already serving quite a number of the prominent advertisers in this field, we would be glad to talk to all who feel that their advertising, like their brake shoes, might be organized to do more and better work.

Doyle, Kitchen & McCormick, Inc.
2 WEST 45th STREET, NEW YORK
An Advertising Agency

The above relief map of Yellowstone National Park, showing the routes of the Yellowstone Park Transportation Company, is supplied through the courtesy of the Northern Pacific Railway Company

What SUPERTWIST Adds to Goodyear Tires

You know what rugged strength and long life have always been built into Goodyear Pneumatic Bus Tires.

Now you may confidently expect even greater service from Goodyears in motorbus service, because Goodyear Pneumatic Bus Tires are now made with SUPERTWIST.

SUPERTWIST is the extra elastic, extra enduring new material specially developed by Goodyear for Goodyear balloon tires, motorbus and heavy duty cord tires.

It far outstretches ordinary cotton cord, and has a maximum flexing power that yields under impact, protecting the tire from rupture, stone bruise and other injuries. It thus insures virtually *double* the *carcass* life of the tire.

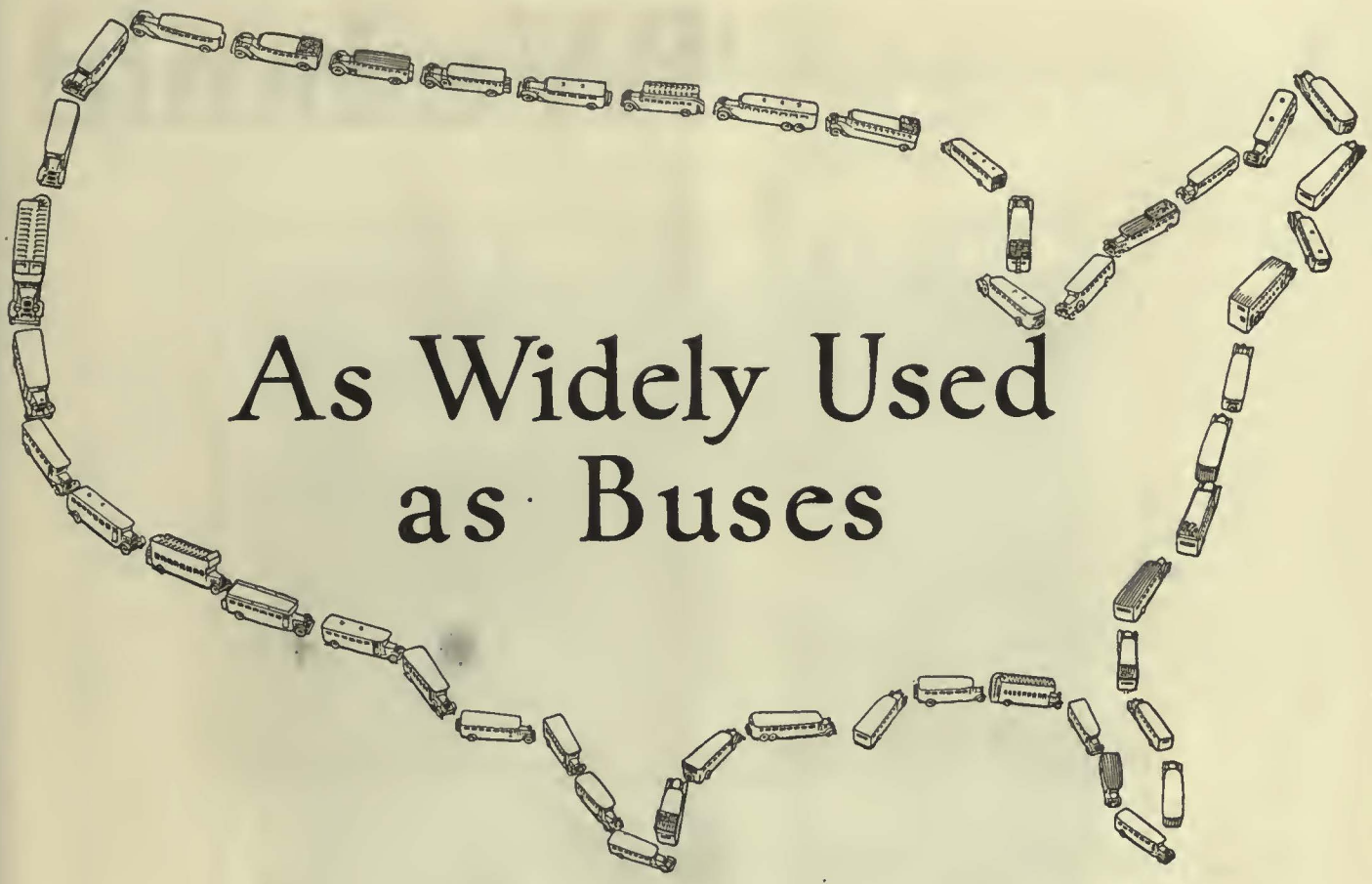
Other exclusive features of the Goodyear Pneumatic Tire construction for motorbus service are (1) the new Goodyear band-building method; (2) the new Goodyear breaker; (3) the new Goodyear bead—patent applied for, and (4) the famous All-Weather Tread.

These advantages you get only in Goodyear Pneumatic Bus Tires—the only motorbus tires made of SUPERTWIST.

They are real advantages, because they result in the utmost durability, tractive power, road safety, riding comfort and long, trouble-free mileage at low cost.

Goodyear Means Good Wear

GOODYEAR



As Widely Used as Buses

THE giant growth of the bus industry has been almost entirely an increase in the number of Timken-equipped buses! For more than 95% of all makes of buses in America are engineered around Timken Tapered Roller Bearings. Never has the endorsement of a single automotive unit been more nearly unanimous. The most notable thing about it is that Timkens are so successfully serving the two masters of the modern bus—the Management with its constantly stricter cost standards—and the Public with its constantly higher service demands.

Maintenance departments know that Timkens hold shafts, gears and wheels in permanent fine alignment, with no attention but greasing or oiling, at comparatively rare intervals. The threat of bearing thrust, shock and speed is nullified by Timken tapered design, *POSITIVELY ALIGNED ROLLS* and Timken-made steel. Timkens are *more* than anti-friction bearings!

To bus passengers Timkens mean smoother, surer transportation, on schedule, at rates which are favorably affected by Timken economies.

Logically, in buses, as in trucks and rail cars, Timken Bearings are provided by an overwhelming majority of all makers.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

"We build

John R. McKay, *Chief Engineer, Indiana Service Corporation, Fort Wayne. Mr. McKay is numbered among America's better known electric railway engineers. He is a member of the Standing Committee on Way and Structures of the A. E. R. E. A.*

for smoothness and easy riding"

"WE have taken special pains in our track construction work to build for smoothness and easy riding, both for our own cars and for automobile traffic." So says John R. McKay, Chief Engineer of the Indiana Service Corporation.

"Particular attention has been paid to arterial crossings, with the result that motorists can cross the tracks without feeling them at all.

"We have been greatly aided in our endeavor to get smoother, less noisy crossings, by the use of an asphaltic cushion next to the rails. This has the advantage of being easily applied, and in addition to deadening sound it gives us a tight construction that keeps out water."

To improve track construction in Fort Wayne, the Indiana Service Corporation has made extensive use of the Carey Elastite System of Track Insulation—and with highly successful results. Complete information on request.

The Philip Carey Company

Lockland, Cincinnati, Ohio

Fort Wayne electric railway tracks in process of construction—showing the slabs of Carey Elastite Rail Filler in place.

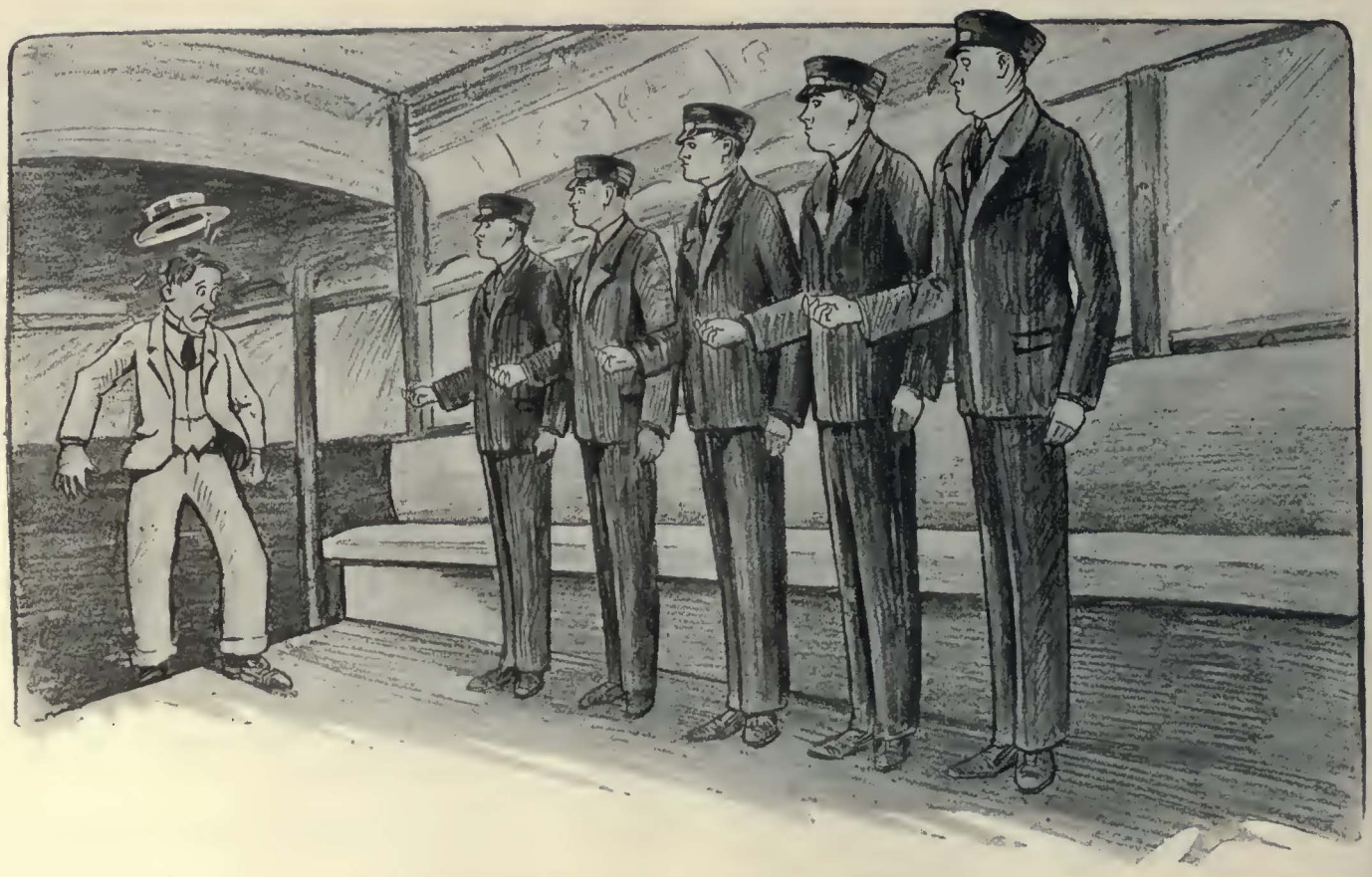
The Carey Elastite System of Track Insulation consists of precast slabs of a fibrous asphaltic compound, which form a resilient cushion betwaen rails and pavement. A biow with a sledge sets the alabs in place. Unaffacted by moisture or changes in temperature.

Carey Elastite

REG. U.S. PAT. OFF.

TRADE MARK REG. U.S. PATENT OFFICE

SYSTEM OF TRACK INSULATION



Five Conductors On One Car

Just suppose you boarded a street-car and were confronted by five conductors.

No. 1 says, "I want three cents for labor."
No. 2 " "I want one cent for interest on bonds."
No. 3 " "I want one cent for power."
No. 4 " "I want one cent for depreciation damages."
No. 5 " "Cough up a cent for profit, taxes, material, etc."

If you could talk at all, your remarks would be eloquent.

Yet, when you come to think of it, would that be any more ridiculous than for the street railway, the electric light company, the telephone company, and a couple of telegraph companies having and maintaining separate lines of poles on the same streets when one or two lines would look better and save a lot of money?

Elreco Steel Combination Railway and Lighting Poles are made for just such purpose. Wherever they are installed on this plan, the improved appearance of curb lines, the saving in cost for all concerned, and reduction of pole maintenance pleases everybody.

Moreover such installations are in line with the modernization of equipment which street railways all over the country are finding both desirable and profitable.

We have some interesting facts on how utilities in many cities have put over this money saving co-operation—write for them.

BEFORE

ELRECO

POLES

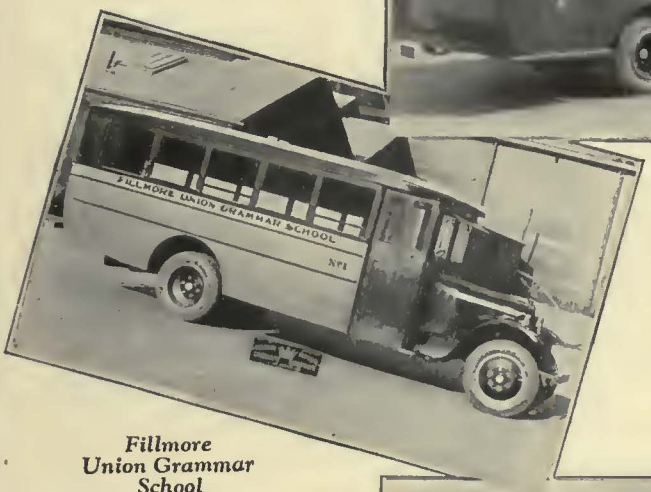
The Electric Railway Equipment Company

CINCINNATI, O.

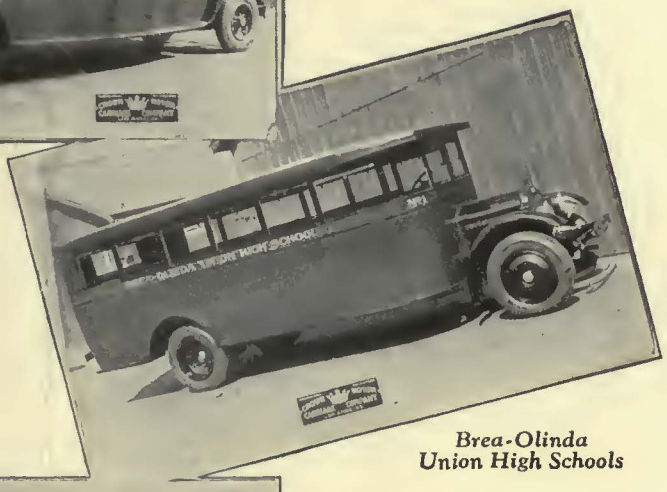
New York Office: 30 Church St.

AFTER

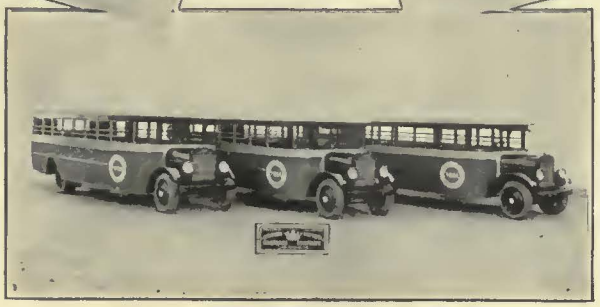
Fullerton Union High School



Fillmore Union Grammar School



Brea-Olinda Union High Schools



Yuma Union High School

Western School Buses With PLYMETL Sides

THE experience gained in nearly a quarter century devoted to the development of the finest commercial and bus bodies has led the Crown Motor Carriage Company, Inc., Los Angeles, California, to standardize upon and recommend PLYMETL for school bus bodies. A few of the typical jobs turned out by this company are shown in the illustrations.

Such bodies have the big advantage of economy in operation on account of their light weight and are particularly valuable for school use on account of the high factor of safety provided in these strong, impact-resisting side panels.

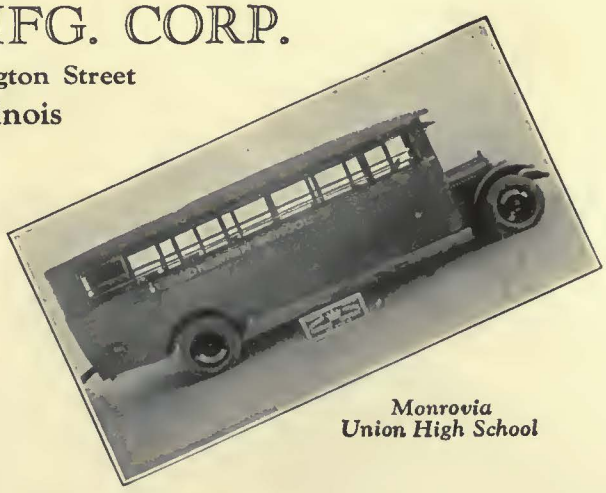
Detailed descriptions and list of users will be sent to anyone interested.

HASKELITE MFG. CORP.

133 West Washington Street

Chicago, Illinois

Arroyo Grande Union High School



Monrovia Union High School

Nation-Wide Triumph

Studebaker leadership established within a year—Studebaker Bus routes link the nation, covering the country from coast to coast and penetrating every state in the Union.

AS the map shows, Studebaker Busses are in operation in practically every section of the United States. Note the Studebaker routes outlined . . . connecting principal cities from coast to coast, from Canada to Gulf . . . serving hundreds of communities over all kinds of roads . . . across desert sand in New Mexico, over mountain grades in Montana, through clinging gumbo as well as over the splendid modern boulevard . . . everywhere providing comfortable, dependable transportation *at a higher profit to the operator.*

Increased profit through low first cost, low operating cost and low depreciation . . . this explains Studebaker leadership.

Low First Cost: Due to standardized design and large-scale production, the first cost of the medium-capacity Studebaker Bus, complete with body, is practically half the cost of the large-capacity bus. This effects a saving of from $2,000 to $4,000 per bus. It enables an operator to buy twice as many Studebaker busses for the same original outlay.

Low Operating Cost: Because the medium-size Studebaker Bus is 50% lower in weight than the average truck-type bus, its operating costs are much lower. Operators report an average operating cost of 7 to 9 cents per mile, against 16 to 17 cents per mile for the same items of operating expense on the average heavy truck-type bus.

Low Depreciation: As shown by the partial list at the right, there are scores of Studebaker Busses with records of over 100,000 miles . . . some 200,000 and even 300,000 miles. Thus, the low first cost of Studebaker equipment coupled with exceptionally long life cuts depreciation to a minimum.

Obviously, if you buy a bus of ample passenger capacity for half the price of the average bus . . . operate it at a lower cost per mile . . . and drive it over 100,000 miles, as records prove possible . . . you obtain a much higher profit per passenger mile. That is why the Studebaker Bus offers more for your money . . . yields a proved higher dollars-and-cents return on your investment.

These 100,000-Mile Studebak Busses give proof of long, dependable service

Operators listed below and at the right h one or more Studebaker Busses which h traveled over 100,000 miles. This is a par list, including only those Studebaker Bus which have been reported to the factory are still in active service. There are hundr more throughout the world, for the Stu baker Big Six passenger-car chassis—p to the introduction of the specially desig Studebaker Bus chassis—was even then choice of hundreds of bus operators.

	Mi Per
R. J. Todd, Spearfish, S. D.	200
R. J. Todd, Spearfish, S. D.	100
Danville Terre Haute Limited Bus Co., Danville, Ill	150
H. A. Lippitt, Hamilton, Ill.	200
H. A. Lippitt, Hamilton, Ill.	185
Loyal J. Boyd, Salina, Kans.	140
Eastern Carolina Coach Co., Inc., Charlotte, N. C.	150
Eastern Carolina Coach Co., Inc., Charlotte, N. C.	127
Bellaire-Neff Bus Co., Bellaire, Ohio	133
Bellaire-Neff Bus Co., Bellaire, Ohio	157
Craig A. Shields, Adena, Ohio	227
Ohio Transit Co., Lancaster, Ohio	250
Ohio Transit Co., Lancaster, Ohio	110
Ohio Transit Co., Lancaster, Ohio	109
Ohio Transit Co., Lancaster, Ohio	100
R. A. MacCartney, Joplin, Mo.	123
Diamond Bus Co., Patton, Pa.	120
Clyde O. Hammond, New Lexington, Ohio	150
Clyde O. Hammond, New Lexington, Ohio	170
Clyde O. Hammond, New Lexington, Ohio	143
Adrian-Ann Arbor Motor Coach Co., Adrian, Mich.	120
J. W. Bilyeu, Bedford, Ind.	110

STUDEBAKER BUS

tor Studebaker Busse

The red lines show the principal routes of Studebaker Bus operators. It is now possible to travel in Studebaker Busses from New York to Los Angeles, except for two gaps, aggregating approximately 200 miles. Studebaker Busses are being operated in every state in the Union.

	Miles Per Unit
yal Blue Transportation Co., Greensboro, N. C.	150,000
yal Blue Transportation Co., Greensboro, N. C.	125,000
yal Blue Transportation Co., Greensboro, N. C.	100,000
ag Bros. Transit Co., Marion, Ohio	225,000
ag Bros. Transit Co., Marion, Ohio	165,000
ag Bros. Transit Co., Marion, Ohio	165,000
ag Bros. Transit Co., Marion, Ohio	100,000
ag Bros. Transit Co., Marion, Ohio	125,000
Hanenkratt, Glendale, Ariz.	150,000
. King, Helena, Mont.	168,000
F. King, Helena, Mont.	175,340
& Eddie Coleman, Springfield, Ohio	350,000
d Davis, Columbus, Ohio	250,000
non Ball Trans. Co., Portsmouth, Ohio	150,000
th & Boatshick, Columbus, Ohio	150,000
J. West, Dayton, Ohio	250,000
land Trail Transit Co., Charleston, W. Va.	150,000
eeling-Cambridge, Cambridge, Ohio	200,000
l Star Trans Co., Cambridge, Ohio	150,000
J. Daniels & Son, Parkersburg, W. Va.	125,000
G. Webb, Lexington, Ky.	300,000
cinnati-Hamilton Line, Cincinnati, Ohio	150,000
cinnati-Louisville Line, Cincinnati, Ohio	150,000
er & Watson, Zanesville, Ohio	150,000
l Fent, Xenia, Ohio	100,000
ag Bros., Marion, Ohio	150,000
l Star Trans. Co., Springfield, Ohio	125,000
g Bros., Dayton, Ohio	150,000
ahontas Trans. Co., Bluefield, W. Va.	150,000
on Transfer Co., Murfreesboro, Tenn.	100,000
on Transfer Co., Murfreesboro, Tenn.	100,000

	Miles Per Unit
W. C. Hadley, Joelton, Tenn.	100,000
H. H. Motor Line, Las Cruces, N. Mex.	147,563
H. H. Motor Line, Las Cruces, N. Mex.	128,472
Green Star Bus Line, Smithfield, Ohio	350,000
Green Star Bus Line, Smithfield, Ohio	400,000
Green Star Bus Line, Smithfield, Ohio	200,000
Green Star Bus Line, Smithfield, Ohio	150,000
Robert Mason, Utica, Ohio	110,000
The Wheeling, St. Clairsville & Cambridge Transportation Co., St. Clairsville, Ohio	200,000
The Wheeling, St. Clairsville & Cambridge Transportation Co., St. Clairsville, Ohio	125,000
The Wheeling, St. Clairsville & Cambridge Transportation Co., St. Clairsville, Ohio	100,000
The Wheeling, St. Clairsville & Cambridge Transportation Co., St. Clairsville, Ohio	150,000
Cambridge-Marietta Bus Line, Cambridge, O.	175,000
Cambridge-Marietta Bus Line, Cambridge, O.	175,000
Cambridge-Marietta Bus Line, Cambridge, O.	153,000
Cambridge-Marietta Bus Line, Marietta, O.	153,000
Cambridge-Marietta Bus Line, Marietta, O.	133,000
Cambridge-Marietta Bus Line, Marietta, O.	133,000
Cambridge-Marietta Bus Line, Marietta, O.	185,000
Cambridge-Marietta Bus Line, Marietta, O.	117,000
G. W. Angel, Franklin, N. C.	128,000
J. M. Tolbert, Newberry, S. C.	150,000
Larry Miller, Bemidji, Minn.	104,000
Lee Price, Columbia City, Ind.	150,000
W. F. Reynolds Bus Lines, Lexington, Ohio	160,000
Brown & Son, The Dalles, Ore.	190,000
Brown & Son, The Dalles, Ore.	175,000
Brown & Son, The Dalles, Ore.	155,000
Brown & Son, The Dalles, Ore.	150,000
Brown & Son, The Dalles, Ore.	125,000

	Miles Per Unit
Parrish Stage Line, Deming, N. Mex.	150,000
Parrish Stage Line, Deming, N. Mex.	115,000
Denver Steamboat Stage Co., Denver, Colo.	160,000
Denver Steamboat Stage Co., Denver, Colo.	125,000
Ed Blankenburg, Glendive, Mont.	125,000
Blue Bird Transit Co., Glendive, Mont.	150,000
Jud S. Skowten, Cheboygan, Mich.	174,000
Cannon Ball Transp. Co., Portsmouth, Ohio	193,000
Cannon Ball Transp. Co., Portsmouth, Ohio	193,000
Cannon Ball Transp. Co., Portsmouth, Ohio	193,000
Cannon Ball Tranap. Co., Portsmouth, Ohio	165,000
Cannon Ball Transp. Co., Portsmouth, Ohio	165,000
Cannon Ball Transp. Co., Portsmouth, Ohio	165,000
Cannon Ball Tranap. Co., Portsmouth, Ohio	120,000
Cannon Ball, S. V. Div., Portsmouth, Ohio	145,000
Cannon Ball, S. V. Div., Portsmouth, Ohio	145,000
Cannon Ball, S. V. Div., Portsmouth, Ohio	145,000
Cannon Ball, S. V. Div., Portsmouth, Ohio	115,000
Cannon Ball, S. V. Div., Portsmouth, Ohio	115,000

CHASSIS

Mail the Coupon for Free Book, "Profitable Bus Operation"

The Studebaker Corporation of Ame
Dept. B South Bend, Ind.
Send me free "Profitable Bus Operation" out obligation.

Name.....

Address.....

City..... State.....

We have.....busses at present.
Check below the Studebaker Bus about which y sire information.

Type: Sedan.....Parlor Car.....Street-Car Ty

Capacity:.....Passengers.

PROFIT-SEEKING DEALERS WILL READ

THESE 7 IMPORTANT STATEMENTS

ABOUT THE LEADING
HEAVY DUTY TIRE
ON THE MARKET

THE CENTURY BUS SPECIAL

(1) A brand new principle in the construction of a heavy duty bus tire.

(2) Tire retains same shape when inflated and giving service as before mounting on rim.

(3) Special material used in construction.

(4) Because of and we guarantee greater mileage than any other bus tire now on the market.

(5) This improved heavy duty tire will greatly reduce mileage cost.

(6) Make us prove the truth of the above statements.

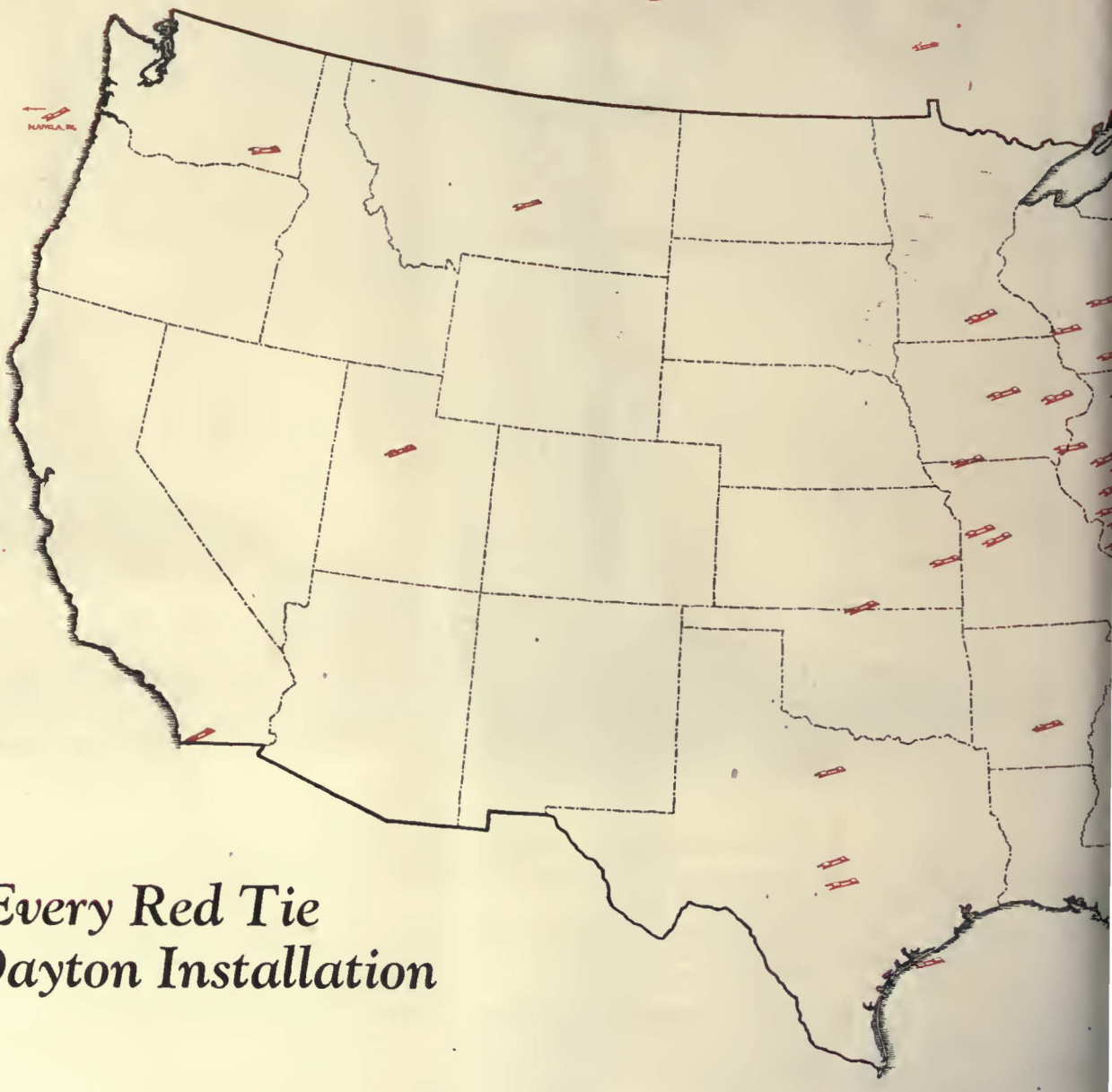
(7) Write today for complete information.

CENTURY RUBBER WORKS

54TH AVENUE AND WEST 18TH STREET, CHICAGO, ILLINOIS

All Over The

Dayton Ties Are Cutting Track And



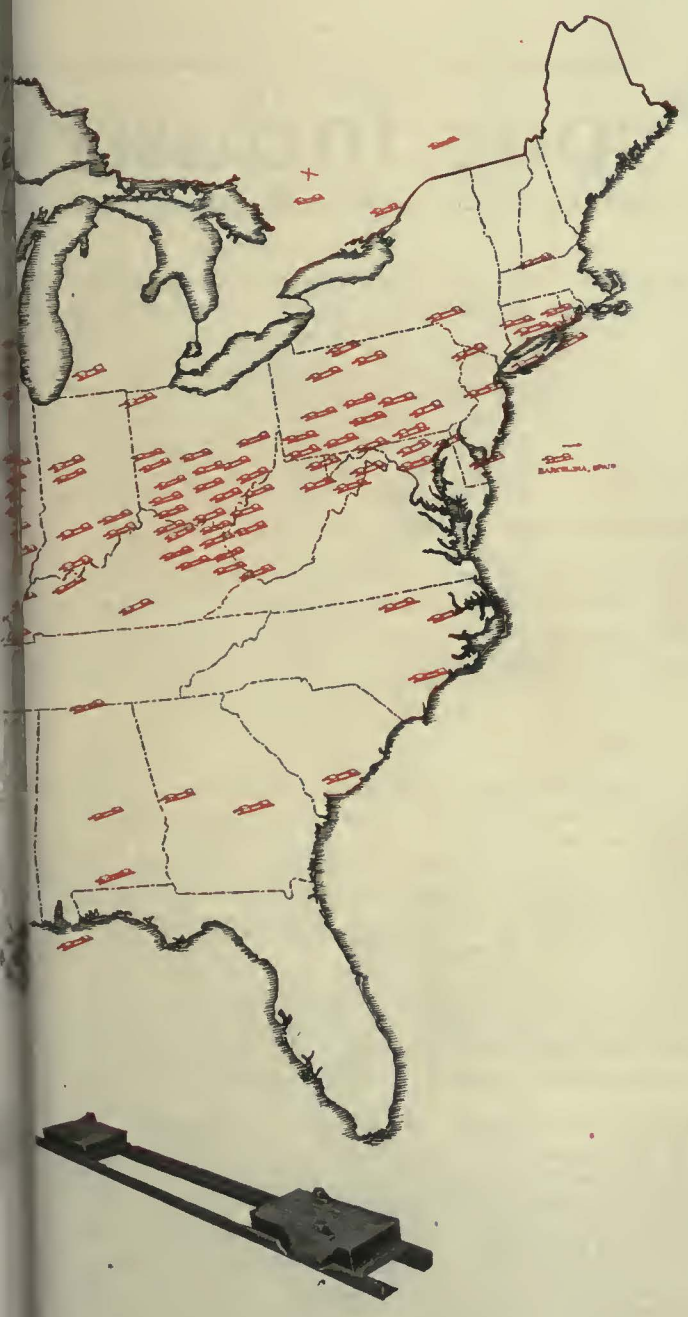
Every Red Tie
Is a Dayton Installation

The Dayton

Dayton

Nation

olling Stock Maintenance Costs



Each little red tie on this map indicates a street railway that uses Dayton Mechanical Ties.

All over the nation, Dayton Ties through inbuilt resilience and durability are reducing maintenance by one half, practically wiping out track repairs, allowing bigger earnings, and bettering public relations.

When track is laid on them, 10 years' severe service leaves it smooth—almost as good as new—ready for another 10.

Small wonder, then, that as users expand their lines, they order and re-order more and more Daytons.

Investigate Dayton Ties—they give you permanently smoother street railway track. First cost is less than for wood tie construction. *Send for complete information.*

The Dayton Mechanical Tie Co.

Dayton, Ohio

Why Dayton Ties Are Better

It is a peculiarity of concrete that it will stand enormous pressure loads, but breaks up at once under pounding.

Dayton Mechanical Ties provide a cushioning resilience which absorbs the pounding shock of wheels, so that pressure only, is transmitted to the concrete.

Thus, the concrete lasts indefinitely, and as constant shocks also wear out rolling stock, Dayton Ties will decrease such repairs by one half.

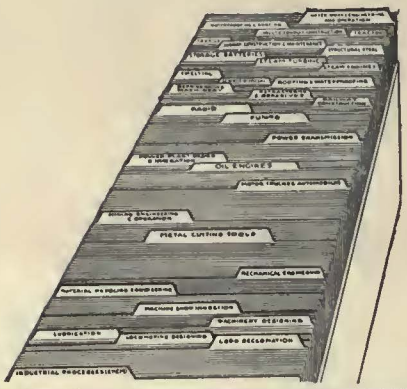
A Dayton Tie consists of two steel pans, or boxes, separated by angle irons. The angle irons preserve the gauge, and re-enforce the concrete ballast.

In the bottom of each pan is a layer of highest grade of asphalt. A selected, thoroughly seasoned white oak block rests on the asphalt, confining it to the pan.

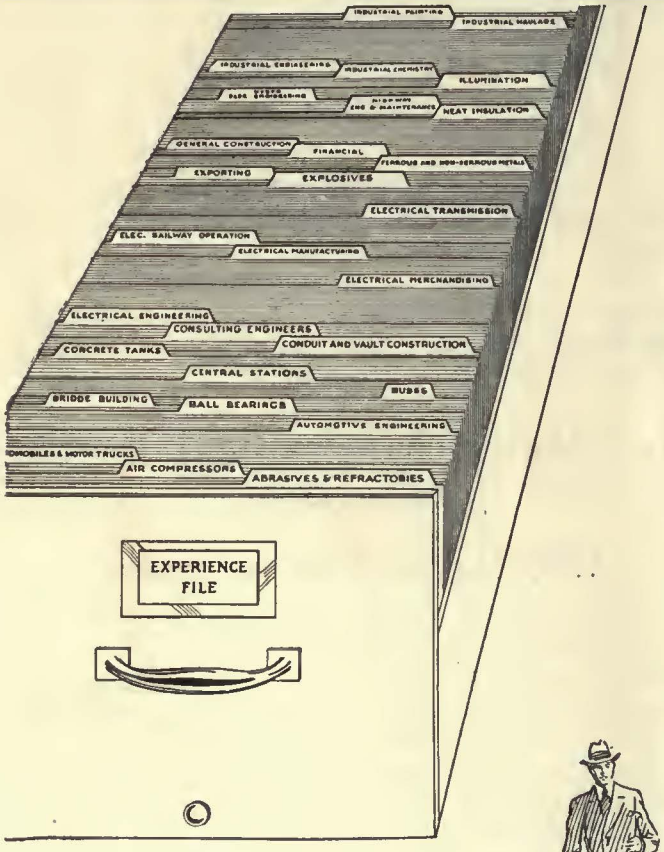
It is this combination of oak and confined asphalt which gives the correct degree of resilience.

Mechanical Tie Co.,

Ohio



Knowledge of your industry



A Few Facts From The Experience Index

Going through the McGraw-Hill experience file at random you will find such facts as these:

5 McGraw-Hill men formerly in automotive engineering.

8 McGraw-Hill men formerly in material-handling engineering.

2 McGraw-Hill men formerly in subway construction.

12 McGraw-Hill men formerly with process (chemical) industries.

9 McGraw-Hill men formerly in electrical merchandising.

4 McGraw-Hill men formerly consulting engineers.

16 McGraw-Hill men formerly with central stations.

9 McGraw-Hill men formerly with electric railways.

6 McGraw-Hill men formerly machinery designers.

And so on.

From shop and mine, from factory and generating station, from chemical laboratory and construction job, from jobber and dealer, have come the men who make the McGraw-Hill organization. Production men, operating experts, specialists in selling from many industries have come to develop the McGraw-Hill Publications as authorities in industry..... authorities, first, to their subscribers, the creators and builders of industry.....authorities, next, to the men who are selling to industry.

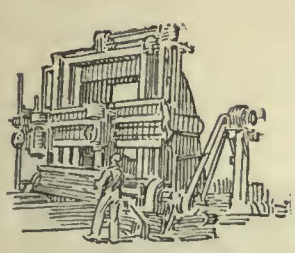
As editors, department heads, service men, marketing counselors and field representatives, these men have become essential units in the McGraw-Hill organization, absorbing its purpose and spirit and devoting their fine attainments to carrying forward its tradition of over a half-century's service to industry.

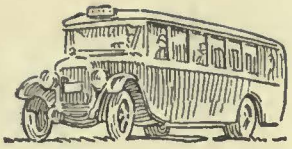
The experience of these men has been cataloged, classified and filed for instant reference. That file is the nerve center of the organization. Thumb over the index tabs and it will be strange if you do not find a man, or twenty men, who have a working knowledge of the industry to which you sell, or the equipment which you make.

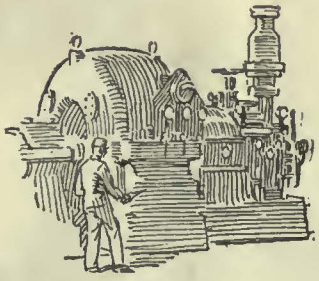
For more than fifty years the McGraw-Hill Company has known industrial America. Its contacts have been inside contacts; its fund of experience is the composite gained in shop, factory and field.

Through this intimate knowledge and constant contact, McGraw-Hill seven years ago sensed the step that industry is now taking in applying to its selling the same science and caution that have advanced industrial production and reduced costs. The service of McGraw-Hill Publications was extended to embrace not only the publishing of technical information on production and engineering but counsel on scientific, waste-free selling. This counsel is epitomized in the following McGraw-Hill Four Principles of Industrial Marketing which today are bringing country-wide endorsement from industry, bank, advertising agency and university.

MARKET DETERMINATION—An analysis of markets or related buying groups to determine the







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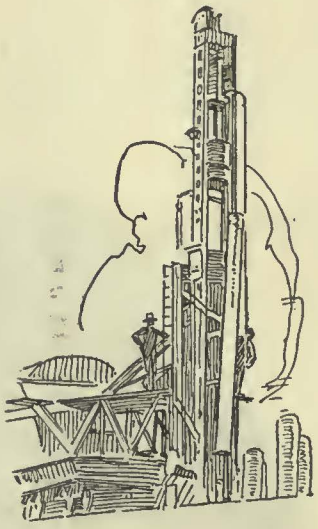


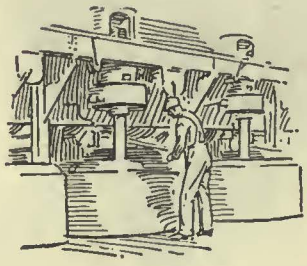
potential of each. With a dependable appraisal of each market, selling effort can be directed according to each market's importance.

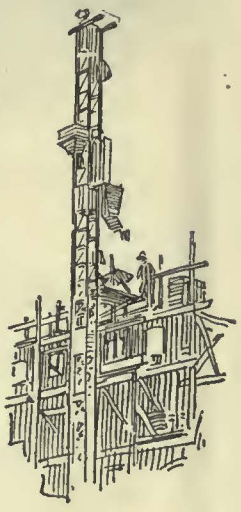
BUYING HABITS—A study of the selected market groups to determine which men in each industry are the controlling buying factors and what policies regulate their buying. Definite knowledge eliminates costly waste in sales effort.

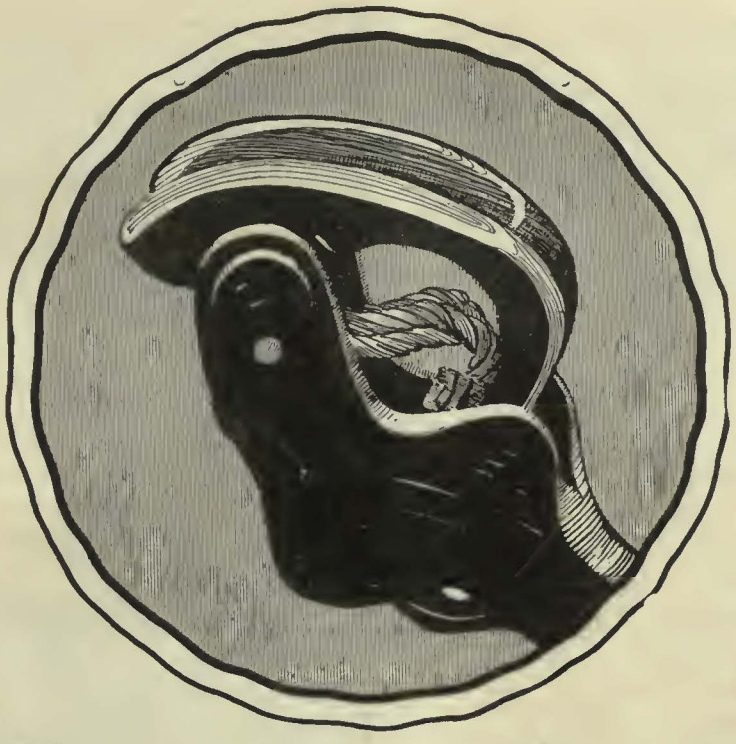
CHANNELS OF APPROACH—The authoritative publications through which industries keep in touch with developments are the logical channels through which to approach the buyer. In a balanced program of sales promotion these publications should be used effectively and their use supplemented by a manufacturer's own literature and exhibits.

APPEALS THAT INFLUENCE—Determining the appeals that will present the product to the prospective buyer in terms of his own self-interest or needs.

These Four Principles are more than a formula. They are a method, repeatedly tested by practical application, backed by a half-century of intimate acquaintance with industry. Any manufacturer selling to industry can apply them to advantage in his own marketing program. Our Marketing Counselors will be glad to lay the details before you or your advertising agent. A conference can be arranged by communicating with our nearest office.







When you modernize be sure to Miller-ize

To consider these five points of superiority is to realize how well Miller Trolley Shoes fit into the industry's modernization movement.

1. Less wire wear. Full 3-inch sliding contact surface "hugs" the wire closer than any wheel—so that less trolley tension is required for absolutely safe operation.

2. Less shoe wear. Sliding contact of shoe lasts longer than wheel because there are no bearings to wear out and only a few moving parts.

3. No lubrication. The absence of rotating parts eliminates the time and labor required to oil the bearing of the trolley wheel.

4. No arcing. Constant contact prevents the pits and burns that are found in the ordinary trolley and contact device.

5. Ample current capacity. Sliding contact handles heavier current drafts than trolley wheels—and always insures steady power for motors and lights.

To provide you with further proof of Miller Trolley Shoe ability, we will gladly co-operate for a trial under your own conditions.

Miller Trolley Shoe Company

295 Columbia Road, Boston 21, Mass.

MILLER TROLLEY SHOES

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

ERJ

POSITIONS WANTED

EXPERIENCED operator of electric railways and bus lines, co-ordinated and separate, immediately available to serve as manager, superintendent, publicity, public relations manager or in any official position pertaining to railway or bus operation. At present manager of large railway properties. PW-916, Electric Railway Journal, Tenth Ave. at 36th St., New York.

POSITION wanted as inspection or shop foreman, 10 years as armature winder, motor repairman, and acting inspection foreman, will guarantee good results. PW-914, Electric Railway Journal, 1600 Arch St., Phila., Pa.

SUPERINTENDENT transportation. With a wide experience and successful record on city and interurban properties also co-ordination of rail and bus service, successful in handling labor, public relations, etc. Recognized as a transportation official of exceptional ability fully capable of getting results on any property. At present engaged. Personal reasons for desiring change. Best of references. Correspondence invited. Address PW-915, Electric Railway Journal, Guardian Building, Cleveland, Ohio.

WHAT AND WHERE TO BUY

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

Advertising Agencies
Doyle Kitchen & McCormick

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

Air Brakes
Westinghouse Air Brake Co.

Air Springs
Cleveland Pneumatic Tool Co.

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

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Illinois Steel Co.
Johnson & Co., J. R.
National Ry. Appliance Co.
Westinghouse E. & M. Co.

Axles, Carbon Vanadium
Johnson & Co., J. R.

Axles, Front
Shuler Axle Co.

Axles, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Johnson & Co., J. R.
Ludlum Steel Co.

Babbit Metal
Johnson & Co., J. R.

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

Barges, Steel
American Bridge Co.

Batteries, Dry
Nichols Lintern Co.

Bearings and Bearing Metals
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Roller
Timken Roller Bearing Co.

Bells & Buzzers
Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Cummings Car & Coach Co.
Graham Bros.

Body Material, Haskelite and Plymetl
Haskelite Mfg. Corp.

Boilers
Babcock & Wilcox Co.

Bolts and Nuts, Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

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

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

Brake Shoes
Brill Co., The J. G.

Brakes, Brake Systems and Brake Parts
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Bridges, Steel
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Buildings, Steel
American Bridge Co.

Bulkheads
Haskelite Mfg. Corp.

Bunkers, Coal
American Bridge Co.

Bus Seats
Hale-Kilburn Co.

Buses, Motor
Brill Co., The J. G.
Cummings Car & Coach Co.
International Motor Co.
Mack Trucks, Inc.
Studebaker Corp.
Yellow Truck & Coach Mfg. Co.

Bushings, Case Hardened and Manganese
Brill Co., The J. G.

Cables. (See Wires and Cables)

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

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

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

Car Wheels, Rolled Steel
Bethlehem Steel Co.

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

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

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

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Wm. Wharton, Jr. & Co.

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

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Ceilings, Plywood, Panels
Haskelite Mfg. Corp.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

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

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

Cleaters and Sockets
General Electric Co.

Coil Banding and Winding Machines
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

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

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

Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

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

Controllers
Amer. Brown Boveri Elec. Corp.

Controllers or Parts
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

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

Converters, Rotary
Amer. Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Conveying & Hoisting Machinery
American Bridge Co.

Copper Wire
American Brass Co.
Amer. Steel & Wire Co.
Anaconda Copper Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Brass Co.
American Steel & Wire Co
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Amer. Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., John A.
Samson Cordage Works

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

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes, Hoists & Lifts
Electric Service Supplies Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
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
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Morton Mfg. Co.
Pantasote Co., Inc.

Dealer's Machinery & Second Hand Equipment
Elec. Equipment Co
Sachsenmaier Co., George

Dealer Second Hand Rails
Electric Equipment Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heating Co.
Nat'l Pneumatic Co., Inc.

Doors & Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.

Drills, Track
Amer. Steel & Wire Co.
Electric Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Ears
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electric Transmission Towers
American Bridge Co.

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

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Byllesby & Co., H. M.
Day & Zimmermann, Inc.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co

Exterior Side Panels
Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Nat'l Ry. Appliance Co.
Perey Mfg. Co.

Fare Registers
Electric Service Supplies Co

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

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
St. Louis Car Co.
Star Brass Works
Wood Co., Chas. N.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Flaxlinum Insulators
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Floor, Sub
Haskelite Mfg. Corp

Floors
Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Carnegie Steel Co.

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

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co
Ohio Brass Co.
Westinghouse E. & M. Co.

Furnaces, Electric
Amer. Brown Boveri Elec. Corp.

Furnaces, Electric, Steel Melting
American Bridge Co.

Funnell Castings
Wm. Wharton, Jr. & Co.

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

Fuses, Refillable
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

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

Gas Producers
Westinghouse E. & M. Co.

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

Gauges, Oil and Water
Ohio Brass Co.

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

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

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

Generating Sets, Gas-Electric
General Electric Co.

Generators
Amer. Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Greases (See Lubricants)

Grinders & Grinding Supplies
Metal & Thermit Corp.
Railway Trackwork Co.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Guard Rail Clamps
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Service Supplies Co
Ohio Brass Co.

Harps, Trolley
Elec. Service Supplies Co
Nuttall Co., R. D.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Corp.
Pantasote Co., Inc.

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

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

Heaters, Car Stove
Smith Heater Co., Peter

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic
Westinghouse Traction Brake Co.

Instruments Measuring, Testing and Recording
Amer. Steel & Wire Co.
General Electric Co.
Westinghouse E. & M Co.

(Continued on page 52)

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite-Callender Cable Co.
United States Rubber Co.
Westinghouse E. & M. Co.

Insulating, Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish and Insulator Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings
Haskelite Mfg. Corp.

Interurban Cars (See Cars)

Jacks (See also Cranes, Hoists and Lifts)
Elec. Service Supplies Co.
National Ry. Appliance Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Brill Co., The J. G.

Lamp Guards & Fixtures
Electric Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Electric Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Leather
Cleveland Tanning Co.

Letter Boards
Haskelite Mfg. Corp.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr. & Co.,

Locomotives, Electric
Amer. Brown Boveri Elec. Corp.
Cummings Car & Coach Co.
General Electric Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oil and Grease
Universal Lubricating Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co.,

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.,

Manganese Steel Switches, Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Meters (See Instruments)

Motor Generators
Amer. Brown Boveri Elec. Corp.

Motor and Generator Sets
General Electric Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Amer. Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Motorman's Seats
Brill Co., The J. G.
Electric Service Supplies Co.
Wood Co., Chas. N.

Nuts and Bolts
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants)

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Packing
Westinghouse Traction Brake Co.

Paints and Varnishes (Insulating)
Electric Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Panels, Outside, Inside
Haskelite Mfg. Corp.

Paving Guards, Steel
W. S. Godwin Co., Inc.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.
Nat'l Ry. Appliance Co.

Plywood, Roofs, Headlinings, Floors, Interior Panels, Bulkheads, Truss Planks
Haskelite Mfg. Corp.

Pole Line Hardware
Bethlehem Steel Co.
Electric Service Supplies Co.
Ohio Brass Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Poles and Ties Treated
Bell Lumber Co.
International Creosoting & Construction Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
International Creosoting & Construction Co.
Naugle Pole & Tie Co.

Poles, Trolley
Bell Lumber Co.
Electric Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Electric Service Supplies Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Houses
American Bridge Co.

Power Saving Devices
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Punches, Ticket
International Register Co.
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Filler
Philip Carey Co., The

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Illinois Steel Co.
Ludlum Steel Co.

Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Rails, Relaying
Hyman-Michaels Co.

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Ludlum Steel Co.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Rectifiers, Mercury
Amer. Brown Boveri Elec. Corp.

Registers and Fittings
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co.
Rooke Automatic Register Co.

Reinforcement, Concrete
American Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Electric Service Supplies Co.

Resistances
Consolidated Car Heating Co.

Resistance, Wire and Tube
American Steel & Wire Co.
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Roofing, Car
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Roofs, Car and Bus
Haskelite Mfg. Corp.

Sanders, Track
Brill Co., The J. G
Electric Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.

Sash Metal Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Car (See also Rattan)
Brill Co. The J. G.
Hale-Kilburn Co.

Second Hand Equipment
Electric Equipment Co.
Sachsenmaier Co., George

Shades, Vestibule
Brill Co., The J. G.

Shock Absorbers
Cleveland Pneumatic Tool Co.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Consolidated Car Heating Co.
Electric Service Supplies Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Electric Service Supplies Co.
Nachod and United States Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod and United States Electric Signal Co.
Wood Co., Chas. N.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

Sleet Wheels and Cutters
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
Cummings Car & Coach Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
Amer. Steel & Wire Co.
Illinois Steel Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel Foundries
American Steel & Wire Co.
Brill Co., The J. G.

Sprinklers, Track and Road
Brill Co., The J. G.
Cummings Car & Coach Co.

Steel and Steel Products
Carnegie Steel Co.
Illinois Steel Co.
Morton Manufacturing Co.

Steel Car Doors
Morton Mfg. Co.

Steel Flooring
Morton Mfg. Co.

Steel and Steel Products
Illinois Steel Co.

Steps, Car
Brill Co., The J. G.
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express)

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Amer. Brown Boveri Elec. Corp.
Consolidated Car Heating Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Telephones and Parts
Elec. Service Supplies Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Electric Service Supplies Co.

Tie Plates
Illinois Steel Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
American Bridge Co.
Carnegie Steel Co.
W. S. Godwin Co., Inc.
International Steel Tie Co.
Ludlum Steel Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires, Rubber
Century Rubber Co.
Goodyear Tire & Rubber Co.
Kelly-Springfield Tire Co.

Tongue Switches
Wm. Wharton, Jr. & Co.,

Tool Steel
Bethlehem Steel Co.
Carnegie Steel Co.

Tools, Track & Miscellaneous
American Steel & Wire Co.
Electric Service Supplies Co.
Hubbard & Co.
Railway Trackwork Co.

Torches, Acetylene (See Cutting Apparatus)

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Expansion Joints
Wm. Wharton, Jr. & Co.,

Track Grinders
Metal & Thermit Corp.
Railway Trackwork Co.
Ramapo Ajax Corp.

Track, Special Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.,

Trackless Trolley Cars
Brill Co., The J. G.

Transfer Tables
American Bridge Co.

Transformers
Amer. Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Transmission Towers & Structures
American Bridge Co.

Treads, Safety, Stair, Car Step
Morton Mfg. Co.

Trolley Bases
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Wheel Bushings
Star Brass Works

Trolley Wheels & Harps
Electric Service Supplies Co.
Star Brass Works

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
American Brass Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Roebling's Sons Co., J. A.

Trolley Shoe
Miller Trolley Shoe Co.

Trucks, Car
Brill Co., The J. G.
Cummings Car & Coach Co.

Trucks, Motor
Graham Bros.
International Motor Co.
Mack Trucks, Inc.

Truss Planks
Haskelite Mfg. Corp.

Tubing, Yellow & Black Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Electric Service Supplies Co.
Ohio Brass Co.
Perey Mfg. Co., Inc.

Turntables
American Bridge Co.
Electric Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Irvington Varnish & Ins Co.

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Ventilators, Car
Brill Co., The J. G.
Consolidated Car Heating Co.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.

Vestibule Linings
Haskelite Mfg. Corp.

Vitrified Brick
National Paving Brick Mfgrs. Assn.

Weatherproofing
Morton Mfg. Co.

Welded Rail Joints
Electric Railway Improvement Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
Electric Railway Improvement Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
Ohio Brass Co.
Railway Trackwork Co.

Welding Processes and Apparatus
Electric Railway Improvement Co.
General Electric Co.
Metal & Thermit Corp.
Nat'l Ry. Appliance Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding Steel
Electric Railway Improvement Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welding Wire
American Steel & Wire Co.
General Electric Co.
Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire and Rods
Railway Trackwork Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tire
American Steel Foundries
Carnegie Steel Co.
Illinois Steel Co.

Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Star Brass Works

Wheels, Wrought Steel
Carnegie Steel Co.
Illinois Steel Co.
Ludlum Steel Co.

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Window Sash, Locks and Racks
Morton Mfg. Co.

Wire Rope
American Steel & Wire Co
Roebling's Sons Co., J. A.

Wires and Cables
American Brass Co.
American Electrical Works
American Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Okonite Co.
Okonite-Callender Cable Co., Inc.
Roebling's Sons Co., J. A.
Westinghouse E. & M. Co.

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Attractively Designed

Appeal to both Operators and Public—

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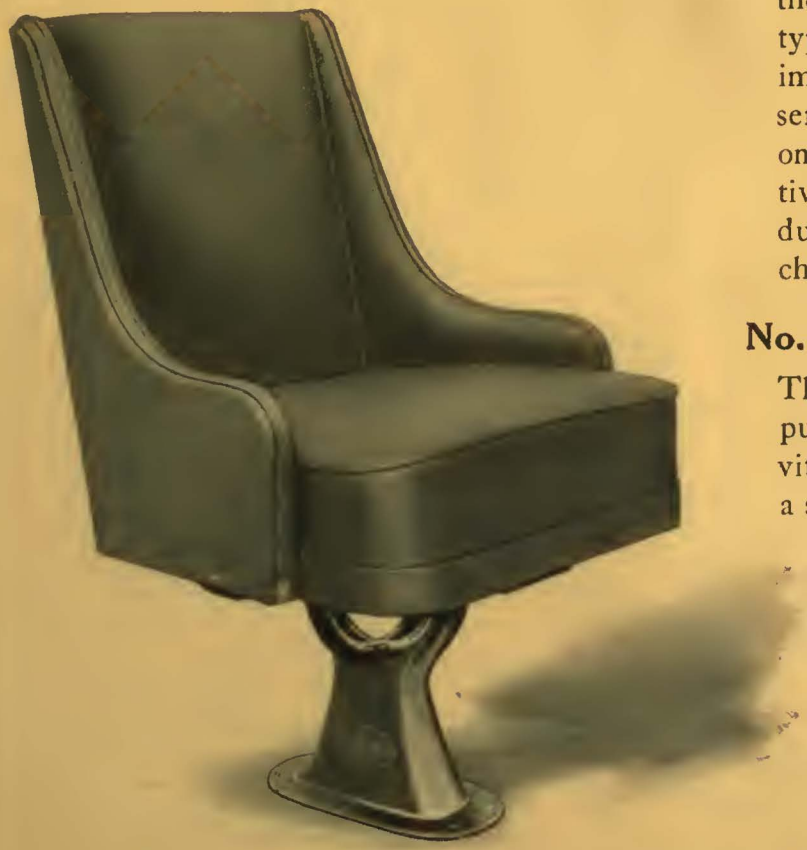
No part of your buses will make a deeper impression upon your passengers than the seating equipment. Consequently, it is of the utmost importance that you specify a type of seat which will insure a favorable impression and help to popularize your service. The No. 105-A illustrated is but one of many Brill types in which attractive appearance, unusual comfort and durability of construction are important characteristics.

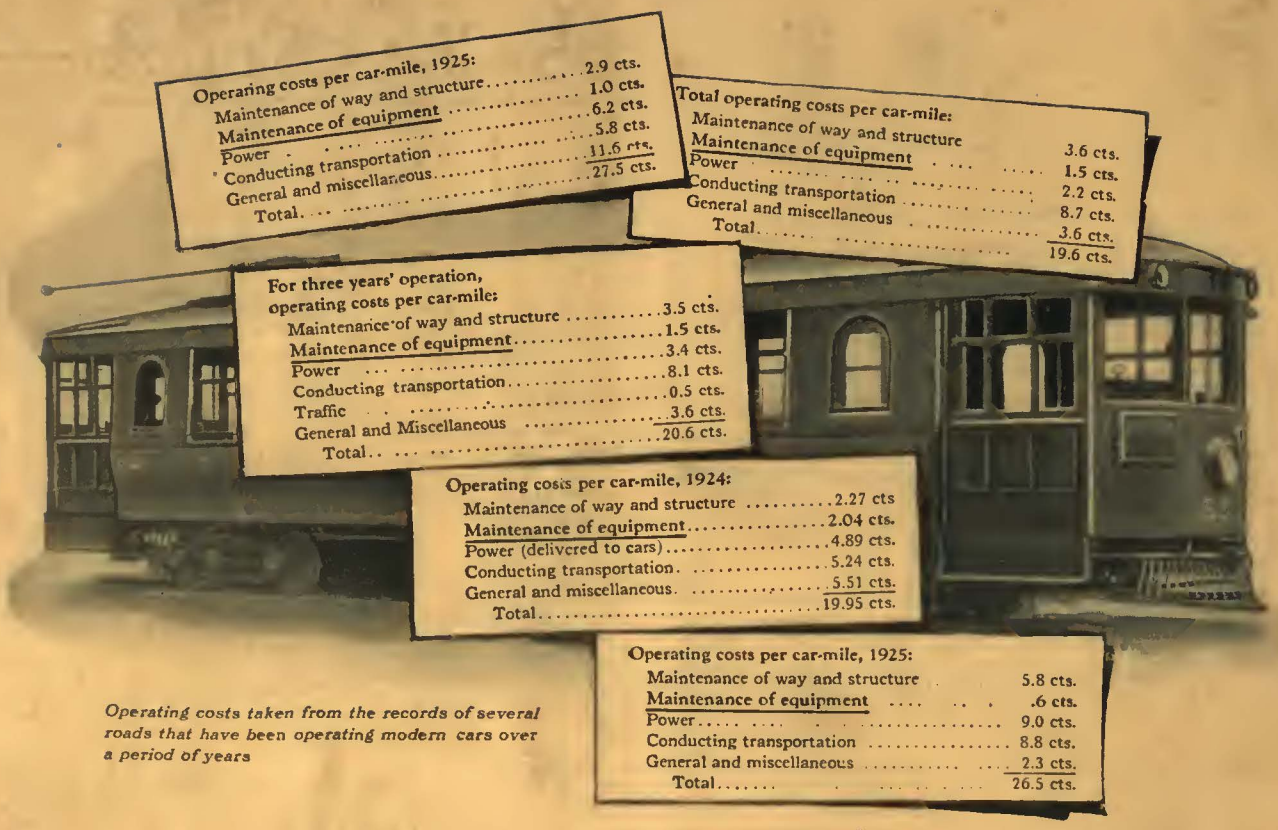


No. 1002 Operator's De Luxe Type

The bus operator is your contact with the public. He is your salesman and you are vitally interested in his success. Give him a seat which will appeal to him, and you help his enthusiasm for your line.

The Brill No. 1002 illustrated, mounted on a single pressed steel pedestal, meets the requirements of the most particular. Our seat catalog is No. 284. May we send you a copy?

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.



Operating costs taken from the records of several roads that have been operating modern cars over a period of years

Maintenance modernized!

Investigate the item: Maintenance of Equipment, in the operating-cost records of any of the companies that are using modern cars. You will find $2\frac{1}{2}$ cents per car-mile is a high figure; 1 cent per car-mile is common. Some roads report even less.

You may not be able to effect a considerable increase in riding—and gross revenue—in your territory. However, you *can* reduce your operating cost, if your equipment is old, heavy, expensive to maintain. The result is the same —*increased net earnings.*

Surely the light-weight modern car G-E equipped is demonstrating its essentiality for the raising of a railway's operating efficiency.

Talk over with a G-E railway engineering specialist *your* opportunities for increasing earnings or reducing expense. General Electric's recent experience gained by working with other railways will interest you. The nearest G-E District Office is at your service.

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GENERAL ELECTRIC