

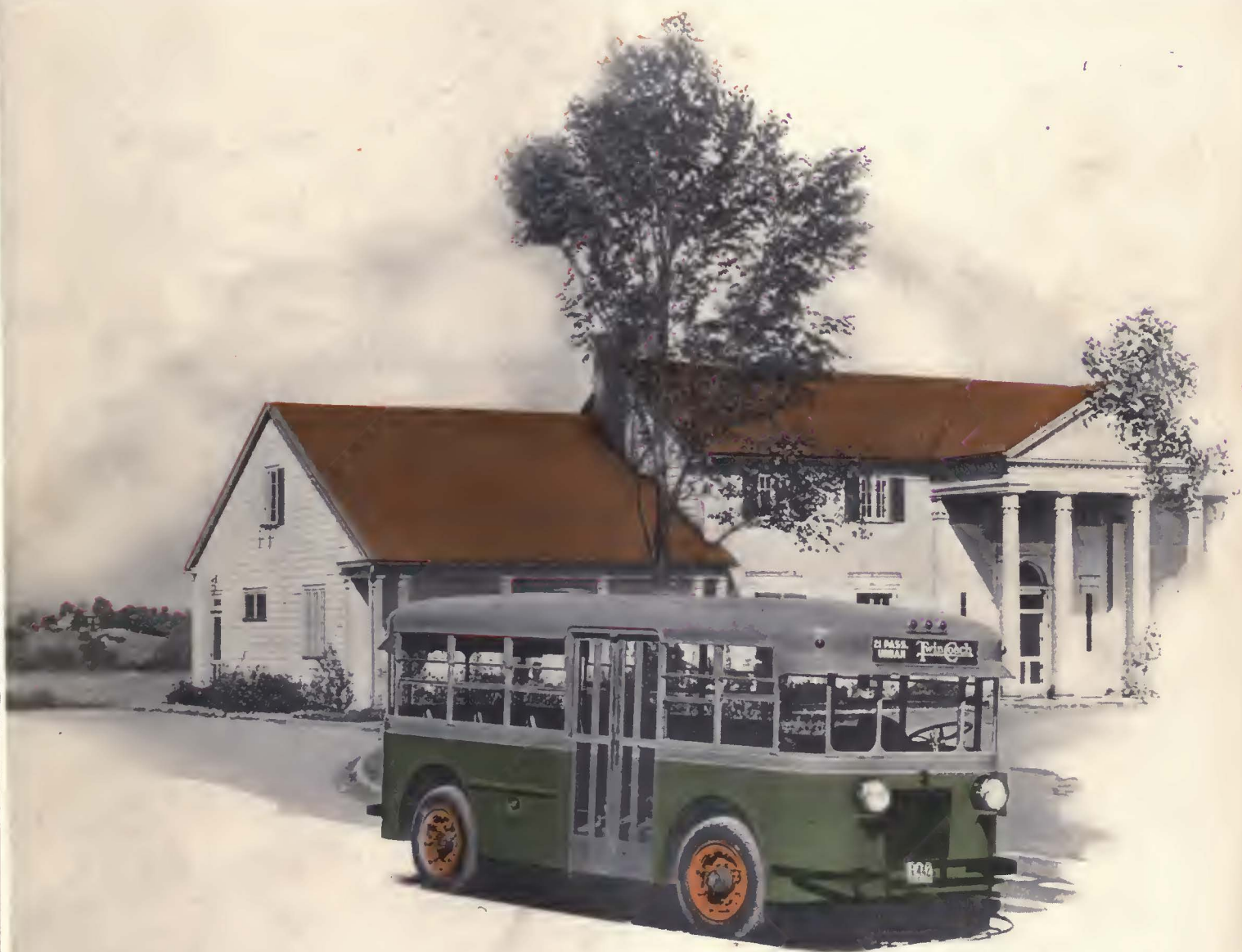
ELECTRIC RAILWAY JOURNAL

Graw-Hill Publishing Company, Inc.

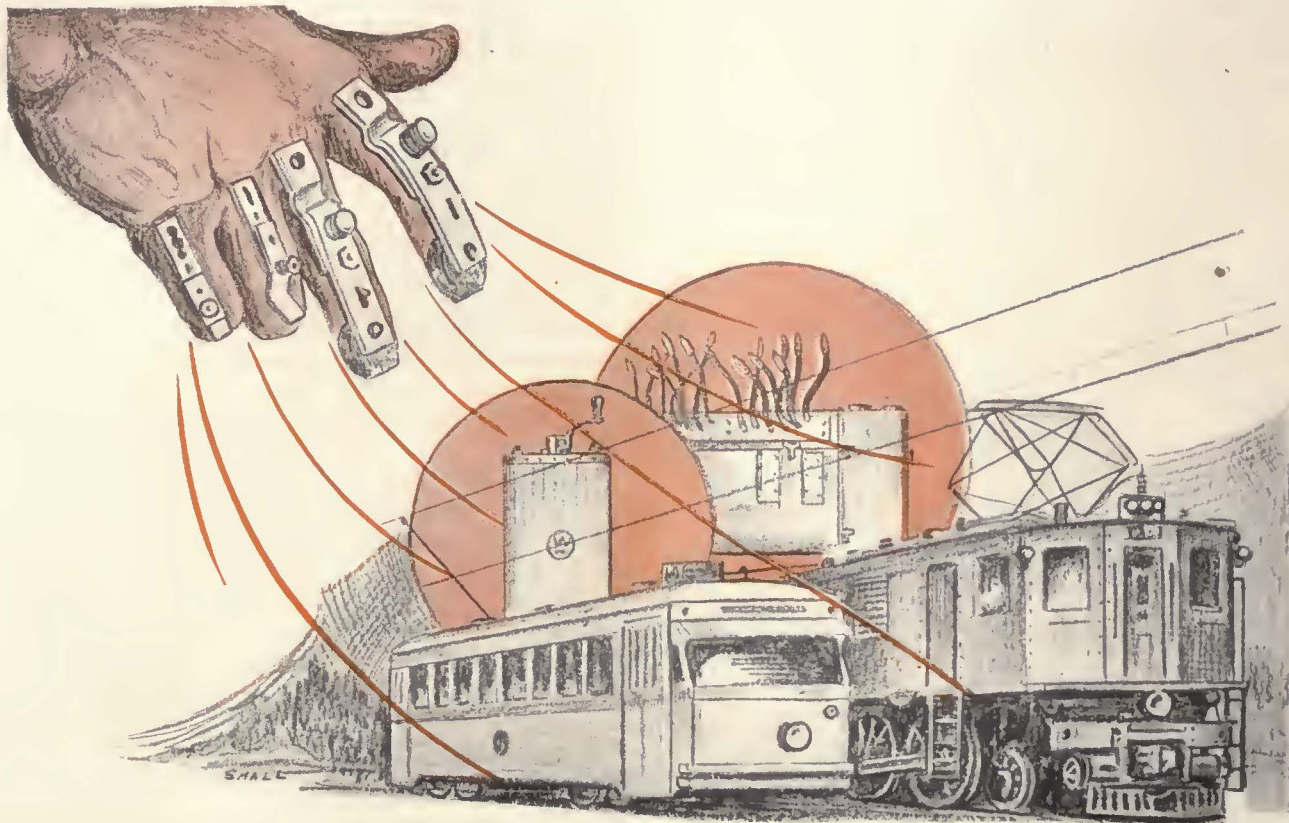
SEPTEMBER, 1929

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"A Chip of the Old Block"



COMPENSATING FINGERS

*are the digits of your
RIGHT HAND in
maintenance work*

COMPENSATING fingers are self-aligning. Regardless of the contour of the controller drum surface, Westinghouse compensating fingers automatically adjust themselves to the position of maximum contact.

These fingers are not only available for type K controllers, but also for various other types of main circuit commutating switches. In addition, we recently have developed a compensating interlock finger which has proved a big success in the elimination of finger breakage. It is suitable for master controllers, unit switches, interlocks, etc.

A new type reverser finger is now available which will help to relieve overloaded reversers.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH PENNSYLVANIA
SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES



Westinghouse

T 30722



Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

MORRIS BOCK
Engineering Editor
GEORGE J. MACDREAY
CLIFFORD A. FAUST
J. W. MCCLOY

JOHN A. MILLER, JR., *Managing Editor*

Vol. 73, No. 18

Pages 819-874

PAUL WOOTEN
Washington
ALBY MCCALLUM
London, England

LOUIS F. STOLL
Publishing Director

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"GETTING DOWN TO FUNDAMENTALS"

is the theme
of the 1929

ANNUAL
CONVENTION NUMBER
of
ELECTRIC RAILWAY JOURNAL
to appear Sept. 14

Franchises, Merchandising, Co-ordination, Fares, Taxation, Traffic, Community Development, Freight and Taxicab Regulation are among the many broad subjects to be treated.

Advance your thinking on the fundamental principles of community transportation by studying each article in this Number.

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McGraw-Hill Publishing Company, Inc., Tenth Avenue at 36th Street, New York, N. Y.

Cable Address: "MACHINIST, N. Y."

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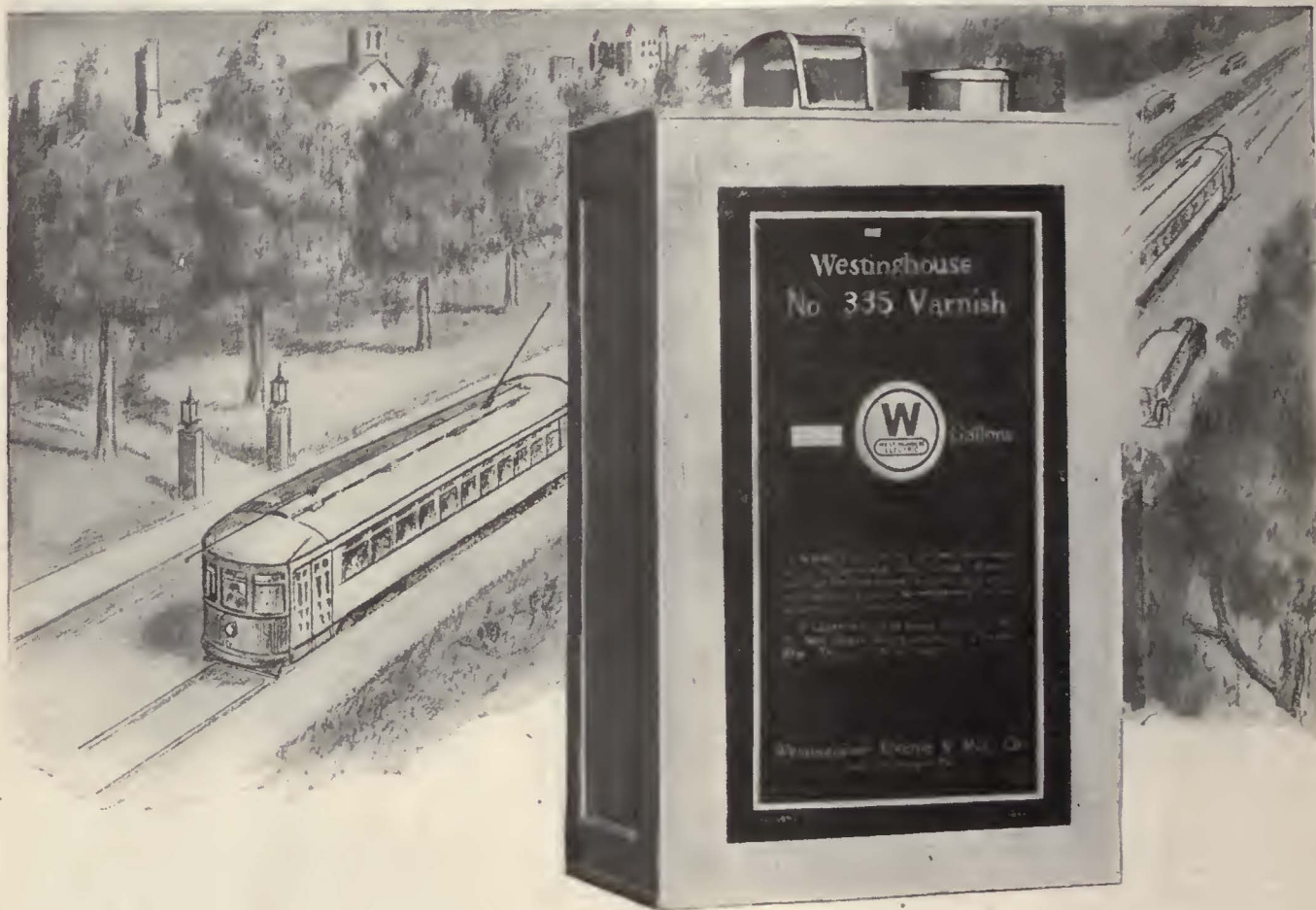


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Official correspondent in the United States for Union
Internationale de Tramways, de Chemins de fer
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Number of Copies Printed This Issue, 6,180

NEW YORK, District Office, 286 Madison Avenue
WASHINGTON, National Press Building
CHICAGO, 520 North Michigan Avenue
PHILADELPHIA, 1600 Arch Street
CLEVELAND, Guardian Building
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This Varnish Keeps Your Motors in Service

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Treated Fabric Tapes
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VARNISH that more than protects the surface; that has the vitality to resist constant strain and vibration; that may be depended upon to keep your railway motors out of the repair shop—that's Westinghouse No. 335 Varnish

This varnish prolongs the life of the motors, covering the windings and cores with a glossy, protective film—hard, but elastic, tough as rhinoceros hide, highly resistant to vibration, excessive moisture and heat.

Safeguard your motors with this insulating varnish of proved accomplishments.

Using Westinghouse Insulating Materials is like owning a million-dollar laboratory.



WESTINGHOUSE ELECTRIC & MFG. COMPANY
 EAST PITTSBURGH PENNSYLVANIA

SALES OFFICES AND SERVICE SHOPS IN ALL
 PRINCIPAL CITIES OF THE UNITED STATES



Westinghouse

CUT CURRENT COLLECTION COSTS

Pole, harp and wheel complete.



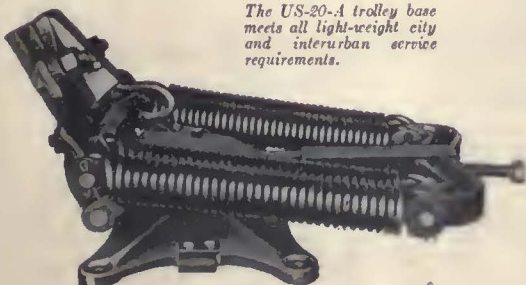
Westinghouse-Nuttall harp with non-turning washers phosphor-bronze shunt springs, and hardened axle pin.



Typical wheels



The US-20-A trolley base meets all light-weight city and interurban service requirements.



LOW-COST car operation necessarily requires trouble-free, maintenance-saving current collecting equipment. That's why so many electric railway companies are using Westinghouse Nuttall trolley bases, poles, harps and wheels.

In the light-weight US-20-A trolley base, Timken bearings, hardened wearing parts, twice-a-year lubrication, simplicity and accessibility safeguard long life and cost-saving service.

Poles of either butt-welded or genuine seamless tubing combine maximum strength with light-weight. Their tapered form gives ample resiliency and permits great deflection without permanent "set". They render long services under the severest condition.

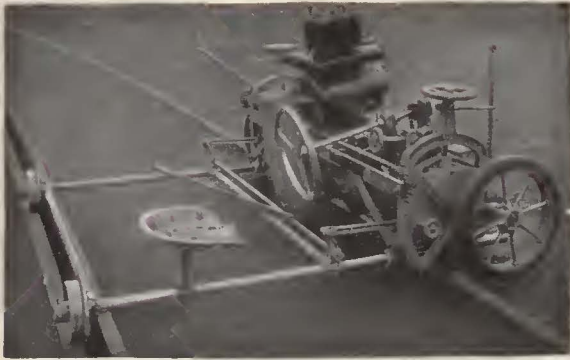
Malleable iron harps for all standard wheels have the strength necessary to endure the buffeting that results when wheels leave the wire, yet they are light enough to preserve positive base spring action. The design and construction of all parts insure high conductivity.

The trolley wheel is subject to worse abuse than any other part of the current collecting equipment, yet to be most economical, it must be light weight, run quietly and smoothly, give long wear, have high conductivity and cause no undue wear on the trolley wire. These requirements are met by Union Standard and Ideal wheels.

WESTINGHOUSE ELECTRIC & MFG. COMPANY
NUTTALL WORKS PITTSBURGH, PENNSYLVANIA
SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES
CANADIAN AGENTS: LYMAN TUBE & SUPPLY COMPANY



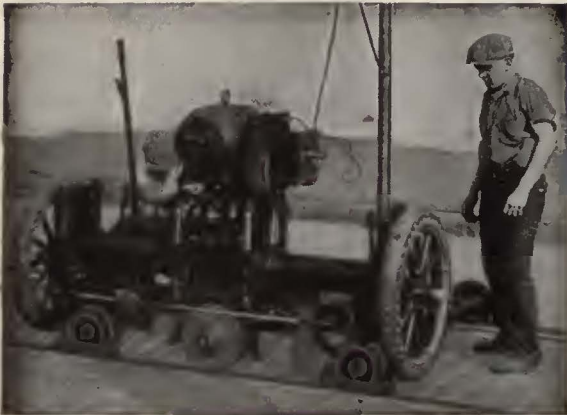
Westinghouse



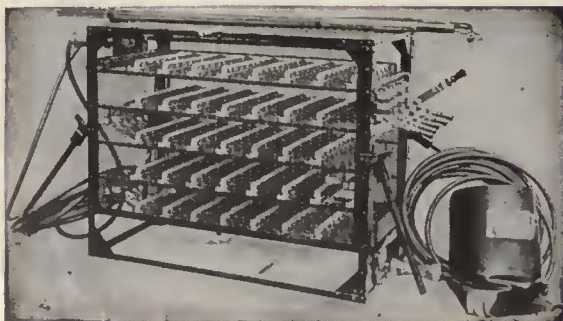
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

None but
the brave
deserve
the fare

Courage to do what must be done to win and hold public approval—without it street railway rides can't be sold in sufficient volume to pay.

Costs money? Not much is needed to do the first thing first—provide good track.

Here is equipment that requires no great investment yet does so much.



Reciprocating Track Grinder



Vulcan Rail Grinder



Midget Rail Grinder



RTW Curve Oiler

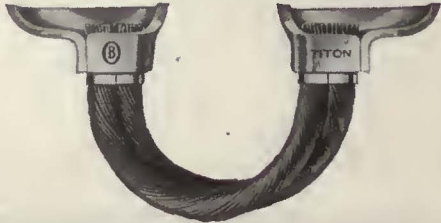
Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

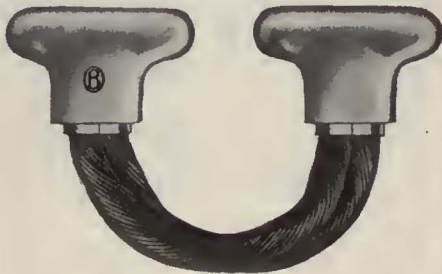
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 Chas. N. Wood Co., Boston
 H. F. McDermott, 208 S. LaSalle St., Chicago
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A Few O-B Rail Bonds



O-B Titon Rail Bond, for head-of-the-rail installation by the copper alloy metallic-arc process. Refer to page 667, O-B Catalog No. 20.



O-B Type AW-8 Rail Bond, for head-of-the-rail application by the steel metallic-arc process. Refer to page 666, O-B Catalog No. 20.



O-B Type ST-2 Rail Bond for head-of-the-rail application by the gas-weld process. Refer to page 51, Supplement No. 2 to O-B Catalog No. 20.



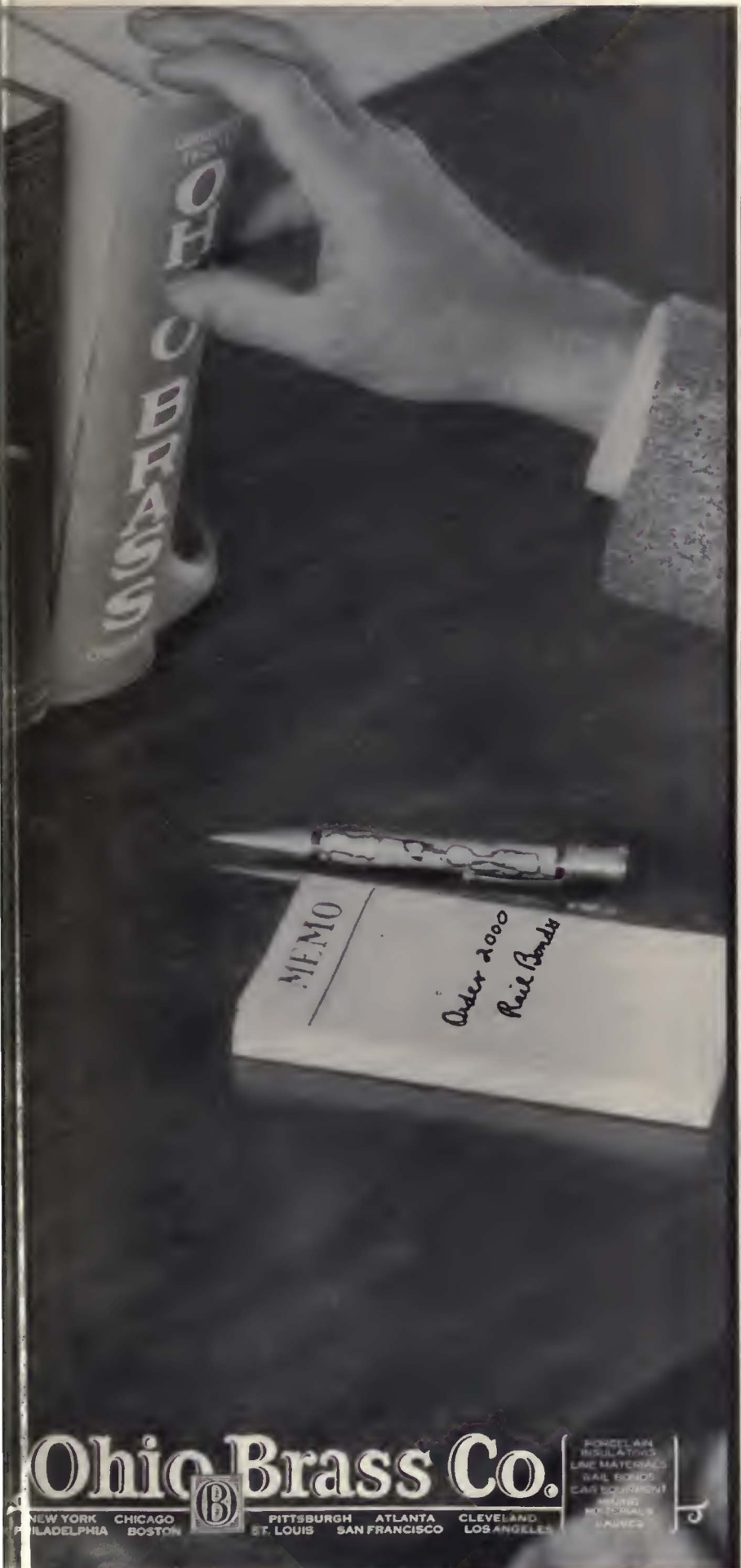
O-B Type AW-12 Rail Bond for base-of-the-rail application by the copper alloy metallic-arc process. Refer to page 670, O-B Catalog No. 20.



Ohio Brass Co.

NEW YORK CHICAGO PHILADELPHIA BOSTON PITTSBURGH ATLANTA CLEVELAND ST. LOUIS SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
EQUIPMENT
WORKING MATERIALS
VALVES



“You Bet I’ll Buy Them From O-B”

“**W**HEN your job is to keep the track circuit one hundred percent efficient, it’s mighty necessary to know that the rail bond is going to do its part of the job—and that is just what we have found out about O-B rail bonds. When we put on an O-B bond it stays put and we don’t have to worry about resistance or fractured welds.”

All over the country you’ll find that the men who have to “keep the wheels turning” are choosing O-B rail bonds—and saving themselves trouble by doing so.

They have found that the service life of an O-B rail bond is longer; that it goes on to the rail easier, and is mighty hard to get off. Consequently, breakage of the strand is the most probable point of failure—and O-B, by careful and proper design, reduces such breakage to an almost unbelievably low percentage. This design also insures low track resistance for the whole life of the bond.

Truly, there is a great difference in rail bonds. The man who knows has found a safe and sure way of buying bond satisfaction. He merely orders rail bonds from O-B.

Ohio Brass Company, Mansfield, Ohio
 Canadian Ohio Brass Co., Limited
 Niagara Falls, Canada
 11188



WHY PAY TRIBUTE ?

EVERY steel wheel that demands re-turning exacts a tribute from maintenance funds that you can ill afford.

Many roads have revolted from this tyranny and by the use of Davis "One-Wear" Steel Wheels have escaped the penalty.

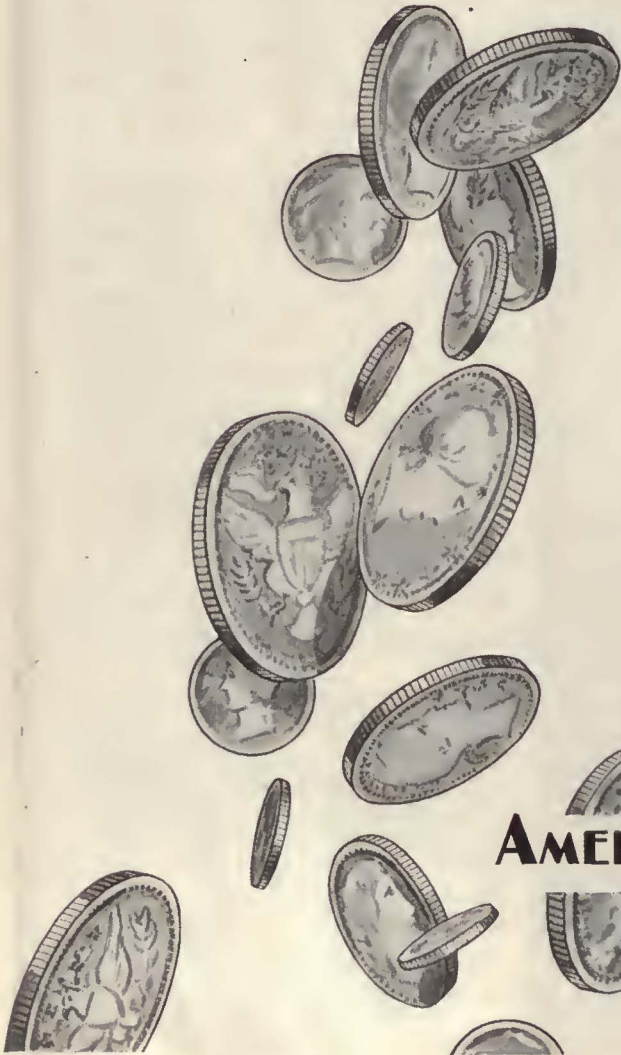
For Davis Steel Wheels are made from a special heat-treated composition that develops the precise characteristics necessary to a "One-Wear" Wheel.

A wheel tread demands a high resistance to wear without brittleness, the plate requires fatigue resistance while the hub should be ductile and tough.

These widely varying characteristics can only be developed by heat-treatment of a special composition wheel metal.

Such heat-treatment makes every part of a Davis "One-Wear" Steel Wheel ideally suited to the work it has to do.

AMERICAN STEEL FOUNDRIES
 NEW YORK CHICAGO ST. LOUIS



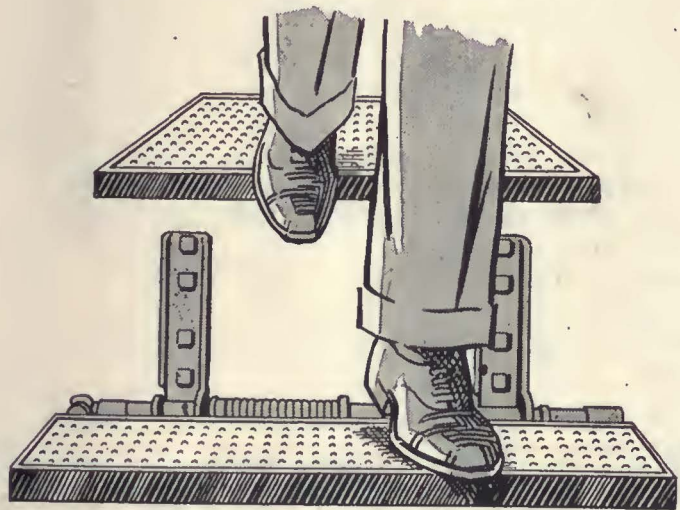
NP

59th Street

Takes to

Treadle-ization

Three months ago the famous fifty-ninth street New York crosstown line put 32 Treadle-ized cars into operation. Neither passengers nor crews fumbled with the new equipment—it went into service without a ripple, and an *out-standing success*.



NATIONAL PNEUMATIC CO.

Put these together ... and trolley worries disappear!



Samson Spot Trolley Cord

Samson Spot Cord is strongly recommended as the most durable and most economical trolley cord on the market. It is made of extra quality cotton yarn, is carefully inspected and is guaranteed free from all imperfections of braid or finish. It is water-proofed by a special process which makes it impervious to moisture and prevents shrinking or swelling.

Samson Spot Cord is particularly adapted for use with Keystone Trolley Catchers on account of its smoothness of braid and uniformity.

The colored spots are a trademark (registered in the U. S. Patent Office) used only with this extra quality cord.



SEVERAL important improvements mark the new type, Keystone Trolley Catcher: Larger rope capacity, larger reel and increased size of openings to allow free movement of the rope, and a new method of mounting pawls by which quicker action and positive catch is assured.

The pawls made in one piece, are large and heavy, and so arranged that when thrown outward by centrifugal force they slide in position and secure a full flat bearing surface against the stops. This also prevents rebound of the trolley pole, causing releasing of the pawl and thus allowing the trolley pole to fly up again. "Stepping up" of the pole is further prevented due to the fact that the pawls are mounted on a rotatable plate located in the back of the machine, cushioned by a spring, which tends to reduce the shock and further eliminates the possibility of the pawls disengaging. The arrangement of the mechanism also prevents wearing of the ends of the pawls and stops.

*It will pay you to get
complete details.*

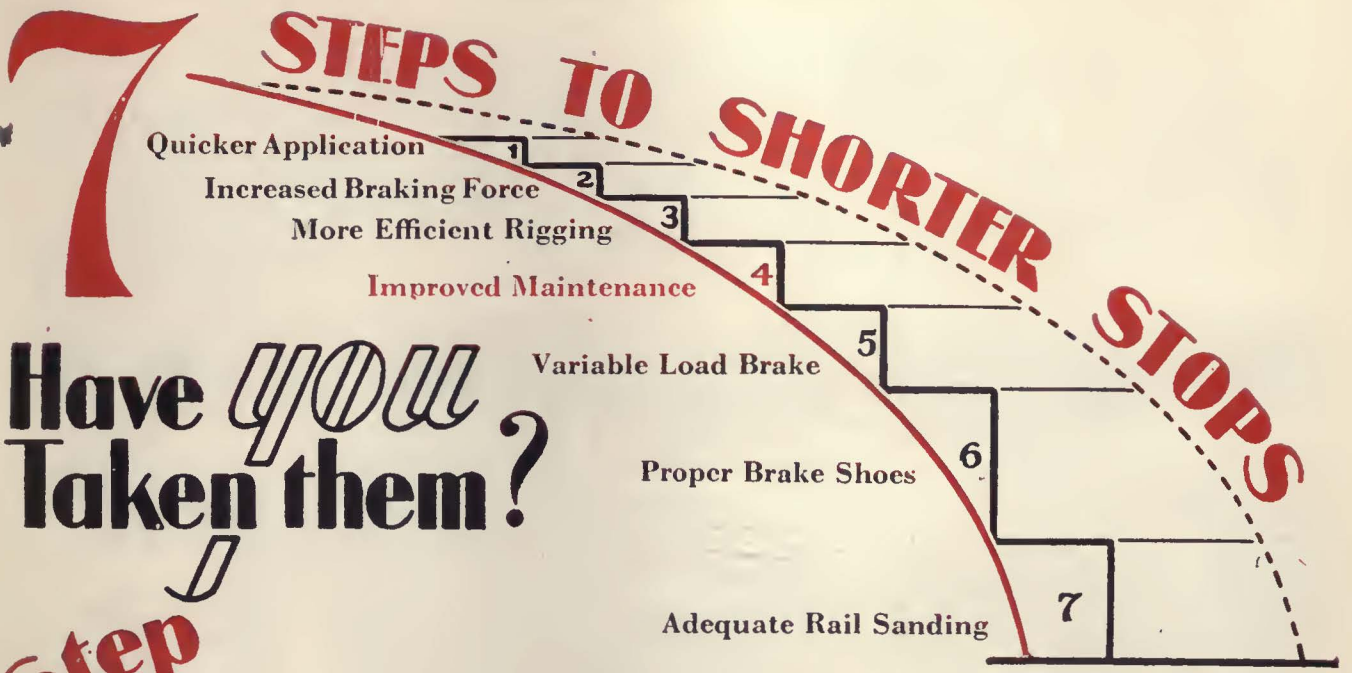
ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER

AND INDUSTRIAL ELECTRICAL MATERIAL

Home office and manufacturing plant located at 17th and Cambria Streets, Philadelphia, Pa.; District offices are located at 111 North Canal Street, Chicago, Ill. and 50 Church Street, New York City.

Branches—Bessemer Bldg., Pittsburgh; 88 Broad Street, Boston; General Motors Bldg., Detroit; 816 N. Washington Ave., Scranton. Canadian Agents—Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.



Have *you* Taken them?

Step
4

IF prompt, effective, and consistent brake operation is to be assured, the various air brake devices must be maintained in good condition so that each will continue to function properly.

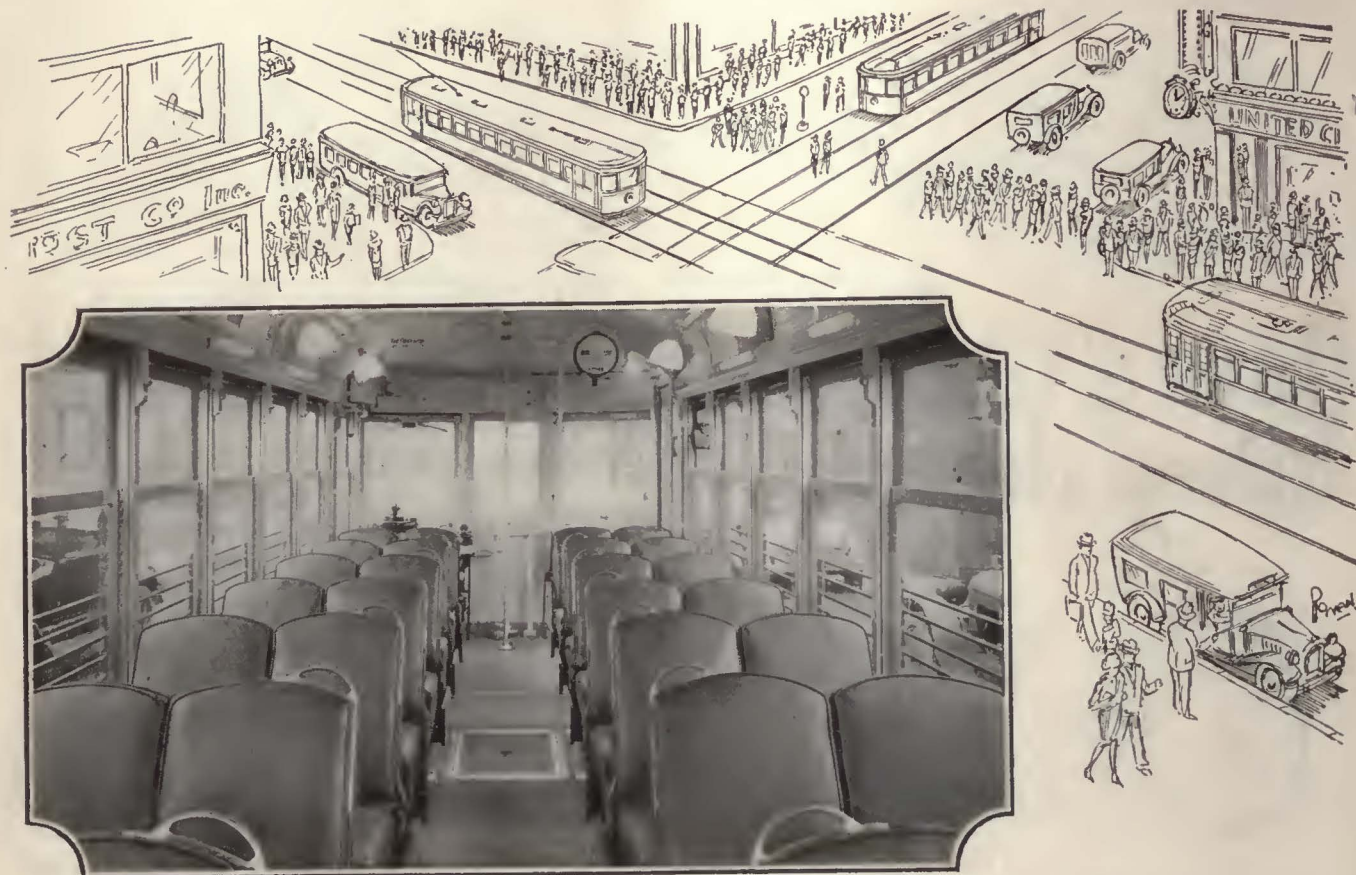
The compressor should be kept efficient to assure prompt restoration of reservoir pressure . . . governor setting periodically adjusted to keep pressure within desired limits . . . brake valve well lubricated to permit easy manipulation . . . relay valve maintained in condition to prevent sluggish action . . . pipe connections, all valve devices, and brake cylinder kept free from leakage that delays the time of brake application and reduces its effectiveness.

A simple means for reducing detrimental leakage is our Brake Cylinder Protector which prevents abrasive dirt from reaching the cylinder walls and packing cup.

Our mechanical experts are available for assistance in effecting improved maintenance standards or in solving any problem relating to brake performance. Consult them freely—no obligation is involved.

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, Wilmerding, Pa.





Don't Overlook Comfort

Progressive traction executives are stressing the advantages of trolley transportation — safety, convenience, speed, economy. They are selling rides aggressively, intelligently and, in numerous instances, effectively.

How much more effective their salesmanship would be if they could sell COMFORT! How much more eagerly would passengers choose the trolleys if they knew that comfortable chairs were waiting for them instead of the usual modified park benches!

Hale and Kilburn seats and chairs, which support the back and rest the body, are proving their value in selling urban transportation.

HALE & KILBURN SEATS

"A BETTER SEAT FOR EVERY TYPE OF MODERN TRANSPORTATION"

HALE & KILBURN COMPANY

General Office and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

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 W. L. Jefferies, Jr., Mutual Bldg., Richmond
 W. D. Jenkins, Praetorian Bldg., Dallas, Texas
 H. M. Euler, 146 N. Sixth St., Portland, Oregon



Dayton Tie Bulletin



OUR OLDEST INSTALLATION IS GOOD TODAY

Defying time and traffic, the first installation of Dayton Ties we ever sold is good today. In Dubuque, Iowa (Dubuque Electric Co.) and Dubuque is buying more Dayton Ties on the strength of this experience. The engineer says the Dayton Integral Track is the best he has today.

The ties were installed in 1917 by E. M. Walker, their General Manager. Mr. Walker went from Dubuque to the Indianapolis and Eastern at Terre Haute, Ind., from there to Schenectady as general manager. In both places he introduced Dayton Integral Track on the strength of his experience in Dubuque.

Maintenance has been negligible, track is good, and Dubuque has recently placed a large order for more Dayton Ties, convinced that Dayton Integral Track cannot be excelled in lasting qualities and all around satisfaction.

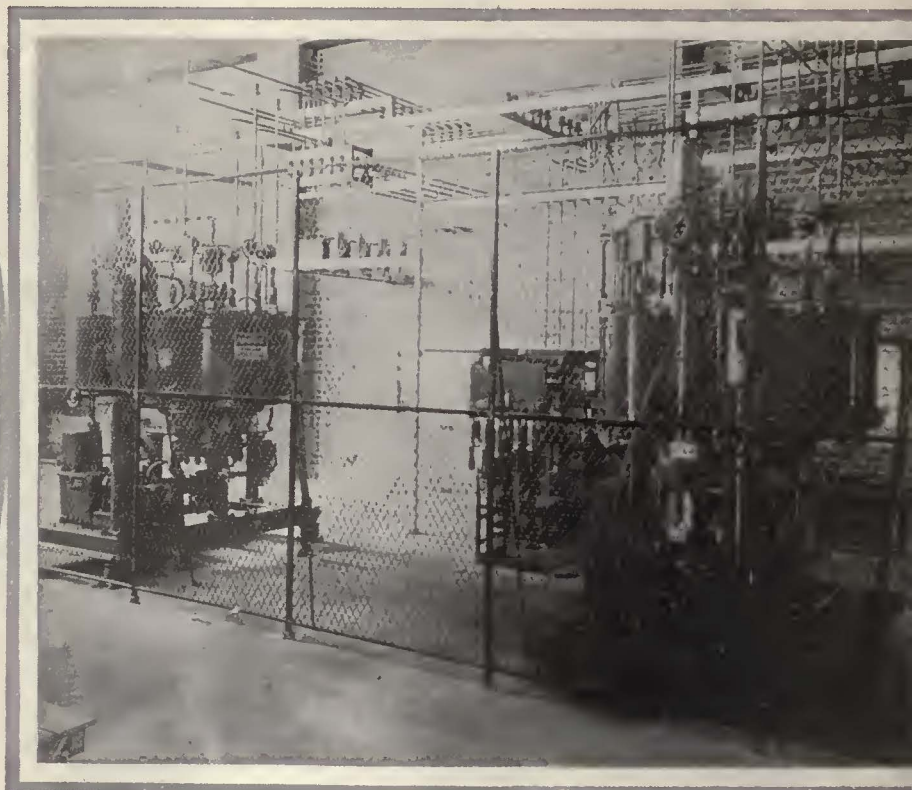
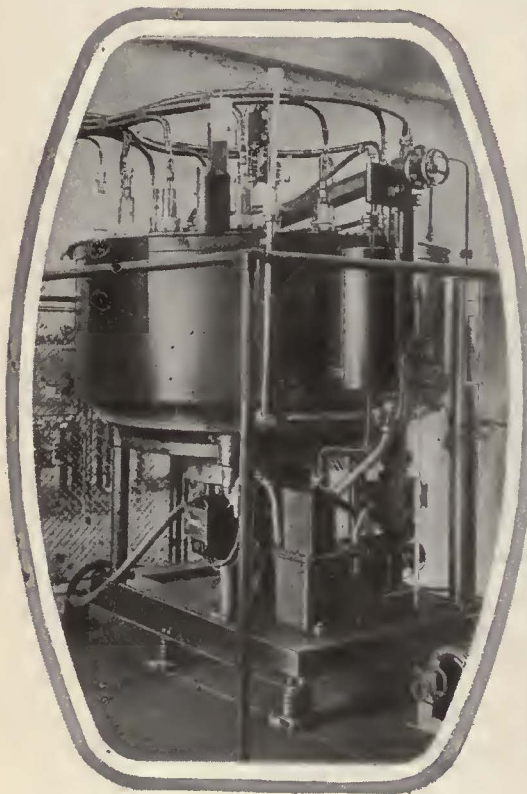
Though Dubuque was the first installation we sold—we have had experimental installations on our own lines around Dayton, O., for nearly 18 years. We feel justified in saying that the Dayton Integral System of Track and Paving Structure produces track which will last at least 20 years.

THE DAYTON MECHANICAL TIE COMPANY
DAYTON, OHIO

Essential factors in converting equipment

1. High efficiency over the entire working range.
2. High capacity to absorb momentary overloads.
3. No synchronizing.
4. Simple operation and minimum attention.
5. Low maintenance cost.
6. Noiseless operation and freedom from vibration.
7. Reliability.

The G-E mercury-arc rectifier embodies them all.



GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.,



628,625 miles without repair

A G-E motor, operated by the Northern Texas Traction Company, was placed in service April 27, 1921, and was inspected April 11, 1929, after 628,625 miles of high-speed interurban service. This inspection showed the motor, including the bearings and the armature, which had never been rewound, to be in excellent condition.

Pinions, too

In April, 1929, two G-E pinions on a car operated by the Denver Tramway Corporation had operated 337,297 miles. At this time, one pinion was shifted to a different position and the other scrapped. The former pinion had .050 inch wear and the latter .120 inch.

Such service is evidence of the quality of the materials and workmanship in G-E apparatus.



JOIN US IN THE GENERAL
ELECTRIC HOUR, BROADCAST
EVERY SATURDAY AT
8 P.M., E.S.T. ON A NATION-
WIDE N.B.C. NETWORK



130-17

E L E C T R I C
SALES OFFICES IN PRINCIPAL CITIES

.. Is the trolley bus the answer to your operating problem?



A motion-picture film showing trolley buses in operation is available on request. Address your communications to the G-E office nearest you.



Modern railless vehicles have assumed a definite place in transportation.

Of those used in city service, the trolley bus has many outstanding advantages, among which are low operating cost, unlimited power, fast acceleration, quietness, speed on grades, and flexibility. The operator of a trolley bus is not confronted with heavy paving charges.

G-E equipped trolley buses have been operated successfully for a number of years in Philadelphia, and in Cohoes and Rochester, New York; and for nearly a year in Manila.

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 8 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

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

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 73

New York, September, 1929

Number 18

An Advantage that Should Not Be Lost

IN THE forefront among the serious civic problems in America today is that of traffic congestion. Everyone suffers from it to some extent. Estimates of its dollars-and-cents cost run into figures that are almost incredible. Certainly the local transportation companies have been among the sufferers from this cause, but it has not been altogether an unmixed evil for them and the solution of the problem may not turn out to be an unmixed blessing. Although congestion has caused a serious reduction in operating speeds it also has diverted a certain amount of traffic from the private automobile to the public transportation vehicle. The passenger in the street car or bus has no parking worries and happily he is free from the nervous strain of driving in traffic. Numerous operating companies have emphasized these advantages in their advertising and undoubtedly many people, recognizing the truth of the argument, are now using their automobiles less than they did formerly.

Elimination of automobile parking is undoubtedly the most promising means of relieving traffic congestion. But if such measures were to be adopted tomorrow it is a question whether the patronage occasioned by congestion would be retained by the public transportation companies, or whether these patrons would go back to their automobiles, although it involved the extra cost of using a garage instead of free parking space in the street.

Even though there might appear to be some reason to believe that the business would be lost, that is not a reason why the transportation company should oppose measures designed to relieve congestion. Such an attitude would be exceedingly short-sighted. Selfish opposition will get nowhere. Means of relieving traffic congestion will be found; in fact, some of them already are available. They await only a sufficiently aroused public opinion to insure their adoption, whether or not the transportation companies like them.

Other and better means exist for retaining the traffic that has been brought to the transportation companies by congestion. Chief among these is improvement in service. Circumstances beyond the companies' control have given them this patronage, but their keeping it will depend on their own efforts. It cannot be done

with dirty old cars running at irregular intervals over bumpy track. If, on the other hand, the company is prepared to meet the public with modern equipment run on frequent headways at a speed comparable with the demands of the public today, it is likely that not only will the present business be retained, but that even more riders can be secured.

EFFECTIVE Sept. 1 Charles Gordon, editor of *ELECTRIC RAILWAY JOURNAL* since 1926, becomes managing director of the American Electric Railway Association. Throughout the period of his editorship of the *JOURNAL* his wide experience and untiring energy have contributed greatly to the progress of the local transportation industry in this country. The publishers of this paper feel keen regret at his leaving the post of editor and congratulate the association upon securing so capable a leader. The broad constructive policies initiated by Mr. Gordon will be continued in the future activities of the *JOURNAL*. After Sept. 1 responsibility for the editorial direction of the paper will be in the hands of John A. Miller, Jr., managing editor, who has been a member of the staff for seven years, following a similar period spent in actual electric railway operation.

MALCOLM MUIR,

President, McGraw-Hill Publishing Company, Inc.

Advertising Used in a New Way

NEWSPAPER advertising has been utilized for a variety of purposes by electric railways, but seldom has it been used in an endeavor to influence public sentiment regarding damage claims. Neglect of this subject in paid advertising probably has been due to the difficulty of presenting the facts in the brief space available in advertising columns, and to the danger of antagonizing

the legal profession and the judiciary. Hazardous the possibility of unfavorable reactions which might outweigh the benefits to be derived, the Georgia Power Company recently issued a series of seven full-page advertisements frankly telling the facts of the situation. The story of the campaign is told in detail elsewhere in this issue.

Carrying the story boldly to the public, the undertaking has already been remarkably effective. Company officials sense an awakening standard of justice among those presenting and awarding claims, and company employees report increased understanding and appreciation of the service being rendered by the railway. The reaction to the advertisements has been almost wholly favorable. A large measure of the success of the series doubtless was due to reiteration that "This company will pay any just claim against it voluntarily." It asked the "same justice you would accord an individual—no more."

Changing Habits Create a Difficult Transportation Problem

MORE or less typical of the problem facing the electric railways everywhere is the situation at Boston. For some years past the total volume of riding has been declining slowly, as it has in many other cities. This has been due to the loss of off-peak business, which has suffered a marked reduction. On the other hand, rush-hour riding has been increasing steadily. Thereby an extremely difficult problem has been created.

Because the annual report of the Boston Elevated Railway is made as of June 30 the situation is prominently in the public eye just now. For the year recently closed there was a decline of \$697,000 in gross revenue. This is attributed principally to the decrease in riding on Sundays and holidays and during the summer season, when more people than formerly are going away on vacations. As a typical instance of the trend of traffic, the month of June may be cited. A year ago the revenue of the Elevated system for June exceeded the cost of service by \$179,791, but in the similar month of the present year the cost of service exceeded the revenue by \$32,188. Some loss in revenue is attributable also to the open winter last year, which encouraged the use of automobiles.

Over neither of these factors has the management any control. Over the factors which it does control, however, the figures contained in the report speak eloquently. Expenses were reduced by \$610,062—an achievement made without any apparent bad effect on the personnel or on the character of service rendered. Actually, this year, from operations there was an excess in cost of service over receipts of \$180,153. This deficit was offset in part by a dividend of \$150,700 from the Transit Mutual Insurance Company, created in 1921 to carry the workmen's compensation insurance of the Elevated. The rest of the deficit was counterbalanced by inventory and other profit and loss adjustments. In short, for the year ended June 30, 1929, the company was able to meet all operating expenses and fixed charges, but with no balance over and above the amounts necessary to restore the reserve fund to the original figure of \$1,000,000, as provided in the public control act of 1918.

That is the situation. No effort has been made to conceal it behind a screen of complicated figures. Rather, the matter has been held before the employees and the public in the frankest manner. Under public control the trustees are directed to operate the road on the basis of service at cost, fixing fares to meet the needs of the situation. An easy way to meet the problem would be to follow this arrangement to the letter, but that the management never has done. Instead of ignoring costs, constant attention has been paid to keeping them down to a minimum. Service has not been impaired but, as in a recent instance, both the public and the management have agreed to forego service that would tend to increase costs unnecessarily. At the same time special thought has been devoted to securing new business. The latest move in this direction is a newspaper advertising campaign, with the idea of inducing more people to park their automobiles at points along the rapid transit line and use the Elevated to get downtown. How this will affect the situation cannot yet be determined.

All in all, the situation at Boston is a difficult one. The vital character of the service rendered by the Elevated is shown by the increasing rush-hour traffic. This, however, only adds to the complexity of the problem

with which the management is faced. Eventually, however, the financial question will have to be solved on a basis that will preserve the transportation facilities of this great metropolitan area and permit their expansion to meet the needs of the many growing communities served.

New Evidence of Broader Thinking on Co-ordination

MORE and more are leaders in transportation becoming aware of the need for fully co-ordinating all transportation facilities within a city. Additional evidence of the expansion of this idea to include proper physical connection between through railroad and community local transportation facilities is furnished by the plans of the new \$40,000,000 Cincinnati Union Terminal, made public only recently. The terminal is so designed that street cars, buses and taxicabs will all pass through the building. These vehicles will enter a north wing, discharge passengers on separate platforms under shelter, and then go underneath the main building to a south wing, where they will pick up outgoing passengers, also under shelter. The plan will allow the complete segregation, not only of incoming and outgoing passengers, but also of those using the three classes of local service. Since seven steam railroads are co-operating in the construction of this terminal, the completed project will tie in almost every transportation facility of the city. It is indeed a significant move and another forward step in the advancement of complete co-ordination.

An even greater degree of co-ordination may perhaps be achieved in Cleveland, now that the Cleveland Railway has combined with the Van Sweringen interests. The plans for the new union terminal include co-ordination of the rapid transit lines and the steam railroads, as well as local street cars and buses. It is not unlikely that some agreement will be reached between the Van Sweringens and the electric interurban lines in the city to use the terminal also. Moreover, a taxicab stand has been built into the station, so that it appears that every facility will be co-ordinated.

Further evidence of the extension of the idea to include proper physical connections between the railroad and community transportation facilities is furnished by the recent revival of the Hudson River Bridge project, connecting New Jersey with New York City at 59th Street, and including a great passenger terminal on Manhattan Island. The most significant features, from the viewpoint of community transportation, are the subway freight line to extend to lower Manhattan and the underground connecting link to join this new terminal with those already built, as well as with the Hudson & Manhattan Tubes, the Ninth Avenue Elevated, Eighth Avenue Subway, Seventh Avenue Subway, Broadway Subway, Sixth Avenue Elevated, Lexington Avenue Subway and the lines to Queens. In addition the underground loop would connect six north and south street car lines, three crosstown lines, the Fifth Avenue Coach lines and most of the intercity bus terminals. In short, the system would make all of the railroad terminals accessible to people reaching the city on any rapid transit line, and conversely, would aid arriving passengers at the terminals to get to their destination. The project reveals a broad vision on the part of those who conceived it and represents an attitude toward the problem which must, of necessity, guide the planning of all great terminal

projects. Plans of this sort naturally involve many intricate physical and economic problems, but none of these is impossible of solution when the authorities realize the importance and fundamental soundness of co-ordination.

Standardization That Is Dynamic

NATIONAL industrial standardization has been advanced greatly during the past year by the work of the American Standards Association. Building on the work of its predecessor, the American Engineering Standards Committee, the new association has so broadened the scope and improved the procedure that its first year of existence has marked a distinct step forward. As at present constituted, it is a federation of 40 national technical societies, trade associations and governmental bodies. The purpose is to bring together manufacturers, distributors, consumers, technical specialists and any others directly concerned with a particular standardization project. After being assured that a preponderance of these interests wish to have a national standard, the association brings about the organization of a technical committee composed of official delegates of all important bodies directly interested to formulate the standard. Finally, when such a committee has prepared the standard and given it substantially unanimous approval, and when the American Standards Association is definitely assured that the standard represents a real national consensus, it is made an "American standard."

Numerous branches of the federal government are participating actively in the work of the A.S.A. Six executive departments are member bodies. The Bureau of Standards was reorganized in 1927, with an assistant director in charge of the commercial standards group. This group comprises the division of simplified practice, the division of specifications and a new commercial standards unit. The last-named has for its objects the promulgation of commercial standards prepared by industry and the promotion of the use of such standards. The bureau and the A.S.A. are co-operating to prevent overlap and conflict. While the details of the arrangement between the two organizations have not been completed, it is understood that the Bureau of Standards, with the approval of a proponent group, will submit tentative standards to the A.S.A. for approval as American standards, provided there is sufficiently wide acceptance by the various industrial and technical groups concerned.

Although it is chance that places the American Electric Railway Association at the head of the alphabetical list of member bodies, it is no chance that makes it one of the leaders in the movement. The association has been one of the leaders in the new association, as it was in the predecessor organization. The association is represented on the technical committees determining no less than 50 different standards, and is sponsor of thirteen of these. It has representation in many of the activities of the A.S.A. The work of standardization thus accomplished had already proved of great benefit to the electric railway industry, even before the reorganization of this standards work. With the added prestige of the new association and the impetus that has been given to standardization and simplification by the Department of Commerce, the advantage will be more and more apparent. In this connection the slogan of the American Standards Association is significant: "Standardization is dynamic, not static. It means, not to stand still, but to move forward together."

Give the Pedestrian a Chance

PROBLEMS of the pedestrian seldom are given the prominence they deserve in the study of metropolitan traffic problems. While the most attention ordinarily is paid to the automobile, and the street car receives some consideration, those who use the sidewalks—and, what is more important to traffic movement, the crosswalks—are allowed to shift for themselves. But no matter what is done in the way of traffic movement, the pedestrian remains a very necessary consideration. Ultimately every rider in a vehicle, public or private, must get out and walk if he is to do no more than pass through the business district. Hence facilities and protection for the pedestrian are equally as important to the rider as to the person who continually walks in the business district.

In Philadelphia the recent traffic survey, which forms the subject of an article in the JOURNAL this month, showed that of all persons crossing the street intersections those afoot outnumbered those in vehicles two to one. In fact, this survey showed that first consideration must be given the pedestrian if real traffic relief is to be obtained. With adoption of any of the various plans for elimination of parking, persons must leave their automobiles still farther from their destination than they do at present, and the ratio of walkers to riders will be even greater.

The principal source of difficulty in handling pedestrians in traffic is due to interferences. While at a few intersections the available time is insufficient to permit both vehicles and walkers to go straight across, most of these situations can be cared for by special treatment. But where many vehicles make turns—and it matters little to those crossing the street whether they are right-hand or left-hand—there is bound to be the problem of movement and a hazard to life and limb that must receive the most serious thought. If the pedestrian waits for the "go" signal, as most authorities would have him do, he is likely to be confronted with what seems to be an endless stream of vehicles making turns, so that as like as not before he has had the opportunity to cross the street the signal has changed against him. Naturally he is tempted to jay-walk, and either attempts to cross against the light or to go to the middle of the block. In fact, many persons claim that it is safer to cross the street away from the intersections, solely on account of the interference caused by vehicle turns. The longer the traffic cycle the more this problem is accentuated.

Turning movements are made at one point or another by practically all vehicles. The real problem is to restrict the turns or if necessary prohibit them where they cause the greatest delay to pedestrians, and to provide vehicle routes that will result in the least interference to traffic. It requires careful analysis, and naturally there may be disagreement as to the locations at which turns should be eliminated.

An entirely different plan for the protection of pedestrians suggested in the same report advocates the construction of underground passages, either as crossings of the most congested intersections or as continuous thoroughfares. While the construction of such facilities ordinarily is expensive, the cost often is only nominal in connection with the building of subways. Sometimes it even is cheaper to leave an open gallery above a subway than to put in a back fill. Where this is possible sidewalks should be provided. Their construction in many places may well be justified.

Advertising to

Good results have been obtained by Georgia Power Company from a series of advertisements designed to show the unfairness of the "double standard" of justice which allows ordinarily conscientious people to expect excessive damages from utility interests

STREET RAILWAYS long ago learned that it pays to advertise, but even with practical proof that newspaper advertising will help sell rides, improve operating conditions and build better public understanding, the damage and claim problem is one which has received scant attention in advertising. Occasional advertisements have been published by various companies but rarely has the problem been gone into as thoroughly as in a series of newspaper advertisements used by the Georgia Power Company. The advertisements, seven in number and ranging in size from 30 to 60 in. of newspaper space, were published in daily and weekly papers in Atlanta, Macon, Augusta, Athens and Rome, Ga., where the company operates street railways, and in several other towns served by the company's inter-urban lines. In addition, reprints of the advertisements were mailed to a number of citizens of the various communities, and each of the advertisements was reprinted in "Two Bells," the company's publication distributed on its street cars.

CONTRASTS SUPERVISION OF MOTORMEN AND AUTO DRIVERS

The first of the advertisements was built around the trainman himself and showed that he is entitled to the benefit of a doubt in any street car-auto collision, simply because he has every reason for being habitually careful, by contrast with automobile drivers who are "supervised and controlled by no one, seldom disciplined for their errors, often responsible only to themselves, and not always sober." The advertisement further stated, "The trainman cannot be careless, reckless, negligent, indifferent to the rights of others, and keep his job. The automobile driver may be all of these things, and continue driving his car through crowded streets for years."

In the second advertisement, the obvious fact was pointed out that street cars can't leave their tracks and dodge around obstacles in their path. The public was asked to remember "in ordinary fairness" that the other party, autoist or pedestrian, had to place himself on the street car's tracks before the collision could occur. The public's attention was called to the fact that frequently accidents are prevented because "street cars can and do stop quickly to save some reckless or careless person in their path from injury or death," but asked fair consideration of the accident which could not be avoided.

In another advertisement figures were used to answer any charges that the company really was to blame for the increase in automobile-street car collisions. The figures showed that

We have never ceased to believe that the public is fair. But we do believe that the public needs to understand
—P. S. ARKWRIGHT



"Mos' as Good as Gittin' Hit by a Street Car"

THAT was the way an old Atlanta dandy described it when he received what was to him a fortune in the wall of the old Mariner he had served for years.

two automobiles crash, the driver who was reckless or careless or negligent is the one who must pay. But some...

started his car again, he became confused and... the accident... than he in... ped forward... the rear end of... though he ad... the facts of... thought the... lion for the... liability and... (the) claim... were cons...

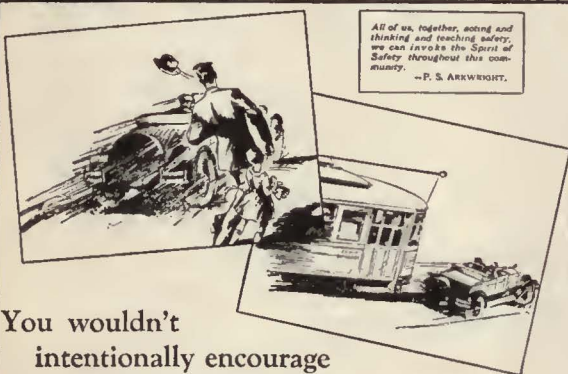
the de- the law... friends... to lose a... of a

When You "Soak the Company" You Soak Your Neighbors and Yourself!

THIS Company will pay any just claim against it voluntarily. We are glad to do it, prefer to do it. And when we go into court to resist a claim, it is because we believe in honest business judgment that the claim is not just.

Yet sometimes you run into men who take great delight in "soaking the Power Company," regardless of the facts of the case. When they do, it costs your neighbors money. It costs every car rider money. For damage claims must be paid out of the only source of income the street railway has—the car rider's fare—and so are paid by the car riders, just as much as the motorist's salary and the cost of laying track. When exorbitant damages are awarded, the car rider pays for it, either in a higher fare or by doing without needed improvements in his service. Keep that in mind when you sit on the jury—and point it out to the man who would give the verdict in prejudice instead of in equity.

GEORGIA POWER COMPANY



You wouldn't intentionally encourage reckless driving!

NOT in this day and time, certainly! Not in this speed crazed era when the reckless driver is the modern menace and thousands of deaths and injuries are his annual toll.

Every day the number of vehicles in the downtown streets and on the highways grows greater. And every day, likewise, the need for stamping out recklessness becomes more urgent, lest recklessness exact a greater needless loss.

Then, obey traffic laws! Drive carefully, thoughtfully, with consideration for others! And when you encounter recklessness, endangering the lives of others, stamp it out as you would a serpent!

You see an accident, read about it in the newspaper, or hear the evidence as you sit

in the jury box. You absolve the innocent, condemn the one who was reckless.

We ask the same consideration, the same impartiality, and no more, if a street car should be involved in the accident.

We ask it because unfortunately there are some who have one standard of justice for ordinary cases and another for cases in which the street car is involved. Because "the Power Company can afford to pay," they think the Power Company should pay, whether the other party caused the accident by his recklessness or not.

Unintentionally, thoughtlessly, they are rewarding recklessness!

Tomorrow, that reckless driver, encouraged in his recklessness, may take another chance at beating the street car to the crossing—and kill your child!

GEORGIA POWER COMPANY

A CITIZEN WHEREVER WE SERVE

Cure Prejudice

from 1910 through 1928, accidents in this one classification increased 1,176 per cent, while the total of all other accidents was decreased 41 per cent, in the face of a greater number of car-miles traveled and passengers carried. "This trainman of yours can, and does, operate his street car safely! When you sit in judgment on him—in the jury box or as you read about an accident in the newspaper—don't you think he is entitled to the benefit of the doubt?" the advertisement asked.

Another advertisement pointed out that the jury member who decides the case in prejudice rather than on the facts, is "soaking his neighbors and himself" as well as the company, and that street railway budgets and family budgets are much alike. When an excessive jury verdict is awarded, it inevitably takes away money which otherwise might be spent in improving the service. Another made clear that the company is responsible legally only for its negligence. This advertisement was built around an old dinky who remarked when he received a legacy from his Old Marster that it was "Mos' as good as gittin' hit by a street car."

Throughout the series the idea was reiterated that: "This company will pay any just claim against it voluntarily." A signed statement by P. S. Arkwright, president of the company, appeared in one of the advertisements as follows: "This company will not wrong anyone intentionally. If by chance it commits a wrong, it will right it voluntarily." When necessary to submit disputed claims to the courts, the company asked "the same justice and fairness you would accord an individual, and no more."

Much good has been accomplished by these advertisements by bringing about a better understanding of the problem on the part of the public and an improved spirit of fairness toward the company.

IMPROVED SPIRIT OF FAIRNESS ESTABLISHED

The direct effect of the advertising on jury verdicts is, of course, not definitely traceable, and immediate results of this sort were not expected. The purpose was to establish a basis of mutual understanding out of which an improved standing in the courts would logically flow, and officials of the company are of the opinion that this has been accomplished.

Widespread discussion and comment was caused by the advertisements. It was almost invariably favorable. Several civic clubs and similar groups took up the advertisements for discussion, and letters and other comment indicated that a large number of persons had gained a new understanding of the situation. Several officials of steam railroads and of other large corporations with a similar problem stated that the company had done a service for all of them in publishing the advertisements. Unfavorable comment was almost exclusively from "damage suit lawyers," some of whom protested to the company against continuing the series and threatened reprisals which never came.

One of the most interesting effects was that on the company's platform men who warmly approved of the series and stated that it made it easier for them to obtain the co-operation of the public in safe operation, and also easier to obtain the names of witnesses when accidents occurred. They felt that the company was "backing them up" and making their work easier by educating the public that the trainman wasn't always to blame when an accident occurred.

Would that everyone would realize that public utilities are run by human beings just like themselves!
—P. S. ARKWRIGHT

"Give Me an even Break" says the Trainman

THE next time you are called to sit on a jury trying a damage suit growing out of a street car-auto collision, remember these things about this Trainman of yours—

He is selected out of hundreds of applicants. He is not permitted to take charge of a car until thorough examinations have proved him physically fit. He is given him skill and experience in the supervised, controlled, sober.

Anyone—of untrained—Auto driven—equipped—strength—sary for—ing an a—They are—by no o—their er—to the—sober.
The train—negligent—ers, and—driver m



Let's all be more than ordinarily diligent in efforts to prevent accidents.
—P. S. ARKWRIGHT

Who caused the Accident? —Street Car or Auto

THIS is the question you decide to your own satisfaction whenever you hear of a street car-auto collision—whether you're seated in the jury box or sitting comfortably in your library reading the evening paper. Did you ever see a scene such as is represented above? It's only ordinary fairness to remember this important fact about all accidents in which street cars are involved or pedestrians, comes onto the street car's track! Street cars can't dodge. They can't turn out. They have to stay on their tracks. When an accident happens, they can't swing around the object which has placed itself in their path. They can only stop. And you'll admit, from your everyday observation, that hundreds of accidents are prevented every year because street cars can, and do, stop quickly to save some reckless or careless person in their path from injury or death. But when the accident does happen, in fairness to everyone and in efforts to prevent similar accidents in the future, let's all cooperate in finding the real cause.

GEORGIA POWER COMPANY

The success of our business depends at last upon a sympathetic understanding of its problems by the masses of the people.
—P. S. ARKWRIGHT

Here's a Startling Situation!

Automobile—Street Car
Collisions increased 1176% from 1910 through 1928—All other kinds of accidents decreased 41%

WE BELIEVE the time has come to lay the facts about this situation frankly before the public.

Take the figures over a period of years on all accidents in which street cars were involved. Break the totals down into the various classifications of accidents and you find that—

One kind of accident alone increased 1176 percent from 1910 through 1928. All other kinds of accidents decreased 41 percent.

Collisions between automobiles and streets cars are the accidents that have increased so greatly. In 1910 accidents of this sort were only 8 percent of the total accidents. In 1928 nearly 70 percent of all accidents in which street cars were involved were of this kind.

Who is responsible for this condition? Is it your street railway Trainman? Look at the rest of his record and judge for yourself.

Forget about auto-street car collisions for a moment. Take every other kind of acci-

dent, large or small, in which street cars figured—collisions with horse-drawn vehicles, accidents to passengers and accidents to pedestrians, everything from the passenger who trips over a suitcase in the aisle on up to accidents of major seriousness, and you find their total practically cut in half!

Athens's trainmen have made this brilliant improvement in the face of an increase in the number of passengers carried from 55 million in 1910 to nearly 90 million in 1928, and an increase in the number of miles the street cars traveled from 9 million in 1910 to over 13 million in 1928.

This Trainman of yours can, and does, operate his street car safely! To the extent that it is within his power to prevent accidents, he is doing it. The figures prove it.

When you sit in judgment on him—in the jury box or as you read about an accident in the newspaper—don't you think that he is entitled to the benefit of the doubt?

GEORGIA POWER COMPANY

A CITIZEN WHEREVER WE BE

Before laying track, the sub-grade should be well drained and thoroughly compacted



Small Details Important

WHILE there are many factors entering into the design, construction and maintenance of a track structure, there is one extremely important factor which has been given too little attention. That factor is the importance of proper care and attention in the matter of details. This holds for every part of the track maintenance and construction organization and is not limited to any one phase. A design may be all that could be desired, but its success may be nullified by failure to give the proper attention to details in its construction, and, through the same neglect, the life of a repair job may be materially shortened. Particularly with track in paved streets, lack of attention to seemingly unimportant details is responsible for subsequent expensive maintenance costs, and this is true also in lesser degree to open track construction.

Design—In the design, there are several questions to be considered. Is the general design the best for your conditions that your available funds can provide? Does it lend itself readily to repairs when these finally become necessary? Does it provide a maximum of

Careful attention to the matter of details necessary in track design, construction and maintenance. Inspection and follow-up system assures proper execution of work



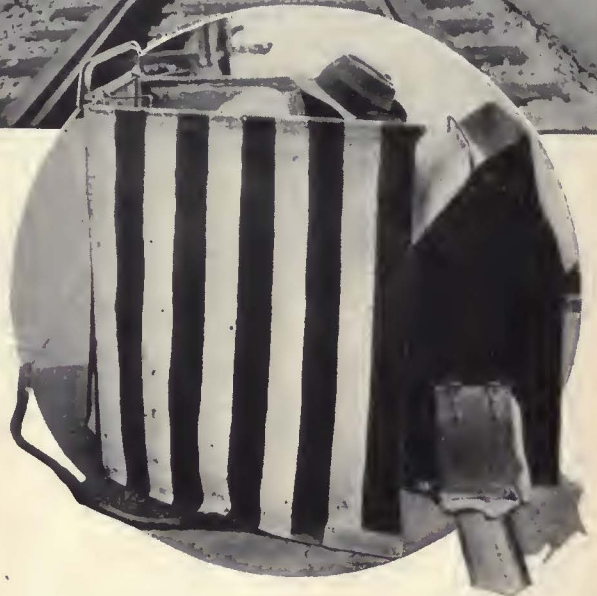
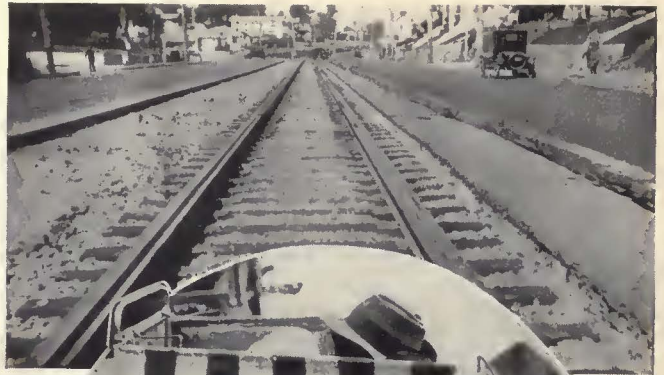
salvage value when the time for major reconstruction arrives? Does it provide a structure that will postpone the period of general maintenance expense for the longest time? Have you covered your materials with adequate specifications which will insure you the best of their kind for the money? If these questions can be answered to your entire satisfaction, the problem of design is taken care of, but to answer them truthfully involves a knowledge, not only of what you are doing yourself but what others are doing as well

under similar conditions, and it will often be found that a page can be taken out of the other fellow's book to advantage.

Sub-grade—Assuming that the design has been taken care of satisfactorily, the next item is construction, and since the sub-grade is at the bottom of all track, it will be given first consideration. The sub-grade varies materially in its nature in different localities and frequently changes in a given stretch of track. Two things are essential with respect to sub-grade before track is constructed upon it: First, it should be well drained. Water is probably the worst enemy of the track main-

tenance organization. Second, the subgrade should be thoroughly compacted before the track is laid. Poorly compacted subsoil causes many track troubles, and the importance of thoroughly rolling the sub-grade, taking out all unsatisfactory material and replacing with material that will pack solidly, cannot be over emphasized. Of course, where subsoil conditions are of a poor character, the remedy lies in a design which will enable the entire structure to act as a unit in distributing the load over the base. This, however, generally means an increase in construction costs which would, under normal conditions, not be justified. While subsoil drains are not very effective for a protracted period in some soils, they are sometimes absolutely essential if the track structure is expected to last for any extensive period. It is often a case of choosing between two evils.

Ballast—Whether the track structure is built with wood ties on ballast or with either wood or steel ties encased in concrete, the attention to details still holds good. If stone, slag or gravel ballast is used, the main body should be rolled thoroughly before track laying is started, if possible to do so, leaving only about two inches under the tie for tamping purposes. The ballast itself should be well graded in size, so as to form, when rolled, the densest base consistent with good drainage. In no case should the ballast below the bottom of the tie be disturbed once the tamping has been completed. If the supporting base is concrete, then it is important that the proper proportioning of the aggregate be determined for the stone and sand actually used, and



Top view—The ballast should be well graded inside, so as to form, when rolled, the densest space consistent with good drainage. In circle—Since it is important to have rail joints properly welded, care should be taken in training the welders

in Trackwork

By

HOWARD H. GEORGE

Superintendent of Way Cleveland Railway
Cleveland, Ohio

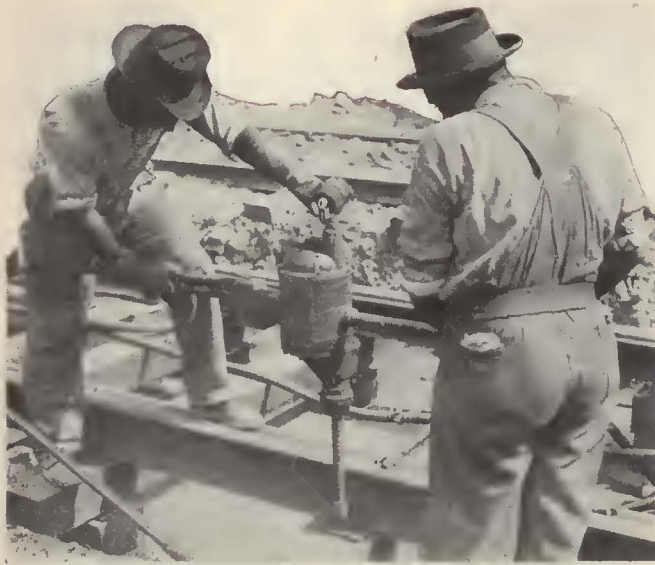
that the water-cement ratio be accurately determined and maintained. It is also important that the mixing be thorough and uniform, and that checks be made on strength, to see that design assumptions in this respect are being met. If reinforcement is provided for in the base, it is necessary to see that it is properly placed and not disturbed during the placing of the concrete, and last, care should be taken in the placing of the concrete to see that there is no undue segregation of the aggregate. Where the supporting base and pavement base are integral, too much emphasis cannot be placed upon the necessity for careful inspection of the tamping of the concrete around ties, under rails and under any bearing plates for which the design provides.

Joint Assembly—Where wood ties and stone ballast are used, the next step is joining the rails and fastening them to the ties. These operations may seem comparatively easy of accomplishment, but they both offer ample opportunities for subsequent trouble. It is generally recognized that the subsequent life of an

electrically seam-welded rail joint is largely dependent upon the degree to which the gap between the rail ends is closed at the time the joint is first made. No matter how well a welding job may be done, a joint is certain to show early signs of cupping if the rail ends do not butt tightly together. This can be demonstrated by making a saw cut partly through the head of an unbroken rail at right angles to the gage, operating cars over it and observing the result. The conditions thus represented are those which would exist in a joint otherwise perfect, both electrically and mechanically.

Bolting Plates—In the assembling of joint plates care should be taken to see that both plates and rail are cleaned of all scale and rust, and that they are bolted up tightly and uniformly, to obtain the maximum wedging action in gripping the rails. Blows with a sledge are necessary to help this operation, but trackmen should never be permitted to strike a plate along its flanges in such a way as to mutilate that portion of the plate to which the seam weld is to be made. Heat-treated bolts should preferably be used on all rail joints, because their high elastic limit and ultimate strength permit them to develop a much higher pressure on the plates without stretching. Whether the bolts should be left in after the welding has been completed or not may be considered as optional if the welding operation has been properly done. However, they are the best possible insurance to cover the possibility of defective welding, and their value after removal, as compared with their value in the joint, is not sufficient to justify the expense of removal. It is even desirable to spot-weld all nuts as the final welding operation.

Preparing Seam for Welding—Of equal importance to the removal of scale and rust from the fishing



Screw spikes and clips used with a tie plate offer a decided advantage over the ordinary cut spike as a rail fastening device

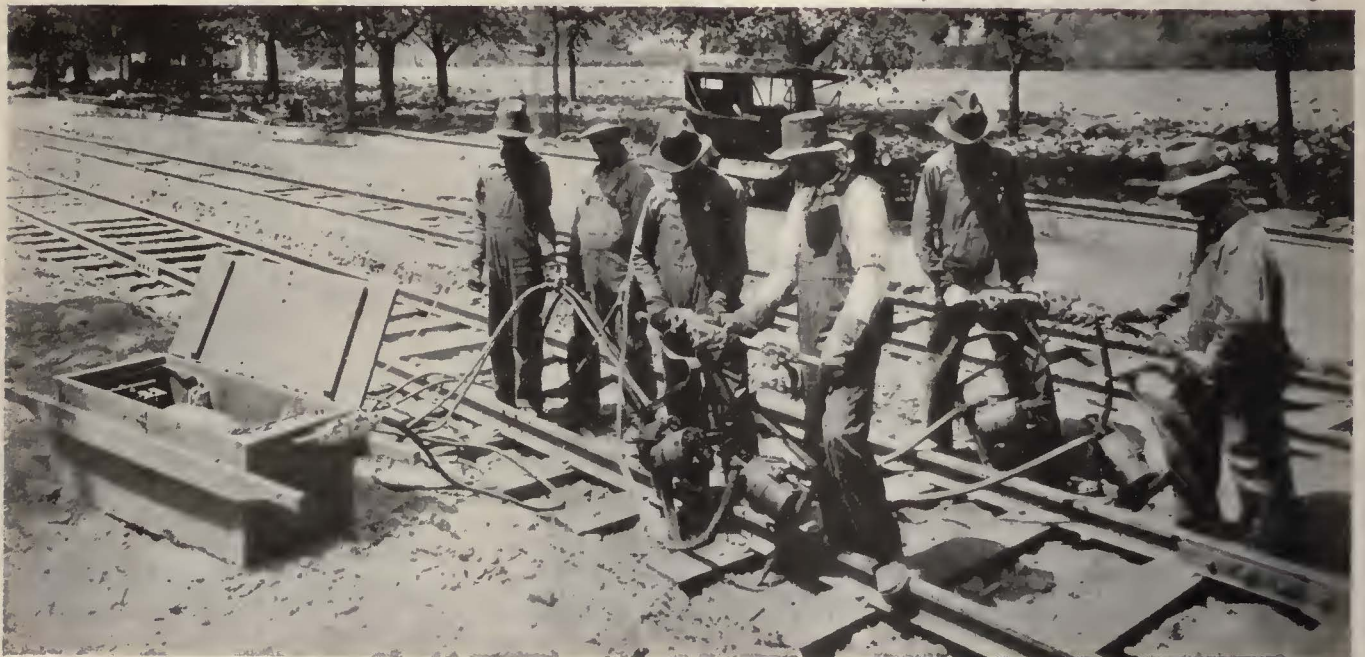
surfaces of the rail and joint plates is the removal of all oil, grease, scale and rust from the surfaces to which the weld is to be applied. While it may be possible to obtain fairly satisfactory results by the use of a wire brush, there is only one practical way of insuring clean metal to weld on and that is by using a sand blast. This method is quick, inexpensive and thorough, and, if done just ahead of the welding crew, leaves the metal surfaces in perfect condition for welding.

Chemical Consideration—Recent experiments and tests on the seam welded type of joint have demonstrated the necessity of having a fairly ductile metal in the seam weld. The ordinary girder rail contains about 0.85 carbon, which is fairly high when weldability is considered. The destructive forces at work on a rail joint are largely of a vibratory character, and the number of repetitions is quite high. It is essential, to develop these stresses and to distribute them from the rail to the plate, that the seam metal be fairly ductile. This

means that a very low carbon rod must be used, preferably not over 0.05 carbon. If the seam weld metal is to be kept low in carbon, it is also necessary that a relatively low carbon steel be used in the joint plates, preferably from 0.20 to 0.30 carbon. The reason for this is that, under the action of the electric arc, the tendency is to draw down into the weld seam metal, carbon from the high carbon rail steel, and, if the joint plates also are relatively high in carbon, some would also be drawn into the seam metal. With a low carbon rod and a reasonably low carbon steel plate, the seam has a fairly low carbon metal of relatively high ductility which is better able to withstand the vibration stresses to which it is subject in service than would the comparatively brittle seam which would result from the use of a higher carbon plate and welding rod.

Weld Plate Design—If it is expected to secure a sufficient amount of weld-seam strength to develop the joint plate and rail strength, the joint plate must have a place to apply the weld. This should be so planned as to prevent wear from car-wheel flanges or other outside sources. It should be such that it affords the easiest possible welding conditions for the operator. Welding conditions in the field are much less favorable than are those which prevail in a shop, and the welders should not be aggravated by introducing into the plate design some feature which a little thought and study would correct.

Training Welders—The proper training of welding operators and the frequent inspection and checking of their work by the engineer is very important. Almost every welder endeavors to follow the instructions given to him to the best of his ability, and to produce the best work he is capable of. If he is continuing with a practice that is fundamentally wrong, it can usually be attributed to lack of proper instructions or to inadequate inspection of his work by those directly responsible for such matters; but, whether poor results are attributable to faulty design or to poor workmanship can be determined with a reasonable degree of accuracy if an honest investigation and analysis of all the facts is made.

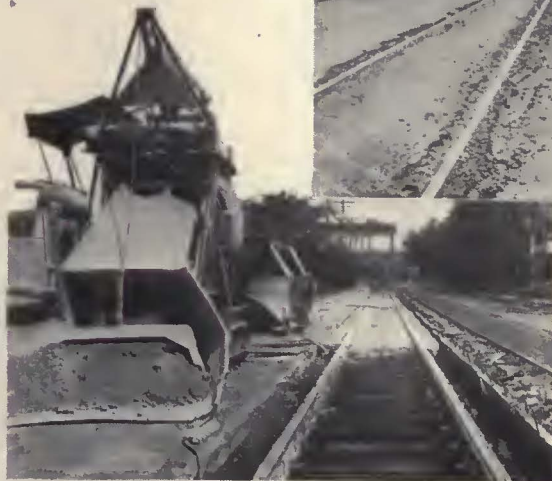


Electric tie tampers are effective in compacting the ballast material thoroughly under the ties

Grinding Joints—The final operation in the finishing of every rail joint is the grinding. It requires the services of carefully trained men and the best equipment available, and the men operating the machines must be thoroughly familiar with their peculiarities and limitations. With the ordinary seam-welded joints a reciprocating or so-called "scrubbing" type of grinder is best, as these joints generally require comparatively little grinding. In any event, this type of grinder should always be used to finish the grinding, the rotary grinder being used only for the rough grinding. The important thing, however, is that no joint, whether welded or not, should ever be put into service without grinding, and, if for any reason this is not found practicable, then the grinding should follow the joint installation within the shortest possible time. The grinding should be carefully checked with a steel straight-edge at frequent intervals during the period of the operation to see that too much metal is not being removed. It also is desirable that an attempt be made in grinding the rail head to retain as far as possible the original contour, as the grinding of a flat surface at the joint, where the remainder of the rail-head contour is a curve, will necessarily introduce different wheel to rail contacts at these points, and consequently change the rail-wear characteristics.

Rail and Tie Fastenings—Wood has a fairly definite, known crushing strength, and, in the design of the track structure, it is necessary that the unit loading on the wood tie be kept well within the allowable limit if rail cutting is to be prevented. This means that adequate tie plates must be used. It is for this reason that once a tie-plate size has been determined, a company should, as far as possible, use the one kind of timber in its ties, or at least take the precaution to see that no timber of lower crushing strength than that for which

as possible. It is not practical to draw the three units of the assembly so tightly together with the ordinary cut track spike that there will be no further compression under car loading, even with a sawed tie and flat tie plate, and this initial compression is exclusive of the effect which is commonly known as rail cutting. This is of equal importance in fastening rails to any form of steel tie. The fact is that no rolled surface is a plane surface, and when two rolled shapes are in contact with each other, the contact is not purely a uniform surface contact but a series of point contacts. Also, if fairly large area plates constitute the tie member to which the rail is fastened, where the thickness of the member is relatively small as compared with its surface area, the



Track, all lined and surfaced, and receiving a concrete base



If pavement repairs are not made promptly, small breaks soon result in spalling of the edges and disintegration of the concrete

the tie plate was designed is used.

Another important point is to draw the rail base, tie plate and tie as tightly together



Though a sand cushion is necessary in a block pavement to take up the inequalities in the blocks and to distribute the load uniformly over the base, it need not be very deep

surface is likely to be warped, and the probability of securing a uniform contact between the rail base and plate is practically nil. For this reason, where wood ties are used, it is highly inadvisable that a tie plate with a ribbed base be used, and, for the same reason, a sawn tie offers many advantages over a hewn tie which has not had the rail or tie plate seat adzed. If the top surface of the tie were planed, the conditions in this respect would be still further improved. This is also the reason why the screw spike and clip used with a tie plate offer such a decided advantage over the ordinary cut spike as a rail fastening device. Whatever the details of the design may be, every precaution should be taken to make sure that the fastening used has been drawn up as tightly as its practical limitations will permit.

Tamping—It is a well known fact that too much tamping is as bad as too little. In other words, it is easily possible to raise the entire track above grade by too much tamping. Also, the effective tamping of one tie may easily be spoiled by too much tamping on the adjacent tie. Then, too, it is quite possible to tamp a tie too much in the center, resulting in what is commonly known as a center-bound tie, which will be liable to rock under car loading and cause serious damage to both track and pavement surface.

Regarding mechanical versus hand tamping methods, it is sufficient to say that the former offers so many advantages over the latter method that there should be no question in anyone's mind as to which is the better. Mechanical tamping permits the ballast material to be compacted thoroughly under the tie, the two tamping tools working directly opposite each other under the tie, and also offers the only solution to the problem of thoroughly tamping ballast under ties in many of the more complicated special trackwork layouts where it is necessary to interlace ties at many points and where the interlacing comes at points requiring the most efficient consolidation of the ballast under the ties. Mechanical tamping also is effective where the space between the ties available for hand tamping is very limited. Whether track is tamped by hand or by mechanical tampers, all ties should be checked carefully before proceeding with the concreting, to find those which are not seated firmly on a well-tamped bed. An experienced track man can spot all such ties easily by tapping them with a bar or sledge, a hollow sound indicating a tie that is not properly tamped.

Tierods—While there is a difference in opinion among street railway engineers regarding the necessity for tierods, it must be conceded that, as track becomes older, there is an increasing tendency toward the development of wide gage. The tie rod is the best insurance against the premature appearance of wide gage, and the results obtained more than justify the

slight expense involved. This conclusion is based on experience with track built under otherwise practically identical conditions, some of which were built with tie rod and some with tie plates but no tie rods.

Pavement—With the track lined and surfaced, and the concrete pavement base installed, there remains only the surface pavement to be considered. If this is some form of block pavement, either granite, vitrified brick or wood, a cushion is required, although a few companies make it a practice to bed their paving blocks, particularly granite, directly in the fresh concrete base. This is not very general practice, however. The purpose of a cushion is to take up the inequalities in the depth of the individual blocks, to provide a medium for bedding

them uniformly over their entire area and to distribute the load uniformly over the concrete base. Therefore, any greater depth of cushion than is necessary to accomplish these purposes only increases the weakness of this part of the structure, which, incidentally, is probably one of the weakest links in the pavement chain. It is the place where the water goes first when it finds its way through the pavement surface, and it is where the heaving action of freezing and thawing causes the most damage to the pavement surface.

In laying the blocks care should be taken to make sure that all the blocks on a course are reasonably close to the

same width. A good paver will do this without any attention on the part of the engineer, but some pavers will not give this the attention it deserves. It is also important that joints in opposite courses be well staggered. As to the width of joints, there is, again, a difference of opinion among engineers. Some feel that these should be wide, but the general practice seems to be to keep them to the minimum consistent with the requirements for installing the filling material. With the wider joints the advantage offered in the way of getting more thorough penetration of the grout or asphalt mastic is largely offset by the difficulties encountered in keeping the blocks in position and maintaining the general surface when ramming the blocks. But whether the joints are wide or close, the ramming of the blocks should be carefully and thoroughly done, and should not be permitted to proceed close enough to the point where the blocks are being laid to disturb them. The ramming locates all improperly imbedded stone, and seats each block firmly on the cushion. If it is slighted, the result is sure to show up in early pavement failures as soon as it is subjected to heavy vehicular traffic.

Since water finds its way to the track sub-structure through openings in the surface pavement, it is essential that the best possible job be done in filling the joints between the blocks with whatever material is being used.



When cupping appears, the rail should be ground immediately; otherwise, the depressions develop into deeper ones and cause much damage

This point cannot be emphasized too strongly. Every joint should be filled and traffic kept off until the filler has set sufficiently to eliminate the possibility of damage. This means going over the grouting more than once; it means adequate protection until it has set, and also proper curing until its full strength has been developed. It is one of the details, however, attention to which means so much, and which will pay such large returns in decreased pavement maintenance expense as compared with its cost.

MAINTENANCE REQUIRES CARE ALSO

The same attention to details should be given to maintenance as has been urged for both design and construction. Whatever is worth doing at all is worth doing well. If a joint fails and requires repairs, insist that the same care be taken on the repair job as was required when the joint was first installed. Broken rails or joints with poor electrical conductivity only aggravate electrolytic troubles and should not, knowingly, be permitted to remain without attention. Where pavement repairs become necessary, do not permit any slipshod methods that would not have been tolerated in the initial installation. A slight cup in the rail head soon develops into a much deeper one and, if not taken care of promptly, may not only cause serious damage to the adjoining pavement but may even cause actual

breakage of the joint plate and the substructure as well. Small holes in the pavement can be repaired at a small expense, whereas, if they are neglected the damage soon spreads over a large area, and is often not confined to the pavement alone but affects other parts of the track structure. Cracks that may develop in concrete pavement will, if not promptly filled in with a good asphaltic mastic, soon result in bad spalling of the edges of the track and rapid disintegration of the adjoining concrete, requiring more extensive repair.

INSPECTION AND FOLLOW-UP IN THE FIELD

There should be in every track organization an inspection and follow-up service, to see that the proper attention is being paid to every detail of the work. This does not mean that a man must be detailed for every job, but it does mean that there should be someone whose duty it is to visit at frequent intervals all the work under way, and to see that the work is being properly done. It is certain that the reason why some track of a given type will last so much longer than other track of the same design under practically identical service conditions is because in one case care was taken to see that every detail was adhered to as closely as practicable, while, in the other case, the execution of the work was left entirely in the hands of the track foreman.

Fatigue in Concrete

An Element to Be Taken Into Account in Design

By

D. D. EWING

Professor of Electric Railway Engineering
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DOES the inanimate and apparently unyielding concrete that carries the myriads of feet that tread city pavements and the unending procession of wheels that roll along city streets ever become tired? If so, how is it affected by fatigue? Does it profit physically from the surcease from labor which comes when the work of men for the day is over? It is the object of this brief article to summarize experimental knowledge which bears upon these queries.

One does not ordinarily select concrete as a material for a spring, shaft or other moving part of a machine or structure. It might seem at first thought that the effect of repeated stresses on concrete would have little practical significance. On the other hand, concrete is becoming one of the most common of the paving and bridge materials. As such it must carry moving loads which, in their passage, cause a cycle of stress variation

Concrete, like steel, loses strength when it is subjected to repeated stresses, particularly when they are reversed. Stresses which may be repeated indefinitely may be less than half the laboratory strength

that ranges from some minimum to some maximum value. In street railway track work the important stress range would seem to be from zero to a maximum and the reversal of stresses from tension to compression would seem to be the unusual rather than the usual condition. As a pole material it might be subjected to completely reversed stresses.

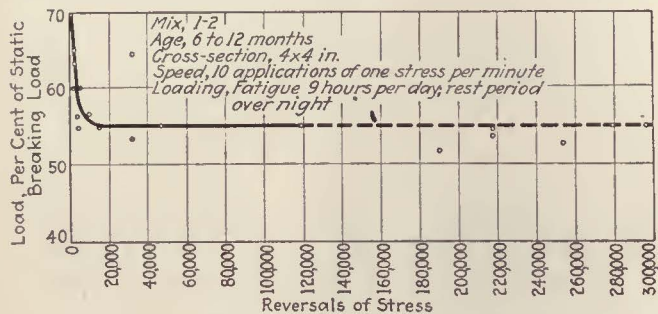
How do such stresses affect the performance of concrete as a structural material? As with metals our most fruitful source of information is in the recorded researches dealing with the subject.

The test data and literature pertaining to concrete fatigue are not nearly so voluminous and so complete as they are with respect to fatigue in steel.

For one thing, the test specimens must be of considerable size so as to nullify the effect of small voids and large pieces of aggregate. This means that the specimens cannot be tested in small high-speed machines such as

are used in the fatigue testing of metals. The properties of concrete are affected by age, moisture and other conditions which make the fatigue testing of concrete a rather tedious and expensive matter.

One of the pioneer investigators in this field, J. L. Van Ornum, has reported tests before the American Society of Civil Engineers on several occasions (see Transactions of the A.S.C.E., p. 443, 1903 and p. 294, 1907). His tests show that for a stress range from zero to a maximum, the endurance limit—that is, the stress which may be repeated many times without rupture—of ordinary concrete is about 50 per cent of the ultimate compressive strength as determined in the ordinary so-called "static strength" test. He also made some tests on the strength



Tests on concrete beams show effects of fatigue

The beams were made with a 1:2 mix and were 6 to 12 months old at the time of test. The cross-section was 4x4 in. The speed of testing was ten applications of one stress per minute. The loading was carried out for nine hours per day with rest periods over night.

of the bond between concrete and steel. These tests showed that the average static bond strength of plain square $\frac{5}{8}$ -in. steel reinforcing rods was 150 lb. per square inch and that under repeated loads this strength was reduced to 125 lb. per square inch, a reduction of 17 per cent or an endurance ratio of 0.83.

A study of the work of other experiments leads to the conclusion that the safe probable endurance limit for bond strength is about 60 per cent of the bond strength as determined by the static test. Several observers also have noted that the modulus of elasticity of concrete decreases under repetitive loadings, the decrease being relatively rapid during the first few hundred cycles and reaching a constant value after several thousand cycles.

FAILURES INCREASE RAPIDLY WITH STRESS

The Illinois Highway Department has conducted a number of fatigue tests on concrete (Transactions of the A.S.C.E., 1924, p. 1196). In the course of these tests beams of 1:2 mortar, 1:2:3½ and 1:3:5 concrete were tested under loads which caused the stress to vary through a range from zero to a maximum. These tests indicate that where the stresses were below 50 per cent of the ultimate strength, as determined by the static test, the stress could be repeated an indefinite number of times without failure, whereas a stress of 60 per cent caused failure in about 30,000 repetitions, and a stress of 70 per cent caused failure after approximately 5,000 repetitions. The operating tests on the Bates, Ill., test road showed that the concrete paving laid on it failed when the loads caused stresses in excess of 50 per cent of the flexural strength of the paving. Experiments made at Purdue University by W. K. Hatt (Proceedings, Highway Research Board, National Research Council, December, 1924) on small beams show that the endurance limit of well-aged dry concrete for stresses which

were completely reversed lies between 50 and 55 per cent of the ultimate strength. For wet concrete the endurance ratio was 37 per cent and the ultimate strength was 11 per cent lower than that of the dry concrete.

The accompanying graph sets forth the data for some of the tests on these beams. These figures are of interest to the track engineer, as wet subsoil under the track will apparently decrease materially the fatigue strength of the concrete. Also in the winter and spring, when the entire roadway is wet, the strength of the structure is considerably reduced, particularly with regard to its ability to stand up under the impacts resulting from dirt on the rails, low joints, flat wheels, etc.

It may be argued that the strength of track concrete is of no importance because the mass of material employed is so great that all unit stresses are low, even under modern vehicular and car traffic. In general this is true, but in going about over the country inspecting track one notices many points at which some local condition has caused stress concentration which, often repeated, finally produced failure.

Briefly summarized the present knowledge of the effect of repeated loads on concrete is:

1. The endurance limit of ordinary concrete is about 50 per cent of its ultimate strength as determined by the so-called static strength test.
2. When the load is such as to cause failure the deformation of the concrete continually increases until finally cracks appear and later complete rupture occurs.
3. If the applied load is less than the endurance limit the deformation approaches a constant value or decreases, thus indicating that the specimen will not fail.
4. Concrete, like steel, withstands somewhat greater repeated stresses if the test specimens are permitted to rest for definite periods. The rest period seems to be more important to concrete than it does to steel.
5. The endurance limit in concrete sometimes can be determined by as few as 20,000 cycles of stress.
6. Fatigue tests on concrete are more difficult to make than similar tests on steel, because much larger test specimens must be used and the frequency of stress repetition must be relatively low.
7. Laboratory fatigue tests in general differ from service conditions because the frequency of stress repetition is higher and the rest periods much shorter.
8. By loading test specimens under the endurance limit and later building up the load by small increments, the endurance limit can be slightly increased.
9. Wet concrete has a lower endurance limit than dry concrete.
10. Fatigue strength seems to increase with the richness of the mixture.
11. The endurance limit of reinforced concrete is higher than that of plain concrete.
12. Concrete specimens should be several months old before subjecting them to fatigue tests, in order that the test data be not vitiated by the natural gain in strength of the concrete.

Look for the *Daily* at the
Convention

Read about the happenings
of the day in

Electric Railway Journal Daily

Four issues will be published—on
Monday, Tuesday, Wednesday and
Thursday of Convention Week

New Equipment

Discussed at Meeting of Southern Maintenance Men

CHIEF interest at the semi-annual meeting of the Electric Railway Association of Equipment Men, Southern Properties, held at Lexington, Ky., July 24-26, centered on the subject of new equipment. The attendance was unusually large, more than 200 equipment men being present from the Southern and Middle Western states. Two extremely interesting papers were presented by railway men, and several others by manufacturers' representatives.

Re-equipment of the Kentucky Traction & Terminal Company's system with light-weight cars was the subject of a paper by F. W. Bacon, vice-president International Utilities Corporation, New York. Due to the inability of Mr. Bacon to be present at the meeting, his paper was presented by J. P. Pope, vice-president Kentucky Traction & Terminal Company, who elaborated on many of the important parts. Mr. Bacon's paper was published in the August issue of *ELECTRIC RAILWAY JOURNAL*.

R. H. Sjöberg, engineering department General Electric Company, discussed "Speed, with Comfort and Safety." Recent developments in the electrical equipment of street cars were outlined, specifically with relation to higher speed and better braking facility. E. M. O'Connor, label service department Underwriters' Laboratories, presented a paper on "The Inspection and Labeling of Electric Cars by Underwriters' Laboratories." He spoke of the advantages to the manufacturers of having their street car equipment inspected by Underwriters' Laboratories before making delivery to railway operators. This not only gives the operator the assurance that his equipment comes up to predetermined safety standards, but also safeguards the riding public from hazards incidental to inferior construction or assembling methods.

RECENT EQUIPMENT DEVELOPMENTS

On the afternoon of Wednesday, July 24, a paper was read by A. J. Manson, manager traction sales department Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., on "Recent Developments in Railway Equipment." He told of the great strides made in the recent years in the development of electric equipment, especially in connection with street railway operation. It was pointed out that the demand for high speed in railway service is now greater than some years ago, due to the effect of automobile competition. Various high-speed

Semi-annual meeting of Electric Railway Association of Equipment Men, Southern Properties, held at Lexington, Ky., Well Attended

and light-weight construction requirements which must influence the manufacturer were discussed in detail by Mr. Manson. The next paper on the program was presented by Mr. McCune of the Westinghouse Air Brake Company, Pittsburgh, Pa., on the subject "Development in Modern Power Brake and Rapid Acceleration." This paper caused lively discussion. Members present used this occasion to obtain information as to the probable future development of the various types of brakes now in use on electric railway equipment. "New Developments in Carbon Brush Application" was the subject of a paper read by J. V. Dobson, chief engineer Stackpole Carbon Company. The characteristics of brushes were outlined in detail by Mr. Dobson, who explained the advantages and disadvantages of hard carbon and soft carbon brushes and their influence on current collection and wear on the commutator.

MAINTAINING ROLLING STOCK

An interesting paper presented by W. H. McAloney, superintendent of equipment Georgia Power Company, Atlanta, Ga., set forth the various difficulties encountered in keeping the rolling stock in first-class condition, at the same time keeping the maintenance cost down to a minimum. An abstract is published on the following page. The last paper on the program was read by T. J. Kaufeld, sales engineer De Laval Separator Company, who discussed "Reclaiming Lubricating Oils by the De Laval System." He told of the benefits which can be obtained if used oil is reclaimed by a special oil-separating equipment, enabling the operator to use oil several times instead of having to dispose of it after it has been used once only. The same procedure can be applied to waste, which can be cleaned thoroughly and be used over several times at a great saving in cost to the operator.

After all papers were read, the meeting was thrown open to discussion of a questionnaire which had been submitted previously by members of the association. The number of questions listed was 73, and it became impossible to finish the entire questionnaire. For this reason, only the most important questions were discussed before the meeting adjourned at 5 o'clock on July 25. In the evening the members gathered at a banquet at the Lafayette Hotel, with E. L. Carr, superintendent of equipment of the Kentucky Traction & Terminal Company, acting as toastmaster.

The last session, held on Friday morning, July 26, was adjourned at 10:30, after which an inspection trip was made over the properties of the Kentucky Traction & Terminal Company. Much interest was shown in a device which lifts a car body from the trucks, lowers it and tips it over to enable repair men to work on the under side of the car while they are standing on the floor in normal position. A demonstration was given of the new

magnetic track brake used by the Lexington company, and various comparative tests were made with air brake and air-magnetic brake application.

The next meeting of the Electric Railway Association of Equipment Men, Southern Properties, will be held in Birmingham, Ala., Jan. 27-29, inclusive, where it will be decided whether the semi-annual meetings will continue or only one meeting a year will be held.

Organization Cuts Maintenance Costs

By

W. H. McALONEY
Superintendent of Equipment
Georgia Power Company
Atlanta, Ga.

ASSUMING that the stitch-in-time theory is correct for maintenance of electric railway equipment, to carry on that idea or any other worthwhile plan, it is necessary to have organization. Organize to the full extent so that the business in hand will stand. Of great value is personal contact, from the department head down along the line with each supervisor or foreman. It is of the utmost importance that we keep close to each man and get into working harmony with him. Another requirement is co-operation. It is difficult to get anywhere unless plans and methods are healthy and recognized as best practices under the circumstances, and unless we have united effort.

Education is now being recognized as an important factor. Individual study, or forming group classes for study, can be put across through our personal contact work, and to whatever extent systematic study can be advanced, in that proportion the quality of our work will improve. Better knowledge of their work and of their relation to other departments of a company will inspire men to give the best that is in them. Efficiency of personnel will doubtless be considered next essential, but if we have organization, personal contact, co-operation and education, then work will bring automatically the efficiency of which we hear so much of late.

In maintenance and inspection we spend about \$2 in labor for \$1 in material. Good fits, hardened surfaces, lubrication and close attention, with limit gages for getting maximum life, will help make the \$1 go farther. We should keep in touch with improved machines and methods. The line breaker is a good demonstration of the value of spending money to save money. Likewise, modern babbitt equipment and dipping and baking machinery with temperature control has been an improvement and a decided factor in reduced costs.

One of the most important things in connection with maintenance of equipment is the matter of inspection. Unless the equipment is given a rigid and definite inspection at proper intervals and necessary adjustments made, failures in service are sure to result and frequent replacements will be necessary because parts will become badly worn before having served their normal usefulness. This is bound to increase the cost of maintenance. The cost of inspection and making minor adjustments is small as compared with the total cost of labor and material in making replacements.

The campaign on noise reduction has caused us to realize the importance of a high standard of maintenance. Loose brakeshoes, gear cases, pins and bushings in brake rigging not only cause excessive noise, but result in higher costs. Special attention should be given to prevent loose bearings in axle caps and too much end play in axle collars, as this causes wear in axle caps and results in shorter life of gears, pinions and gear cases. The caps can be numbered the same as the motor in order to keep caps with the same motor to avoid pinching when renewing axle bearings. Axle collars can be of a type that extends over the flange of the axle bearing, thus increasing the life of both bearings and axles.

ARMATURE MAINTENANCE IMPROVED

The method of banding armatures has been improved with the new type tension regulator which is attached to the banding lathe. This enables the tension to be easily varied on core bands and the end bands. One of the factors in lower maintenance cost is dipping and baking of armatures, but the method of banding is a most important factor. Our present practice is to remove the bands and put a filler of some good heat-resisting material, such as treated duck, under the band so that the tension of the band would be on the coil and at the

same time would be on the iron core to keep the band from becoming loose when the armature coil insulation started to shrink. Dipping and baking the armature will fill up the cracks and crevices with a thin film of varnish, which has a tendency to keep moisture from getting into the windings but is not sufficient to overcome vibration. The insulation used in the armature slots should be of a good grade with heat resisting and low shrinkage qualities, such as treated fish paper, which is also a factor in overcoming vibration.

We like to discuss our successes but hide the details of our errors. There is more to be learned from one clean, honest mistake, as a rule, than from a dozen successes. Be on the lookout for new ideas. Don't be afraid. What was considered the best method a year ago may be obsolete today. Yet it must be recognized that uniform methods, practices and parts are big factors in holding down costs.

MAKING THE WORK EASIER

The place where we work should be comfortable, well lighted, properly heated, should have good drinking water, plenty of room—and then profit is in order. Make work easier, cut down the number of back-breaking operations.

If we looked over some cars it is possible that we would find apparatus which could be discarded. For example: On a certain type of truck, we have just recently discovered that the release spring (two to the truck, four to the car) was in a good functioning location but almost impossible to get at to keep it functioning. We are now considering placing the release spring on the top rod, one end fastened to the car-body, two to the car.

A manufacturer's representative once said that the greatest concern he had about his competitor was "that they kept him from sleeping in the daytime." On economy and performance our Southern Equipment Men's Association has been a big factor in gaining departmental co-operation and effective work on the several properties.

It is difficult to leave the subject of economy without calling attention again to the oft-repeated importance of the foreman. He is the key man. The foreman and his men—that is teamwork, and teamwork is vitally necessary. It takes a "Heap of livin' to make a home," and it takes a heap of time and experience to know all the kinks in the trade. With experienced men and a good leader foreman who is interested in our kind of work, the maximum of economy may be looked for.

Bow Collectors

Are Developed Successfully in Toronto



Original type of bow collector used for five years on Toronto shunters



Later type of collector used for the past year with satisfactory results

After five years' experience in car yards a number of cars on the important Yonge Street line have been equipped with a new type of sliding collector developed by the staff. If successful it may be adopted for the entire system



REALIZING that there is room for improvement in the overhead trolley wheel method of current collection, the Toronto Transportation Commission, five years ago, commenced to experiment with bow type sliding current collectors and, as a preliminary experiment, all the yard shunters were equipped with the reversing type of bow collector, as shown in one of the illustrations. This type of collector has given fairly satisfactory results in this particular service, but the rolled aluminum collector section, with its grease groove and comparatively narrow width, was found to wear too rapidly and so did not warrant any further extension to general service operation. About a year ago a shunter, No. Y-17, was equipped with the sliding plate type of collector as shown in another illustration. The performance of this type of collector, with regard to stability and wear of the plate, was so satisfactory that it was decided to rearrange the overhead on one of the shorter and lighter traveled routes to permit testing of the plate collector in actual service. As a result of these preliminary tests, a number of cars have been equipped with the new device and placed in regular service on the Yonge Street route, which handles the heaviest traffic in the system.

The bow collector used in Toronto is fitted with a special design of sliding plate. This is shown in the illustration of the car. This plate differs from conventional types in that the contact surface proper is mounted on an axle and is free to rotate. It is held in the normal position, with contact surface horizontal, by means of a counterweight of iron tubing, which is of such shape that, in the unlikely event of the plate striking an obstruction and tilting over, it cannot be caught in the overhead. It is, therefore, possible to use a wide plate giving a large area of contact as, irrespective of the angle taken by the bow itself, the plate for its entire width is always in contact with the trolley wire. The plate itself has a total length of 39 in. and is channel section, made of

14 U.S. gage sheet steel. In the center is a parallel section 24 in. long by $4\frac{3}{8}$ in. wide, and it is tapered toward each end to 1 in. wide. In relation to the horizontal it has a slight camber, the difference in height between the center and ends being about 1 in. In the wearing surface are two grease grooves run-

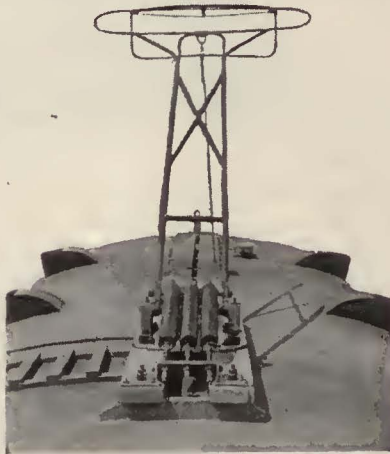
ning the full length of the parallel center section of the plate. The bow, constructed of steel tubing, is mounted on a non-swiveling base of such design that the upward pressure on the trolley wire is kept constant, irrespective of trolley wire height. In Toronto this varies from 13 ft. 6 in. at subways to 22 ft. 6 in. at railroad grade crossings.

The bow is mounted on the car in such a position that the plate itself is located directly over the king pin of the rear truck at an elevation of 18 ft. This insures that the device will describe an arc along the center line of the curve when turning at an intersection, and permits the alignment of the trolley wire to follow the center line of the track curves throughout. The mounting of the bow in this position means the minimum of alteration in the present location of the trolley wire, eliminating one of the problems during the period of transition. So far as the tangent wires are concerned, it is essential that the trolley wire be staggered on either side of the center line to a maximum of 6 in. at every fourth span in order to spread the wear on the surface of the plate.

The T.T.C. is proposing to operate these collectors under the standard trolley wire construction after making a few changes on some fixtures, such as inverting pull-offs, clearing all obstructions below the under side of the trolley wire and changing the curve dressing at intersections. The section insulators must be of the single beam type so that there is no projection below the bottom of the trolley wire. All overhead frogs in Toronto are suspended on a special device clamped over the frog pan so that no insulators project below the level of the trolley wire. The trolley frogs can be run over in their present locations. It has been necessary to fill in the clearance



Several cars on the Yonge Street line are equipped with the type of sliding plate collector illustrated



The collecting plate is mounted on an axle and is free to rotate. It is held in position by a counterweight of iron tubing



The 90 deg. overhead crossovers were redesigned to accommodate the sliding plate bow collectors by filling in the clearance gap somewhat and leveling the leads



Separate overhead contactors are used for actuating electric switches with trolley wheels and with sliding collectors

gap somewhat and level the leads on the 90 deg. crossovers.

Additions and modifications were necessary to the electric switch overhead contactor equipment, owing to the new position of the sliding plate, as compared with the location of a trolley wheel on similar types of cars. The sliding plate is located 13 ft. forward of the trolley wheel over the center of the rear truck. It was desired



Adaptation of a double track curve for bow collection. Note that the hangers are inverted so that no part of the overhead projects beneath the plane of the contact wire

to continue operating the two types of current collectors over the same electric operated switches. To carry this out the switch contactor on the overhead for the trolley wheel was undisturbed as to location but modified so that the sliding plate in passing the contact could not in any manner cause the switch mechanism to be energized, but still be operated by the passing contact of the wheel. At a distance of 13 ft. forward another contactor was installed. It was so designed that the sliding plate in passing energizes the switch mechanism, but cannot be affected when the trolley wheel passes through it. With this special layout of contactors, as illustrated, the difficulty of operating the two types of collectors over the same electric switches has been successfully solved without any additional hazard, or diminution of safety factors.

While opinion is divided as to the relative merits of trolley wheels and sliding collectors, there certainly are features in connection with the type of sliding collector now being operated in Toronto which cannot be equalled by the wheel. The advantage that makes the heaviest score is that the upward pressure against the trolley wire is only 9 to 12 lb. as against 25 to 30 lb. with trolley wheels. Other features are the entire absence of arcing at the wire due to the large contact area and the feasibility of obtaining adequate greasing of the trolley wire.

Other advantages are that the collector cannot leave

the wire, as sometimes happens with the standard trolley wheel and pole, causing delay and annoyance, particularly in the case of one-man cars. These dewirements and their cumulative effect are frequently the direct cause of breakdown and expense on the overhead system. A feature that is important in the latitude of Toronto is



Overhead special work redesigned to permit of bow collection

that sleet will not readily form or accumulate on a wire coated with grease. If it does form it is removed easily by the sliding plate without any special devices.

At the present time it is not possible to state definitely the saving in cost of maintenance and renewals of the overhead structure with this type of current collector. But it must be apparent, with the low contact pressure of this sliding plate compared with the orthodox trolley wheel, the elimination of side wear, the ultimate abandonment of frogs in favor of a spot-welded splice, and many other such details, that the potentialities for saving maintenance costs are very great.

Trolley Operated Traffic Signals Prevent Delays

DELAYS to car operation caused by automatic traffic signal lights have been much reduced at one important street intersection in Louisville, Ky., by the installation of apparatus co-ordinating the lights with the movements of the cars. This apparatus consists of four trolley contactors and a relay box, which are connected with the ordinary signal lights and timing device without any change being required in the original apparatus. Overhead trolley contactors have been installed on each wire as far back from the intersection as the car will travel during the time of the red light. Leaving contactors are set at the crossing. The distance from the setting to the clearing contactor on each track constitutes a block.

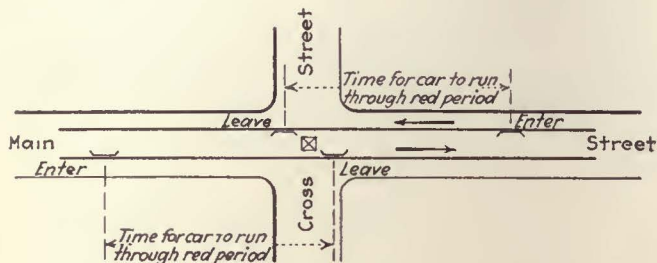
If the car is stopped by the signal at red, the control will not shorten this period, but it will prolong the green under certain conditions. In other words, the car does not change the indications at the instant of passing the entering contactor, but merely causes a prolongation of the green, if necessary. If a car enters and leaves the block within the normal green period, the special control will not be actuated, and the green will not be prolonged. This would be true if one or more cars on both tracks passed within the normal green period. The relays on the two tracks are connected as though all cars were on one track.

When the car stays in the block between the entering and leaving contactors longer than the normal green period, the traffic control causes the green display to be continued, so as to run into the next green period. This maintains the cycle without shifting it, which would be detrimental with progressive or wave systems. While this prolongation or extension may be longer than re-



Bardstown Road at the intersection of Eastern Parkway, looking east, Louisville, Ky., showing one of the Louisville Railway's new cars and trolley operated traffic signal. The relay box is on the pole at the extreme right, and the westbound clearing contactor is shown on the wire

quired for the particular car to pass, it is likely to be useful in releasing the accumulated or bottled traffic behind the car. When a car has caused a prolongation of the green, should another car enter the block at the end of the prolonged period, the green display will not be further prolonged, but the signal will change to red, permitting the cross traffic to be released. Thus if a

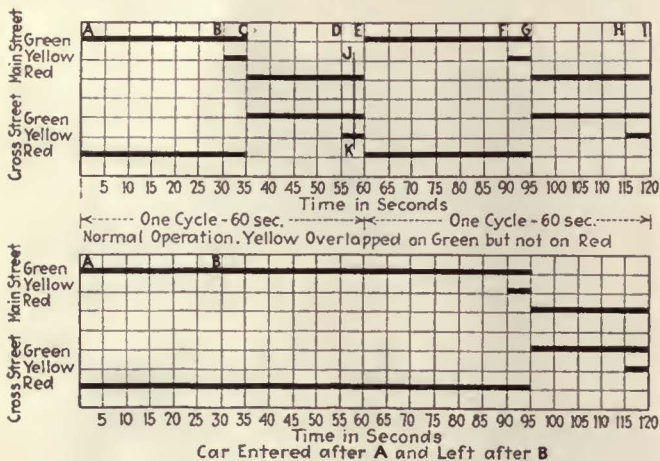


Arrangement of contactors for trolley control of traffic lights

car should for any reason stay in the block indefinitely, the green will not be held longer than one prolongation for each time the red is displayed. This places a limit on the restraint to the cross traffic.

The "Stop" and "Go" signal is at present adjusted for 25-second interval on Bardstown Road and 20-second interval on Eastern Parkway. It is possible to extend the time on Bardstown Road, on which the trolley line operates, by a complete cycle of the signal—45 seconds—thereby holding the green or "Go" period a maximum of 70 seconds.

The apparatus was furnished by the Nachod & United States Signal Company. It does not include the signal nor the timer, but only the overhead contactors and the relay box containing the relays actuated by the



Operation of Trolley Controlled Traffic Signal

A typical signal system has a traffic signal with three decks showing green, amber and red in the upper, middle and lower decks, respectively. The sequence of these indications is shown in the upper chart, and is known as the "split yellow overlapped" system in which the yellow is overlapped on the green at the end of the latter period, but not overlapped on the red. For simplicity a 60 second cycle has been assumed, in which the green is displayed for 35 seconds, during the last 5 seconds of which the yellow is added; and then at the extinction of these the red is displayed for 25 seconds. The cycle then begins anew with green. The same indications are given for the cross street, but in opposing phase, the green with the red or vice versa. A vertical line JK drawn anywhere on the charts shows indications displayed to both streets at that instant. The yellow is used as a caution signal at the end of the green period to warn the moving autoist that the signal is about to go red; but no yellow is shown at the end of the red when it changes to green, so that the driver may not start on the yellow.

contactors and controlling the display of the signals in combination with the timer. There are two 600-volt d.c. relays in the trolley contactor circuit and two a.c. relays operated from the light circuit. Throwover switches are provided, so as to cut out the contactor control in case of trouble, and which permits the complete removal of the control panel. The trolley contactors are of the type without moving parts, as used in the company's standard block signal. They are non-directional, one normal-open and one normal-closed contactor being used on each track.

Installations of this nature are in operation also in the cities of Detroit, Mich.; Atlanta, Ga., and Pittsburgh, Pa.

Oil Buffer Eliminates Switch Tongue Slapping

By W. A. UNDERWOOD
*Engineer Maintenance of Way,
 Chicago South Shore & South Bend Railroad*

NOISE made by the back slapping of spring-operated tongue switch points, long a cause of complaint by Michigan City residents, has been eliminated with the installation of spring switches with oil buffer shock absorbers by the Chicago, South Shore & South Bend Railroad. Due to heavy freight movement through Michigan City, the back slap of this particular siding used to cause considerable annoyance to the nearby residents, for when a freight train of 40 cars passed through the switch, as several do each day, the former switch tongue slapped 80 times.

The apparatus used is a modification of the "Mechanical Switchman," manufactured by the Pettibone Mul-

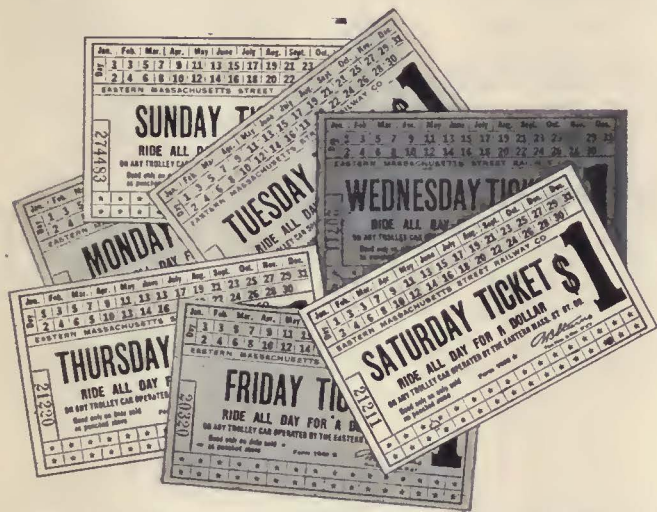


Oil-buffed spring tongue switch of the Chicago, South Shore & South Bend Railroad. Box open with manual control handle in neutral position

liken Company, of Chicago, designed for operation on sidings. When a car passes this switch, like any spring switch, the tongue normally returns to its setting. But the oil buffer retards the return of the tongue to normal position, the returning period being adjustable from six to eighteen seconds to suit conditions. This prevents the tongue slapping after the passage of each truck. When a freight train of 40 cars passes, the tongue never gets back to its normal position during the whole movement, eliminating the 80 slaps of the tongue. If it is desired to throw the points manually, the apparatus offers no resistance. The device is assembled in a cast-iron box 14 in. x 5 ft., located in the street.

Building Riding with the Dollar Pass

IN AN endeavor to win back to the street car the patronage lost to the private automobile, the Eastern Massachusetts Street Railway decided to experiment with a Sunday pass selling for \$1, good on any of the company's routes on the date of purchase. Accordingly, on Sunday, July 10, 1927, this pass was made effective, and in conjunction with it, new de luxe cars with air cushion seats and other improvements were placed in service on the interurban lines. The pass caused so much favorable comment that on March 26,



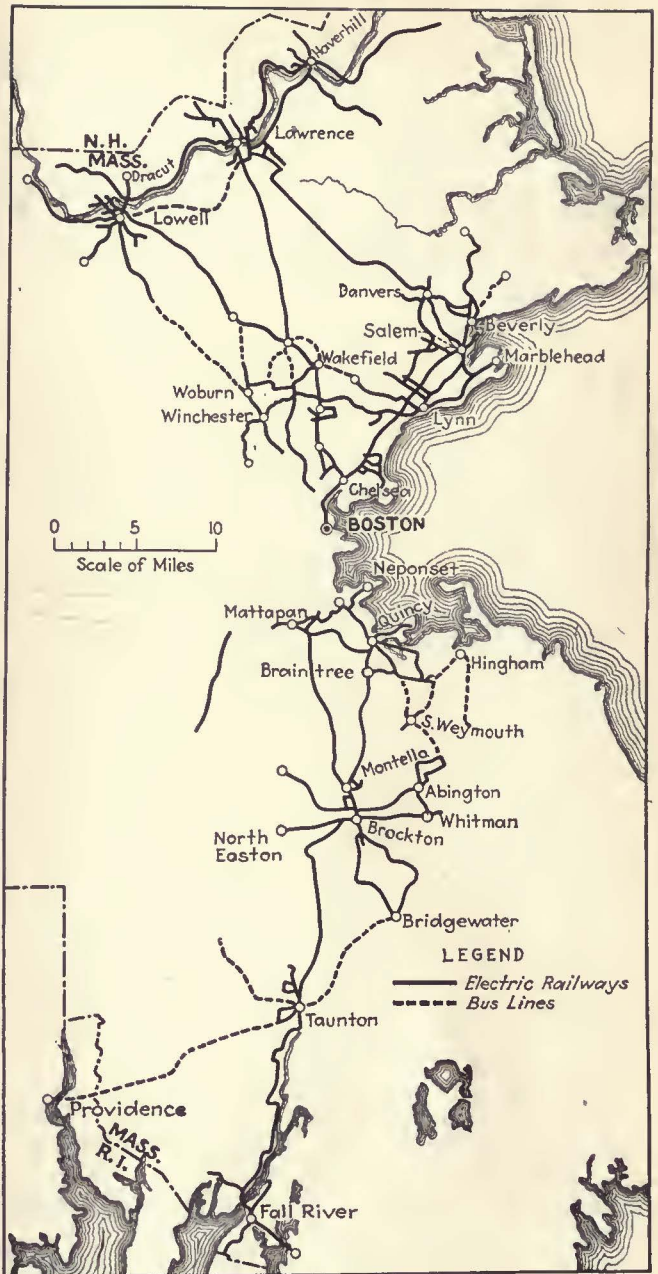
The dollar passes sold by the Eastern Massachusetts Street Railway are colored differently for each day in the week

1928, its use was extended to every day in the week with the exception of Saturday. On May 5, 1928, it was made effective on Saturdays also.

The pass is particularly attractive since it can be used on any route of the system. The company's lines serve a total of 74 cities and towns, of which 15 cities and 27 towns are north of Boston and 4 cities and 27 towns are south of Boston. Along the lines there are numerous pleasure resorts and places of amusement, as well as many points of historic and general interest. Probably the most striking feature of the ticket is that the stopover privilege is unlimited. Passengers can board and leave the car wherever they please, stay as long as they like during the day, and then board a car in any direction and ride anywhere without the payment of an additional fare.

That the \$1 all-day pass has met with the approval of the riders of the system is best shown by the volume of sales. The sales average \$2,200 a week, or approximately \$115,000 a year. The largest revenue obtained in one day was \$2,400. On the interurban routes, particularly where riding had fallen off to a very marked degree of late, there have been crowded cars in the summer and increased riding in the winter.

Aside from enabling families in the summer to enjoy a clean, cool ride at a nominal cost, with a beach, lake, grove, or other amusement place as the destination, without the inconvenience of Sunday automobile driving, these tickets allow the same people during the colder months to visit their friends in warm, comfortable trolley cars at low cost and without the dangers of winter driving. The tickets find favor with salesmen and other business people who make a series of calls daily in a city



Lines of the Eastern Massachusetts Street Railway, serving 74 cities and towns. The \$1 pass is good on any of the lines

or adjoining communities. For the person who merely desires to "see the sights" the slogan "trolley all day on a dollar bill" proves to be inviting, indeed.

When first instituted the all-day ticket was advertised for a period of thirteen weeks by a series of radio broadcasts from one of the principal Boston radio stations. The services of an excellent quartet known as "The Four Motormen" were secured, and interspersed with the songs of this quartet was a well-arranged advertising talk featuring the all-day \$1 ticket. Small inserts were placed in all the envelopes of outgoing mail inviting attention to these broadcasts. Booklets were distributed containing time-tables as well as line sketches of the more important routes. System maps and divisional time-tables folded to pocket size, containing the same information in more detail, also were made available. Extensive advertising by means of dasher signs and center rack signs carried by every car over the entire system also proved effective in stimulating sales.

Pedestrians Dominate

PHILADELPHIA'S TRAFFIC

PHILADELPHIA'S traffic problem in the central business district revolves very largely around the pedestrian, according to the report recently made to the Chamber of Commerce by Mitten Management, Inc. The report, which is the second of a series, makes a number of recommendations which, it is stated, should be advantageous to the entire community in speeding up the flow of traffic, as well as to the great majority who use the street cars and buses.

Chief among the recommendations made, as listed in the panel opposite, is revision of the existing parking ordinance. While the survey data indicate that the ordinance in general would meet conditions adequately if enforced, some concessions may be made on certain non-essential streets, while the principal streets should have their curb-space free at all times. It is recommended that parking should be prohibited between 3 a.m. and 6:30 p.m. on certain important business streets. On Market Street west of City Hall it is recommended that parking be prohibited at all times.

Signals which permit a continuous movement at a speed of 15 m.p.h. in the business district and up to 30 m.p.h. outside the business district are recommended in a separate report. Establishment of a bureau in the department of public safety, charged with the constant observation and study of city traffic conditions and with making recommendations, is urged. A traffic court and violations bureau, which has been considered by the Legislature, is unqualifiedly endorsed.

Complete co-ordination of Philadelphia's transportation facilities, which now requires only the tying in of the Broad Street subway, is recommended. It will be the subject of a subsequent report.

Construction of a concourse under City Hall and on Broad Street, from Vine to Spruce, is the first step in a program of underground sidewalks for the protection and convenience of the pedestrian. Extension of these sidewalks by connecting the platforms of the Market Street subway to provide a continuous underground sidewalk from Fifth Street to Nineteenth Street is proposed. All future subways should provide for this facility, at least in the central business district.

At certain intersections in the business district the volume of pedestrian traffic greatly exceeds the vehicle turning movement. Pedestrians are inconvenienced and vehicular traffic is impeded by these movements. Elimination of all turns into and out of Market Street between Seventh and Juniper Streets, and of certain turns at other points is recommended.

With some 2,500 individuals, companies and corpora-

Report of Mitten Management shows that all traffic is impeded by the narrow streets, parked vehicles, and frequent turns of motor vehicles. Many proposals are advanced to bring relief immediately and in the future

tions in the trucking business, a large part of their operations being in the central business district, consolidation and co-ordination of these interests would result in economies, as well as reduce traffic congestion materially. Placing all vehicles engaged as common carriers under the Public Service Commission would not only provide proper control but would tend to bring about in an orderly manner a gradual merging of these interests.

Legislation is recommended providing that, in the construction of

any building in the central business district where merchandise is handled, facilities off the street be provided for the parking of vehicles carrying merchandise to and from such buildings. Legislation should further provide that within a reasonable time, say five years, all such buildings now in this district be reconstructed to provide similar facilities. Already 211 buildings are so constructed.

Rittenhouse, Washington and Franklin Squares present definite obstacles to through traffic. They should be reconstructed, so as to carry the abutting streets through or provide passages which will permit the free flow of traffic without right-angle turns. Logan Square already has been reconstructed, and the plan for Franklin Square was contained in the first report of this series. A comprehensive paving program should be adopted, which will not only care for present and future traffic needs but which will also adequately maintain and repair all existing paving. Standard uniform traffic signs and markings, in conformity with the recommended national practice, should be adopted.

Traffic control legislation should provide for the following regulations designed to relieve the traffic stream from various elements which prevent free flow: (1) Prohibit horse-drawn, slow-moving vehicles from center city streets; (2) require that coal deliveries, ash removals and all similar services in the central business district be performed outside business hours; (3) prohibit parades in central business district except on Sundays and holidays; (4) prohibit the storage of building material on the sidewalks or roadways; (5) mark definite traffic lanes on all wide streets; (6) install loading platforms for street railway passengers on all wide streets; (7) prohibit the moving of theater scenery, safes, heavy building material and similar material on all center city streets during business hours; (8) prohibit all street openings, either on the street surface or manholes, within the central business district during business hours, except in cases of emergency.

The report presents traffic conditions which are a direct

PROBLEM

result of the natural economic growth that has expanded Philadelphia to a community covering an area of 130 square miles, with a population of well over 2,000,000, and which draws daily from a normal commuting radius of 25 miles in which there is a population over 3,500,000. Probably the factor which has had the greatest influence has been the motor vehicle. There was an increase in registrations in the state of Pennsylvania from 1,246,126 vehicles in 1924 to 1,676,025 in 1928, or 34.5 per cent, while in Philadelphia there has been an increase in the same period from 168,417 to 271,347 vehicles, or 61.1 per cent. Meanwhile the population in the state has increased from 9,344,000 to 9,854,000, or 5.46 per cent, and that of Philadelphia has gone from 1,951,076 in 1924 to 2,064,200, or 5.80 per cent.

The central business district, bounded on the north by Callowhill Street, on the south by Pine Street, on the east by the Delaware River and on the west by the Schuylkill River, covers 56,810,944 sq.ft. or 2.04 square miles. Of this 11,157,574 sq.ft. (0.40 square miles) is roadway area, which is 19.6 per cent of the total, comparing with 29.5 per cent in Detroit, 29.0 per cent in Chicago and 25.0 per cent in Boston. Included in this street area are 1,648,596 sq.ft. (0.06 square miles) of unimportant disconnected streets and alleys and 380,584 sq.ft. (0.01 square miles) of roadway in street intersections.

The lineal extent of street surface is 79.52 miles, of which 25.55 miles is in the unimportant streets. The balance, 53.97 miles, includes many streets which, although narrow, are of use in moving traffic. The subdivision as to width is as follows: 20 ft. and less, 5.51 miles; 21-30 ft., 35.94 miles; 31-40 ft., 6.03 miles; 50 ft. and more, 6.49 miles. Of the total in this classification, 41.45 miles, or 76.8 per cent, are 30 ft. or less in width.

Summary of Philadelphia Recommendations

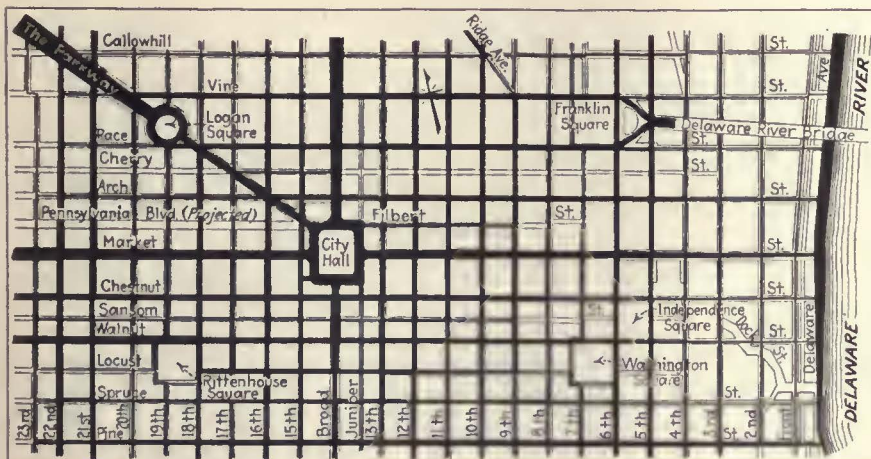
1. Revise existing parking ordinance.
2. Install signal system on main streets.
3. Establish a city traffic bureau.
4. Establish a traffic court and violations bureau.
5. Completely co-ordinate transit system.
6. Construct underground sidewalks.
7. Eliminate many right and left-hand turns.
8. Co-ordinate and control trucking.
9. Provide off-street loading facilities in new buildings and reconstruct old buildings within five years.
10. Reconstruct streets through certain squares to remove traffic obstacles.
11. Adopt comprehensive paving program.
12. Erect proper signs and markings.
13. Miscellaneous.

To determine the traffic flow into and out of the central business district, its direction and its characteristics, a cordon count was made covering a period of several days. Table I shows the figures of this count compared with a similar count made in 1925. The change in the various classes of traffic is shown in Table II. There has been an increase in the total of 18.6 per cent.

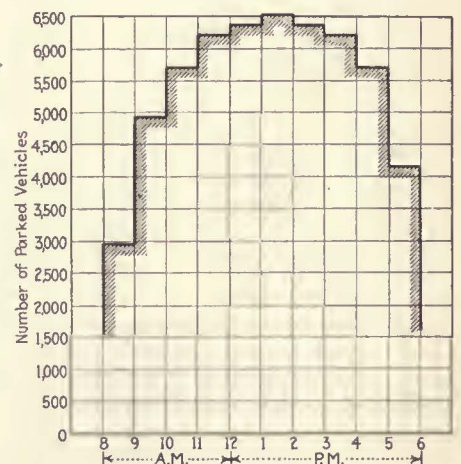
TABLE I—VEHICLES ENTERING AND LEAVING PHILADELPHIA CENTRAL BUSINESS DISTRICT, 1925-1928. TYPICAL WEEKDAYS, 5 A.M. TO 12 MIDNIGHT

Kind of Vehicle	Typical Weekday, November, 1925			Per Cent	Typical Weekday, December, 1928			Per Cent
	Enter-ing	Leaving	Total		Enter-ing	Leaving	Total	
Passenger automobiles	76,245	72,437	148,682	53.1	104,441	101,310	205,751	61.9
Taxicabs...	6,914	6,662	13,576	4.8	6,032	5,715	11,747	3.5
Trucks....	36,691	35,508	72,199	25.8	37,880	38,068	75,948	22.9
Horse-drawn vehicles..	9,971	9,907	19,878	7.1	5,824	5,455	11,279	3.4
Surface cars*....	12,427	12,350	24,777	8.8	10,701	10,671	21,372	6.5
Buses.....	508	503	1,011	0.4	3,038	3,031	6,069	1.8
Total....	142,756	143,367	286,123	100.0	167,916	164,250	332,166	100.0

*Exclusive of sub-surface trolley cars.



Typical weekday traffic flow in central business district of Philadelphia



Parked vehicles in main streets Jan. 7-8, 1929

TABLE II—CHANGES IN VEHICLE TRAFFIC ENTERING AND LEAVING CENTRAL DISTRICT

Kind of Vehicle	Increase or Decrease, Per Cent	Per Cent Change in Vehicular Traffic To and From the			
		South	West	North	East
Passenger automobiles.....	38.4	44.1	18.2	33.2	142.0
Taxicabs.....	-13.5	16.5	-3.1	-34.5	577.0
Trucks.....	5.2	10.3	-3.1	1.3	25.6
Horse-drawn vehicles.....	-43.3	-40.0	-59.5	-43.7	-51.2
Surface cars.....	-13.7	-7.6	-17.0	-17.4	..*
Buses.....	502.0	148.0	168.5	105.0	..*

*No buses in 1925

TABLE III—PASSENGERS CARRIED BY PUBLIC AND PRIVATE CONVEYANCE

Kind of Vehicle	Number of Daily Passengers		Increase or Decrease	
	November, 1925	December, 1928	Passengers	Per Cent
Passenger automobiles.....	260,516	353,202	92,686	25.6
*Taxicabs.....	15,532	9,780	-5,752	-37.0
Trucks.....	103,033	107,307	4,274	4.1
Horse-drawn vehicles.....	23,993	13,577	-10,416	-43.4
Surface cars.....	820,727	703,262	-117,465	-14.3
Buses.....	25,471	102,741	77,270	304.0
Sub-surface and elevated.....	342,075	437,028	94,953	27.8
Total.....	1,591,347	1,726,897	135,550	8.5

*Taxicab drivers not included

The number of passengers carried by public and private conveyance is shown in Table III. The total number of passengers carried by mass transportation units on the street decreased from 846,198 in 1925 to 806,003 in 1928, a decrease of 40,195 or 4.8 per cent. The number carried by mass transportation, sub-surface or elevated, increased from 342,075 to 437,028, an increase of 94,953, or 27.8 per cent. The total increased 4.6 per cent. These mass transportation units carried 74.5 per cent of the total persons entering and leaving the district in 1925 and 72.2 per cent in 1928.

A similar cordon count embracing the district between Walnut and Arch Streets and the two rivers was made in 1919. A comparison of the three counts, with necessary adjustments for the difference in territory, is made in Table IV.

Summarizing the results of the cordon count, the outstanding facts are as follows: There is a daily flow into and out of the central business district of about 332,000 vehicles, or approximately 166,000 each way. This is an increase of 143 per cent during the past ten years. The principal element in the flow—the passenger automobile—increased 279 per cent and the smallest numerical element—the horse-drawn vehicle—decreased 65 per cent in the same period. From 9 a.m. to 6 p.m. the flow is fairly uniform, showing a total hourly movement of about 20,000 vehicles.

Comparison with the 1925 count shows the greatest change in movement has been the 127 per cent increase in flow to and from the east, due to the opening of the Delaware River Bridge. Seven streets handle 66 per cent of the traffic with North Philadelphia and 49 per cent of the traffic with South Philadelphia, the heaviest flow being on the Parkway and on Broad Street.

While the total number of passengers carried by mass transportation units on the street decreased 4.8 per cent

in 1928 from 1925, the total handled by the surface, sub-surface and elevated increased 4.6 per cent, and while these services in 1925 carried 74.5 per cent of the total persons entering and leaving the district, in 1928 the proportion had dropped to 72.2 per cent.

NARROW STREETS MAKE MOVEMENT DIFFICULT

With streets that are only 26 ft. wide between curbs and carrying street car tracks in the center, the problem of movement is difficult. On account of the street car loading zones, the right-hand lane on one-way streets is of little use as a through traffic artery. Over 50 per cent of all vehicles in the narrow streets use the street car lane. Assuming a 50 per cent stop, 50 per cent go, distribution of time, the maximum capacity of such streets is 1,065 vehicles per hour. With two free lanes and a 10 per cent reduction due to unequal distribution and lag between the permissive signal and the actual movement of the vehicle, it can be assumed that the normal capacity of a free traffic lane is between 450 and 500 vehicles per hour.

A special investigation was made of Chestnut Street. A large proportion of the Chestnut Street traffic is made up of vehicles using it for only a few blocks. This is due in part to the system of one-way streets requiring vehicles to use several streets to reach their destination. Abolition of parking will not only increase the street space available for moving vehicles but will tend to reduce the number of vehicles due to elimination of the "cruising parking-space seeker." The elimination of turns into Chestnut Street would aid in reducing traffic in that street. Improved paving and complete elimination of parking in Sansom Street from Broad to Eighteenth would provide a bypass route for vehicles now making these turns.

A series of riding checks on both street cars and motor vehicles was made to determine the rate of traffic flow through the business district. It was found that on north-south streets, street car speeds range from 6.54 m.p.h. on Thirteenth to 9.79 m.p.h. on 22d over a distance of approximately one mile. On east-west streets speeds range from 5.83 m.p.h. on Walnut to 8.68 m.p.h. on Pine. The average speed for the entire district is 6.9 m.p.h.

Distribution of the running time of street cars was found as follows:

	Per Cent
Actual operation of car.....	70.6
Passenger stops.....	13.8
Delays due to cross-traffic and signals.....	13.7
Delays due to other causes.....	1.9

Thus 84.4 per cent of all time on the street is devoted to the transportation of passengers. Of the delays 88 per cent were due to cross traffic or signals.

Analysis of the automobile riding checks indicates an average over-all speed of about 9.5 m.p.h. Classification of the observed delays was as follows:

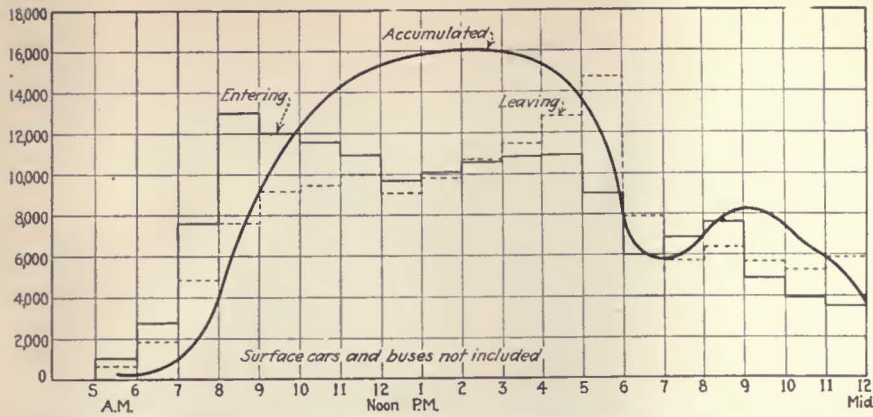
	Per Cent
Cross traffic.....	83.05
Congestion*.....	6.73
Auto or trolley loading or unloading passengers..	4.47
Vehicle parking.....	1.99
Vehicle obstructing track.....	1.66
Loading or unloading merchandise.....	0.82
Street repairs.....	0.67
Stalled vehicles.....	0.61

*Delays for which the observers were unable to detect any readily apparent reason.

TABLE IV—INCREASE IN TRAFFIC, 1928 OVER 1919 AND 1925

Kind of Vehicle	December, 1928		Increase or Decrease from	
	March, 1929	Per Cent	November, 1925	Per Cent
Passenger automobiles*.....	139,702	279.0	45,582	31.7
Trucks.....	43,154	138.0	3,250	4.6
Horse-drawn vehicles.....	-20,645	-64.8	-8,592	-43.2
Total.....	162,211	143.0	40,240	17.1

*Includes taxicabs



Count of motor and horse-drawn vehicles entering and leaving the central business district on a typical weekday

The actual time on east-west streets is divided as follows:

	Per Cent
Moving at speed greater than 5 m.p.h.....	67.5
Moving at speed less than 5 m.p.h.....	4.4
Stopped due to cross traffic or other causes.....	28.1

THREE GROUPS OF CONDITIONS AFFECT TRAFFIC FLOW

The conditions which affect traffic flow may be classified into three groups: (1) The inclusion in the traffic stream of elements which tend to hinder its flow; for example, parking, and slow-moving elements such as horse-drawn and certain types of commercial trucks; (2) those conditions which tend to impose on traffic arteries loads which are in excess of their normal carrying capacity (the most outstanding elements of this sort is the increasingly dense concentration of business and even social life in small areas, due to the construction of high buildings; (3) improper or inadequate direction and control of the traffic stream, such as faulty signal installation or lack of proper directional regulation.

TABLE V—PARKED VEHICLES IN PHILADELPHIA BUSINESS DISTRICT

Length of Time Parked, Hours	Number of Vehicles	
	Total	Per Cent
Less than 1.....	23,590	72.5
1-2.....	4,425	13.6
2-3.....	1,693	5.2
3-4.....	812	2.5
4-5.....	546	1.7
5-6.....	364	1.2
6-7.....	274	0.9
7-8.....	280	0.8
8-9.....	307	1.0
9-10.....	207	0.6
Total.....	32,498	100.0

To determine actual parking conditions a survey covering the period from 8 a.m. to 6 p.m. was made on Jan. 7, 8, 14 and 15, 1929. A maximum of 6,523 vehicles parked between the hours of 1 and 2 p.m. An interesting comparison between 1925 and 1928 may be made by taking the accumulation of vehicles in the district obtained from the algebraic summation of the ins and outs from the cordon counts, the 1925 showing 14,200, and the 1928 count showing 16,271. The increase in accumulated vehicles for 1928 is 14.6 per cent.

In September, 1927, a parked vehicle count was made, which showed a total of 3,650 vehicles as compared with 5,462 in 1929, an increase of 50 per cent.

A summary of the parking survey shows that the

accumulated vehicles in the central business district have increased 14.6 per cent since 1925. In the district between Vine and Pine Streets, there has been an increase in parked cars of 50 per cent in the past two years. As seen in Table VI, 72.5 per cent of all vehicles parked for periods of less than one hour, and of the cars parking in excess of one hour 25.4 per cent were "repeaters," being found during both checks. The total number of vehicles using the streets for parking purposes during the business day is about 12 per cent of the city registration. These cars carry only 2 per cent of the people entering

the central business district. Repeaters or regular parkers are long-time parkers, the percentage of the total repeaters for periods of from 4-5 hours to 9-10 hours varying from 45.5 per cent to 53.9 per cent. Of all repeaters, 73 per cent are evidently regular parkers as they were found in practically the same location during both checks.

TABLE VI—CHECK TO DETERMINE "REPEATERS" IN PARKING

Length of Time Parked First Check, Hours	Total Number Parked, First Check	Repeaters	
		Total Number	Per Cent of Total
1-2.....	4,425	751	17.0
2-3.....	1,693	345	20.4
3-4.....	812	260	32.0
4-5.....	546	202	36.9
5-6.....	364	196	53.8
6-7.....	274	133	48.5
7-8.....	280	145	51.8
8-9.....	307	140	45.6
9-10.....	207	94	45.4
Total.....	8,908	2,266	25.4

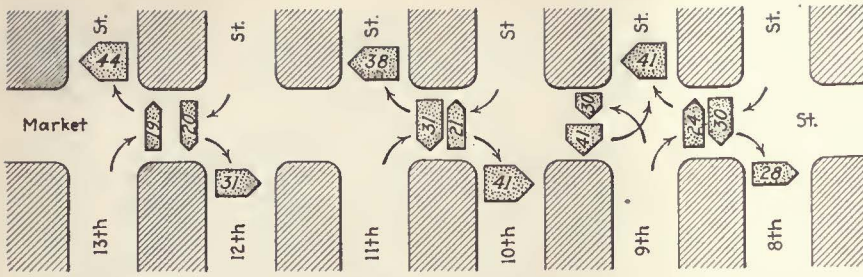
Through the co-operation of the Keystone Automobile Club, a survey of the actual garage and parking facilities was made. The summary is given in Table VII. It was noted that in certain sections of the business district there are not proper facilities for the garaging of automobiles. It is unreasonable to expect that any plan of parking regulation can be entirely successful unless suitable garaging facilities are provided, including reasonable and uniform rates. As this is a matter in which the city is directly concerned, it should encourage the construction of garages at such points throughout the city as will provide proper facilities.

DIFFICULTIES IN WAY OF PARKING REGULATION

With regard to the regulation of parking, the report states:

All attempts that have been made to regulate parking in this city have met with strenuous opposition from business interests, with the claim that such regulation seriously interferes with business. It is an open question whether this claim is justified. From the experience of other cities and from such information as we have been able to secure, we are inclined to believe that this claim is based on a state of mind rather than on actual facts, and an unbiased investigation of the facts would not sustain the claim. It is certain that in other cities where there is effective parking regulation business has been helped rather than hindered, and that such regulation has brought more people, more traffic and more business to the business districts.

We secured the co-operation of a number of large and representative stores in making a three-day survey to determine facts. A total of over 56,000 customers were canvassed as to the method used in reaching the various stores, and the following tabulation



Conflicting movements of vehicles and pedestrians 8 a.m.—6 p.m. on a typical weekday in March, 1929

of transportation methods used by customers shows the percentage of the total using the means indicated.

	Per Cent
Auto parked at the curb.....	9.02
Auto not parked at the curb.....	8.32
Public conveyance.....	68.57
Walked.....	14.09

It will be noted that while the number of customers requiring curb parking space is considerably higher than shown by checks in other cities, yet it is a small percentage of the total and must represent a comparatively small number of the aggregate of customers using our central city shopping centers. It is doubtful whether it is to the advantage of the business houses to inconvience the free movement of 91 per cent of their customers to provide free parking in the streets for the other 9 per cent.

A check of conditions made since the recent enforcement of the no-parking ordinance shows that while parking has not been entirely eliminated, vehicle speeds have been increased about 20 per cent. The number of parked vehicles on Chestnut and Walnut Streets has been reduced 90 per cent from the number observed during the parking survey made in January, and on north-south streets the number of parked vehicles has been reduced about 50 per cent.

Another reason for the inability of Philadelphia's streets to handle the traffic is the increasingly dense concentration of business and even social life due to the construction of high buildings. Of the buildings above ten stories in height approximately 17 per cent are 20 stories or over, 27 per cent are 15 to 19 stories and 77 per cent are 10 to 14 stories. A survey of 141 buildings in this district shows a total estimated population of 89,238 persons and a total daily traffic of 286,664 persons, or 4.4 times the population, and while the opening business hour is fairly well distributed, the closing hours are rather concentrated at 5 o'clock.

It has been estimated that during the closing hour—5 to 6 p.m.—people leave office buildings at the rate of 480 per floor, per hour. A 20-story building, therefore, discharges about 10,000. If one in 30 uses an automobile to get home, there would be required sixteen cars per floor or 320 cars for the building, or six times the number that could be parked in one city block, which would make the street impassable. Should all these people use street cars, on the basis of 100 persons per car, 100 cars would be required, which, stretched end to end, would reach almost a mile. No demonstration is necessary to

TABLE VII—GARAGE AND PARKING LOT FACILITIES COMPARED WITH PARKING ON STREET

Number of parking lots.....	23
Number of garages.....	76
Total available parking places.....	99
Total car capacity.....	19,528
Number of cars stored.....	9,919
Available car space.....	9,609
Per cent of capacity available.....	49.2
Number of cars parked on street at peak hour.....	6,524

visualize the effect of the sudden imposition of such loads on the narrow city streets. Only high-speed sub-

surface transportation could meet such requirements, and the continuing development of this nature is a powerful argument for a completely co-ordinated and comprehensive transit system.

Observations were made of persons and vehicles entering certain selected intersections. The counts, made for an average weekday between 8 a.m. and 6 p.m., show only persons moving across the roadway and exclude those who turn the

corner and remain on the sidewalk. The distribution of the persons and vehicles was: pedestrians, 65.8 per cent; passengers in street cars and buses, 25.2 per cent; passengers in other vehicles, 9.0 per cent.

Several charts indicate the conflicting movements between pedestrians and vehicle passengers in making turns at certain intersections along Market Street. One of these is reproduced. The conflict is most noticeable at Thirteenth, Tenth and Ninth at Market, where the number of pedestrians are 44, 41 and 41, respectively, for each passenger in private vehicles making the right turn from Market to the intersecting street. It was found that a well-defined cruising circuit used by private chauffeurs exists, including Chestnut, Fifteenth, Walnut and Sixteenth Streets.

The turning movements at certain Chestnut and Market Street intersections cause serious inconvenience to the greatly predominating pedestrian movement and very definitely slow up all vehicular traffic.

OTHER SECTIONS OF THE REPORT

Other reports in the Philadelphia traffic survey already released are No. 1, which treats of the traffic conditions in the vicinity of the Delaware River Bridge Plaza; No. 3, on the traffic control signal system for the central business district, and No. 4, concerning accidents and the street traffic situation. In the first report it is recommended that Fifth Street be carried across the bridge approach through a tunnel, so that the through movements will not interfere with each other.

The third report recommends a progressive co-ordinated traffic control signal light system, which would be entirely automatic. It would be operated as a unit, controlled from one or more central points. The lights at each intersection would be so timed that a vehicle could move continuously through the district without stopping. This speed would be 15 m.p.h. on that section of Broad Street between South and Vine and at a materially higher speed beyond these limits. It is estimated that the proposed system would increase the average speed of traffic on all streets almost 50 per cent.

In the fourth report, on accidents and traffic, it is recommended among other things that a city traffic engineering bureau be organized to plan for future as well as present relief from traffic hazards and congestion; that there should be properly constituted traffic courts with adequate punishments; that further development of safety patrols and teaching of safety in the schools, and education of the police, be encouraged; that more playgrounds and other inducements to discourage play in the streets be established; that commercial vehicle movements and loading be controlled; that travel lanes and pedestrian crossings be marked; that loading platforms for street railway passengers be installed on all wide streets.

For heavy traffic lines, where short headways are economically justifiable, articulated units have definite advantages



Determining the Proper Vehicle

By

GEORGE M. WOODS

Westinghouse Electric & Manufacturing Company

ONE of the major problems confronting railway operators who are about to purchase new equipment is determining the type of rolling stock to buy. This question cannot be answered according to any fixed rule. There are so many variables involved that numerous exceptions can be taken to almost any general statement. The first choice must be between a rail vehicle and a trackless vehicle, that is, between car and bus. Next, if the car is chosen, should it be articulated, multiple unit, or single unit—double truck or single truck?

In determining the proper vehicle, the traffic conditions must first be analyzed to ascertain the number of persons to be hauled at the various hours of the day. The number of cars required or the number of buses required, with their tentative schedules, must be determined. The total investment for each can then be calculated within fairly close limits. The investment must include not only the cost of the vehicles themselves, but also such items as track construction, additions

Characteristics of large and small cars, multiple-unit trains and articulated units compared, and their advantages and disadvantages under various operating conditions outlined

to substation and distribution systems, garages, shop additions, etc. Generally the investment for cars and the items which accompany car operation, will exceed the investment for buses. It is equally true that the operating costs of buses per seat-mile ordinarily will exceed the operating costs of street cars. If the annual fixed charges on the necessary investment are added to the annual operating costs, the total annual charges give a true comparison of the two systems from a cost standpoint.

The earning power of cars compared with buses is another factor that must be considered. Obviously it would be poor policy to select a method of transportation merely because it is cheap, if the public would not patronize it after it had been provided. Not only the present desires of the public but also its future attitude must be considered. While this phase of the analysis approaches the realm of prophecy, it cannot be ignored. In some instances bus operation was started a number of years ago with wholly unsatisfactory vehicles; the patrons became dissatisfied and today the street car is generally

avored. But such a comparison is fundamentally unfair if modern street cars are compared with out-of-date buses. On the other hand there are numerous street railways which have purchased few new cars in recent years, while at the same time they have been consistent purchasers of modern buses. It is only natural that many persons, comparing street cars of the vintage of 1900 with buses of the vintage of 1929, consider the street car an obsolete vehicle and can see no prospect of the street railways continuing in operation. Their judgment is biased just as much as that of the people who base their opinions on old buses and modern cars. Actually there is less fundamental difference from the passenger's viewpoint between street car and bus than there is between either and the private automobile.

Wages are such a large part of the total operating expense that every effort must be made to have each man operate as large a unit as is practicable. The electric railway man is always between the "devil" of high operating costs, and the "deep sea" of infrequent service. A street railway which operates large cars at long intervals can no more expect to prosper than an office build-

weigh approximately 66,000 lb. for the same seating capacity as two single units. The electrical equipment should have the same capacity per unit of weight. In the same service the maintenance would be expected to be 4.5 cents per car-mile and the cost of energy consumption, 7.5 cents per car-mile. For the purposes of comparison let it be assumed that motormen and conductors receive 60 cents per hour on single cars, articulated cars, or multiple-unit trains and 65 cents per hour on one-man cars.

Between single cars and multiple-unit operation, there would be little difference in operating expenses, except wages of conductors and motormen. During the rush hours the headway would be doubled with the multiple-unit trains, but since the resulting headway is only four minutes, fairly frequent service is afforded. Under the conditions previously outlined, taking two-man operation of all single cars and three-man operation of multiple-unit trains, the total daily wages would be \$562 for the single cars and \$519 for the multiple-unit cars, a saving of \$43 per day for the latter.

If all cars were operated by one man during the non-



Multiple-unit cars provide a convenient means of handling light traffic during the day and heavy traffic in the rush hours

ing which would attempt to operate elevators at similarly infrequent intervals.

In considering this question, let us take for example a route with the following characteristics:

Length of line, miles per round trip.....	15
Schedule speed, miles per hour—non-rush.....	10
Schedule speed, miles per hour—rush.....	9.4
Running time, minutes—non-rush.....	90
Running time, minutes—rush.....	96
Headway, minutes—non-rush.....	5
Headway, minutes—rush.....	2
Number of cars—non-rush.....	18
Number of cars—rush.....	48
Equivalent hours of non-rush service.....	18
Equivalent hours of rush service.....	3

A typical modern car for this class of service would weigh about 35,000 lb. and seat 50 passengers. This car should be maintained for not more than 2.5 cents per mile and the energy cost should be approximately 4.2 cents per mile. A car of this type could readily be arranged for train operation. The platforms and couplers might be somewhat heavier but the increase in weight is so slight that the same weight may be used for the multiple-unit car without appreciable error. An articulated car with two body sections and three trucks would

rush hours, the wages per day would be \$384 for single cars and \$341 for multiple-unit cars. The relation between single-car and multiple-unit operation remains unchanged, but a saving of \$178 per day in each case would be effected by one-man operation. If the service conditions were such that one man could run a single car successfully throughout the day, the total daily wages for single cars would be \$304. The wages for multiple-unit cars remain unchanged at \$341. Under these circumstances there would be a saving of \$37 per day for the single cars.

When the operating costs of articulated cars are compared with those of single cars and multiple-unit trains the power and maintenance expenses differ and must be included. On page 845 is a comparison based on the provision of the same number of seats throughout the day with the three types of equipment. In some instances the larger units might have to make more stops, especially during the non-rush period, than the smaller units and, hence, would make lower schedule speed and have higher energy consumption per ton-mile. This tendency is neglected in order to avoid obscuring the main point to be developed.

Under these conditions the articulated cars save

\$174 per day, compared with single cars and \$131 per day, compared with multiple-unit cars. The former, however, have the disadvantage of affording 10-minute headways during the non-rush hours instead of the 5-minute headways furnished by the latter.

If the single cars and multiple-unit cars are operated by one man during the non-rush hours the wages are reduced, as previously mentioned, to \$384 and \$341, respectively. The articulated cars remain unchanged. The total expense for wages, power and maintenance become: single cars, \$693; multiple-unit cars, \$650; articulated cars, \$697. On this basis the expenses for the articulated cars are \$4 per day more than for single cars, and \$47 per day more than for multiple-unit cars of the same capacity.

Although some of the most recently designed articulated cars are arranged for three-man operation, there are a number of articulated cars in service which are operated by two men. If the latter plan is followed the expense of one man for the entire day is saved and the total cost of wages, power and maintenance of the articulated cars becomes \$555. The two-man articulated cars, therefore, save \$138 per day, compared with single cars,



Single-car operation under extremely heavy traffic conditions has many staunch advocates

are regarded as too long to meet the demands of the public. Multiple-unit cars are the most flexible means of providing service for varied traffic conditions. Operated singly they can provide frequent service on the lighter lines during the entire day and on the heavier lines during the non-rush hours. At periods of heavy traffic, the cars can be operated in trains of two or three. In the past multiple-unit cars have been looked on with disfavor in some instances because of the assumed complication.

and \$95 per day, compared with multiple-unit cars.

If it be assumed that the articulated car at ten-minute intervals affords a service which is too infrequent, and that, in order to retain the business, maximum headways should be five minutes, the three types of cars compare as given in the table below.

On this basis the multiple-unit cars save \$295 per day, compared with the articulated cars. It so happens that in the example chosen the resulting non-rush headway, when the articulated cars provide the same number of seats as the single cars, is such that there may be a difference of opinion as to its adequacy. In some cities 10-minute headways are considered satisfactory even on important lines, in others they

COMPARISON OF OPERATING COSTS—SAME SEATING CAPACITY

	Single Car	Multiple Unit	Articulated Car
Car-hours per day non-rush.....	324	324	162
Car-hours per day rush.....	144	144	72
Wages per day non-rush.....	\$389	\$389	\$292
Wages per day rush.....	173	130	130
Total wages per day.....	562	519	422
Car-miles per day non-rush.....	3,240	3,240	1,620
Car-miles per day rush.....	1,355	1,355	677
Total car-miles per day.....	4,595	4,595	2,297
Cost of energy per day.....	\$194	\$194	\$172
Maintenance per day.....	115	115	103
Wages, power and maintenance per day.....	871	828	697
Saving per day compared with single car operation.....		\$43	\$174

COMPARISON OF OPERATING COSTS—SAME MAXIMUM HEADWAY

	Single Car	Multiple Unit	Articulated Car
Car-hours per day, non-rush.....	324	324	324
Car-hours per day, rush.....	144	144	72
Wages per day, non-rush.....	\$211	\$211	\$289
Wages per day, rush.....	173	130	86
Total wages per day.....	384	341	475
Car-miles per day, non-rush.....	3,240	3,240	3,240
Car-miles per day, rush.....	1,355	1,355	677
Total car-miles per day.....	4,595	4,595	3,917
Cost of energy per day.....	\$194	\$194	\$294
Maintenance per day.....	115	115	176
Wages, power and maintenance per day.....	693	650	945
Excess per day compared with multiple unit.....	43	295



The single-truck car has a definite field of usefulness on light traffic lines

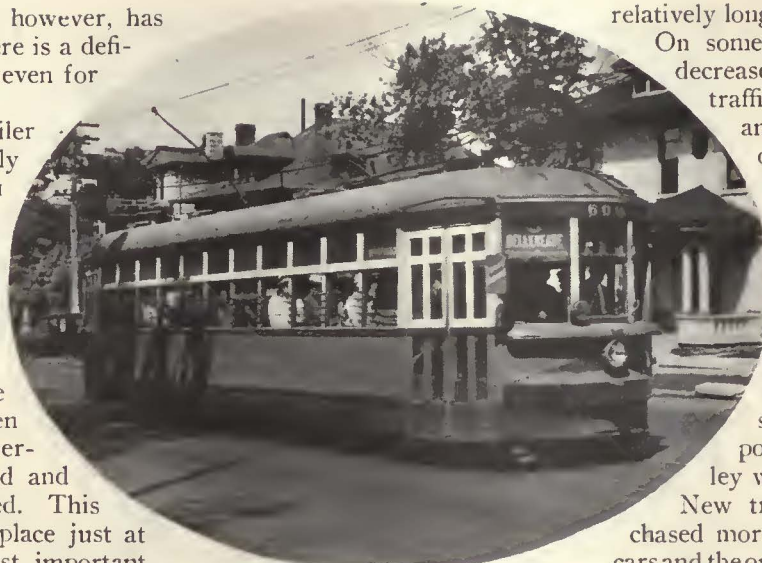
Modern remote control, however, has many advantages and there is a definite trend toward its use even for single units.

Motor car and trailer trains are less favorably regarded at present than formerly. It has always been known that the equipment of the motor car had to be heavier and less economical in operation than if designed for the motor car alone. When the trailer is added acceleration rates are decreased and the car speed is decreased. This decrease in speed takes place just at the time when it is most important to move traffic quickly. Unmotored trailers are difficult to handle in switching operations, and equipment to move them from carhouse to line and around the carhouse must be provided. If motor troubles occur on the car hauling a trailer, it is impractical to continue the train in service. However, the main objection to motor car and trailer trains is the fact that low rates of acceleration are too great a handicap today.

Single-car operation for almost all classes of service has many staunch advocates. Short headways can be maintained, and in these days of private automobile competition are a most effective weapon. Single cars operated by one man compare favorably in operating expenses with any other form of transportation.

In certain cities where vehicular traffic is dense and street intersections are close together, trains and articulated cars interfere with cross-street traffic. Under these conditions single cars are preferred, even if two-man crews are required.

The single-truck car has a definite field in small cities or on lightly traveled lines. Distances traveled are short and unless frequent service is available, patronage is sure to decrease. The single-truck car has never had as good riding qualities as the double-truck car, especially on poor track, and that sometimes has caused it to be unpopular. In many small cities double-truck cars, even at



Double-truck cars of moderate size are frequently preferred to single-truck cars, even where traffic is light

relatively long headways, are preferred.

On some railway lines traffic has decreased or expected increases in traffic have not materialized, and the continued operation of street cars is not economical. The track may require high reconstruction costs. The cars also may have reached the stage where replacement is necessary.

To these conditions the trolley bus is eminently suited. The substations, a pole line and one of the trolley wires are already available.

New trolley buses can be purchased more cheaply than new street cars and the operating expenses should be about the same as those of the street car.

It is possible to make theoretical studies of the investment and operating costs of each of the various types of vehicles discussed, in service of various densities.

From these studies deductions could be drawn as to the exact field of application of each type. But these studies usually ignore local conditions which quite frequently are the determining factors. No general rule can be applied to evaluate the earning power of the various vehicles. A slight change in assumptions of unit costs, changes the relative economy of various schemes. For instance, in the comparisons made between single cars, multiple-unit and articulated cars each could be shown to be most economical, depending on the number of car operators.

It is probably fortunate that definite divisions between the fields of application cannot be made. It is human nature to continue to do things in the same old way once a standard procedure is established. The urban transportation business is changing so rapidly that the industry cannot afford to over-standardize. By carefully studying each application of new equipment, the railway operator keeps in touch with new conditions and is better able to meet the requirements of the public. The best results can be obtained only by thoroughly analyzing each problem and by applying the correct vehicle.



Trackless trolleys involve smaller capital cost than street cars and are cheaper to operate than are motor buses

	Operating Revenue \$	Operating Expenses \$	Taxes \$	Gross Income \$	Net Income \$
Calgary Municipal Railway, Calgary, Alta.					
June, 1929.....	82,486	49,062		33,422	3,321
June, 1928.....	72,060	50,312		21,747	3,077
6 mo. end. June, 1929..	514,703	293,611		221,091	39,293
6 mo. end. June, 1928..	458,657	278,863		179,793	29,264
British Columbia Electric Railway, Vancouver, B. C.					
May, 1929.....	1,175,623	787,370		388,2536	
May, 1928.....	1,095,798	744,043		351,2956	
11 mo. end. May, 1929..	12,847,132	8,565,854		4,281,2786	
11 mo. end. May, 1928..	12,056,243	8,207,247		3,848,9966	
London & Port Stanley Railway, London, Ont.					
May, 1929.....	50,357	49,225		1,1326	
May, 1928.....					
5 mo. end. May, 1929..	169,228	173,117		3,8896	
5 mo. end. May, 1928..	156,207	158,074		1,8676	
Hydro-Electric Railways, Essex District, Toronto, Ont.					
7 mo. end. May, 1929..	756,349	546,830	2,746	206,773	886
7 mo. end. May, 1928..	636,857	513,238	2,798	120,820	28,538
Regina Municipal Railway, Regina, Sask.					
June, 1929.....	30,538	19,453		11,085	357
June, 1928.....	26,683	19,954		6,729	3,254
6 mo. end. June, 1929..	218,490	131,660		86,830	15,351
6 mo. end. June, 1928..	183,006	121,619		61,387	1,479
Saskatoon Municipal Railway, Saskatoon, Sask.					
June, 1929.....	26,515	18,898	1,034	6,583	3,051
June, 1928.....	23,673	17,611	958	5,139	2,038
6 mo. end. June, 1929..	203,575	129,327	8,024	66,224	14,750
6 mo. end. June, 1928..	173,258	114,231	6,930	52,097	8,895
Havana Electric Railway, Havana, Cuba					
3 mo. end. June, 1929..	1,486,833	1,161,977a		332,718	171,754
3 mo. end. June, 1928..	1,358,009	1,110,328a		257,171	96,112f
6 mo. end. June, 1929..	2,864,581	2,285,997a		593,610	271,673f
6 mo. end. June, 1928..	2,725,993	2,272,760a		475,270	153,247f

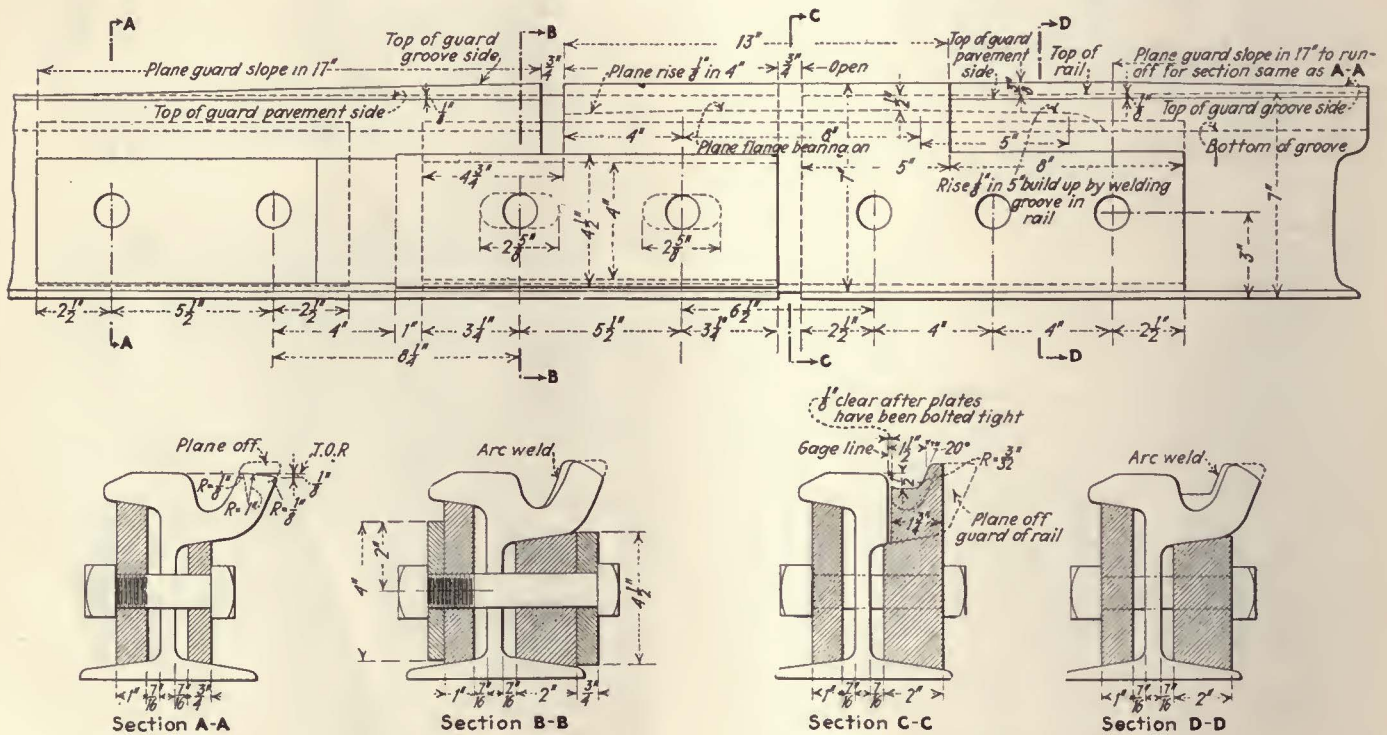
pany and the Brooklyn City Railroad into the Brooklyn & Queens Transit Corporation. The statement for the current year shows the combined results for the entire system. For purposes of comparison the results in July, 1928, for the two systems that were consolidated are shown both separately and together. Gross revenue, gross income and net income are all higher this year. The net income of \$607,513 for July, 1929 for the system includes \$99,400 accruing to minority interests in the B. & Q. T. Corporation, making a balance of \$508,113 for July, 1929, for the B.-M.T. that compares with \$507,475 net income for the B.-M.T. in July, 1928.

Flange Bearing Expansion Joint Used in Brooklyn

By H. F. MERKER

EXPANSION joints have been installed at numerous locations on the lines of the Brooklyn City Railroad on bridges and approaches. Recently a joint was designed to permit expansion and contraction up to 1½ in. and having a flange bearing at the gap in the rails. In order to provide the flange bearing, the guard was cut away and in its stead a bar of steel was used so constructed as to serve as a splice bar, a guard and a floor of the flange-way, in one piece. This bar of steel was tightly bolted to the one rail end through round holes with reamed fit bolts. On the other end the combination splice bar and guard was equipped with slotted holes similar to the accompanying splice bar on the opposite side of the rail, permitting the two splice bars to slide along the fishing space of the adjacent rail end. In order to prevent the bolts through the slotted holes from changing the 90 deg. angle which they made with the rail, a bar was provided with a set of 2 in., equivalent to the thickness of the combination splice bar and guard. This permitted one end to be bolted against the web of the rail and the other end to be bolted against the outside of the combination splice bar and guard. It was fitted with round holes in order to hold the bolts firmly in their position.

The joint as designed provided ½ in. depth of flange-way where the flange bearing was desired, and while there is little need of any riser beyond the limit of the bar, the riser or arm was continued by arc welding into the flange-way of the guard rail to which the combination piece was bolted. The joint as designed was intended to be used where car speeds are not higher than is customary over such special trackwork. It is provided with flange bearings at frog intersections. The design also contemplated welding the floor of the flange bearing groove when wear made it necessary.



Straight track expansion joint constructed by the Brooklyn City Railroad for use on lines which traverse bridges

Practices Found Useful in Expediting MAINTENANCE WORK

in Railway Shops



This truck for welding equipment is easy to move about and requires the services of only one man under the most unfavorable conditions

Truck for Welding Equipment

CONSIDERABLE trouble was experienced in transporting the welding equipment until the truck shown in the accompanying illustration was designed and constructed in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. The equipment is used throughout the shop and yards on cinder and dirt paths and passes over rails and rail crossings. Metallic frame trucks with small wheels of various designs were tried out but they were found unsatisfactory. The services of two men were required to transport these trucks and often the mechanical structure did not hold together.

The truck shown is made of wood and steel. Two longitudinal members of the frame of 3x4-in. oak are spaced 21½ in. centers and tied together by means of two ¼x1½-in. angles spaced 22 in. centers. A ¼x10-in. plate is riveted to each of these angles which are notched to receive the oxygen and acetylene tanks. These act as a support for the tanks. This construction takes care of any lateral motion of the tanks during transportation. The longitudinal motion is prevented by a ¾x1-in. bar bolted to the oak beams near the end.

The Maintenance Contest \$200 cash award and the departmental certificates of merit will be presented at the Tuesday morning meeting of the Engineering Association during the Atlantic City Convention

Two iron wheels 31 in. in diameter with a rim 2½ in. wide by ½ in. thick are mounted on a 1½-in. square axle and spaced 30 in. centers.

The oak frame is 80 in. long and one end is rounded for a distance of 36 in. to provide for a suitable hand grip. The other end is beveled so that it will rest firmly on the ground. The axle is installed at about the center of gravity when the tanks are in position, and, as a result, little effort is required to maintain a balance. The oak beams are notched 1½ in. square for the reception of the axle, and a ¾x1¼-in. plate fastened to the beams across the axle holds the axle in position.

Straightening Front End Channel Irons*

By H. C. PRESSLER
Master Mechanic Eastern Texas Electric Company, Beaumont, Tex.

A TOOL for straightening the front end channel irons, or those on the sides of street cars, was recently designed in the shops of the Eastern Texas Electric Company. This tool consists of a 6-in. jack, one piece of 1¼ in. No. 5 iron, bent 4 in. at 90 deg. at one end and 12 in. also at 90 deg. at the other end, both bends made in the same direction 26 in. apart. When a bumper is to be straightened the long end of the iron is placed behind the channel to be

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

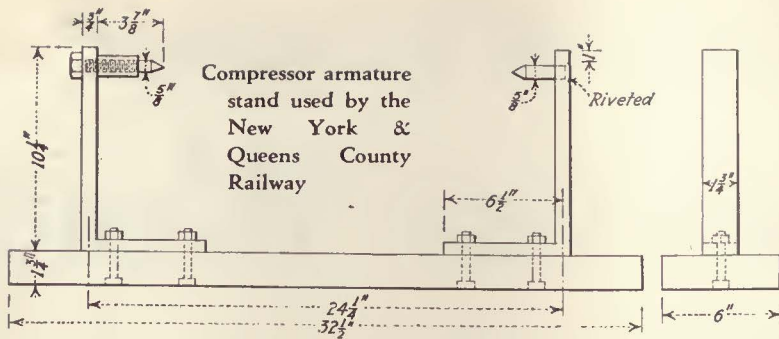


Jack for straightening bent bumpers

pulled out. The jack is placed in a horizontal position between the short end and a wooden block or bar which rests against two blocks attached to the undamaged part of the bumper. When the apparatus is in position, supported by wooden blocks, if necessary, the jack is screwed out in the conventional manner, thus straightening the bumper.

Special Winding Stand for Compressor Armatures

TO PROVIDE a special stand for compressing armatures that are not designed with a shaft extension on the commutator end, the device shown in the accompanying illustration is being used by the New York & Queens County Railway, Woodside, N. Y. This stand consists of oak



Compressor armature stand used by the New York & Queens County Railway

1 3/4 in. thick, 6 in. wide and 32 1/2 in. long, to which are bolted two angles 10 1/4 in. high with centers spaced 24 1/4 in. These angles are made from 3/4 x 1 3/4-in. steel. A supporting center 3/8 in. in diameter and 2 3/4 in. long is riveted to one of these angles. The other angle has an adjustable supporting center 5/8 in. in diameter and 5 5/8 in. long.

Prolonging Life of Window Wiper*

By H. F. REXROTH

Master Mechanic Harrisburg Railway Harrisburg, Pa.

A SIMPLE device for prolonging the life of rubber windshield wipers has been devised by the Harrisburg Railway. It consists of a V-shaped hook attached to the upper window frame against which the wiper usually rests when not in use. When placing



V-shaped hook which holds window wiper off glass when not in use

the wiper in the rest position by turning the handle upward, the wiper will be pushed over the V-shaped hook and thus will be lifted from the window. This will relieve the rubber from the continual pressure and thus preserve the flexibility necessary to wipe the water thoroughly from the windshield. It has been found that wipers consisting of five plies of rubber give better service over the uneven glass than did the single heavy piece.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

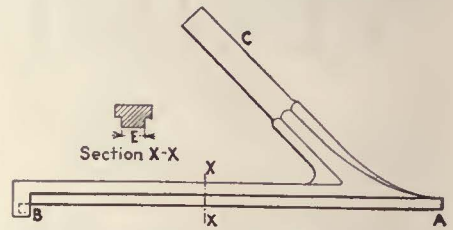
Driving Tools Speed Up Armature Stick Removal*

By S. M. SPINDLE

Engineer Power Department Cleveland Railway, Cleveland, Ohio

IN THE past the electrical maintenance division of the Cleveland Railway has used several methods for driving the coil-retaining sticks when repairing large armatures. Recently this division developed a simple driver, which does the work more effectively. This device is shown in an accompanying illustration. B is a shallow pocket, into which the rear

end of the stick is placed as it is about to be driven. The distance from A to B is the length of the stick to be driven. The width E is just a trifle less than the width of the armature slot. A small air hammer is slipped over the round, case-hardened



Handy tool designed by Cleveland Railway for removing armature sticks

end of the tool at C. As the point of the stick is held snugly against the coil by the point A, the long flat lower surface of the tool keeps the stick from buckling. Three times as many sticks can be driven in a given period with this tool, and the resulting job is more satisfactory than can be obtained from any other appliance formerly used.

Portable Hydraulic Lift

By W. L. BRIAR

Shop Supervisor Kansas City Public Service Company, Kansas City, Mo.

CONSIDERABLE labor has been eliminated in the shops of the Kansas City Public Service Company by the use of a portable hydraulic lift. The device is used to remove and install air compressors, resistance boxes, air tanks, brake cylinders, and other heavy equipment, when cars are in the shops for overhaul or repairs. Parts are also moved between the repair benches and the cars by the use of the same device. The lift is operated by a hand pump on the side of truck. Oil is used for lifting.

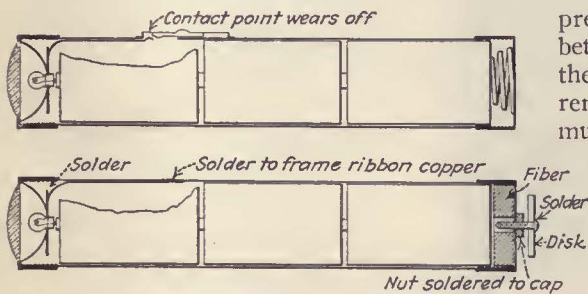


Hydraulic lift for heavy units in use by the Kansas City Public Service Company

Improved Switch for Flashlights*

BY FARRELL TIPTON
Electrician San Diego Electric Railway,
San Diego, Cal.

A SIMPLE method has been devised by the Electrical Department of the San Diego Electric Railway to use a screw contact in the bottom of the case of electric flashlights instead of the sliding switch



Screw control used instead of sliding switch on electric flashlight

ordinarily used. The sliding switch is taken off the case and replaced by a piece of strip copper—the other end of which is soldered to the reflector. The tension spring in the cap of the flashlight is replaced with a fiber filler block, with a hole in the center large enough to permit the passage of a $\frac{1}{4}$ in. stove bolt. A hole is drilled through the center of the cap and a $\frac{1}{4}$ in. nut soldered to it. A disk of convenient size is soldered to a $\frac{1}{4}$ in. stove bolt, which is then used to control the light circuit through the cap.

Special Tools Speed Up Heater Installation*

BY GLENN S. REEVES
Assistant Master Mechanic
Omaha & Council Bluffs Street Railway
Omaha, Neb.

LAST fall electric heaters were installed on 67 cars of the Omaha & Council Bluffs Street Railway in a remarkably short time. The heaters were placed in ducts running the full length of the car on each side, and with openings at each heater unit for the heat to escape to the inside. Each of the ducts was about 27 ft. long with ten openings the size of a heater unit. Construction of the ducts was difficult, and the work had to be done quickly. It was evident that a spot welder and sheet-iron break and punch would speed work considerably, and it was decided to construct suitable equipment in the railway shop.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

The spot welder contained a transformer coil which was built up from laminations salvaged from a substation transformer not in use. There were 290 primary turns made of No. 6 wire with two coil taps to vary the secondary voltage. The secondary consisted of two turns of 1x1.5-in. copper made from GE-57 motor field ribbon. Primary voltage used was 440 at 25 cycles.

Satisfactory control was particularly important since the pressure contact must be made between the electrodes before the secondary welding current flows, and the current must be interrupted before the electrode pressure is released. If this is not done it was found that instead of making a weld the arc would burn a hole in the metal. A pedal-operated toggle switch connected with a

magnetic switch in the primary circuit was used for control. The toggle switch operates only after the electrodes are together and under pressure. This was made possible by the fact that the pedal is not connected directly to the movable electrode but is connected to it by means of a heavy coil spring which stretches after the electrodes are brought together and the pedal is further depressed. The bottom electrode is stationary, and both electrodes are water cooled. In the accompanying illustration the primary tap switches are shown on the opposite side from the magnetic switch. At the bottom is the pedal, and the toggle switch is operated by it when the pedal is depressed sufficiently. Through the use of this welder the work was completed six times faster

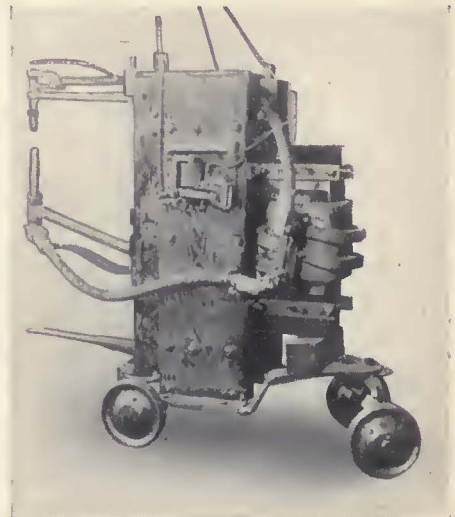
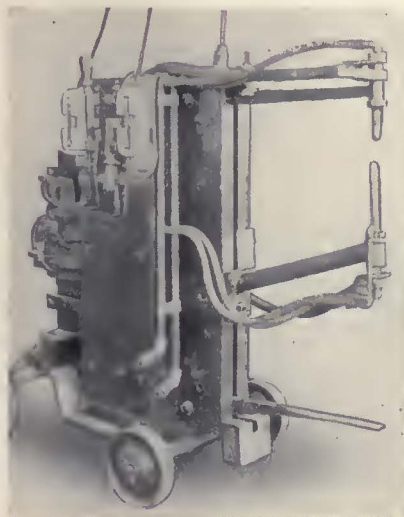


Sheet iron break and punch

and at only one-sixth of the cost.

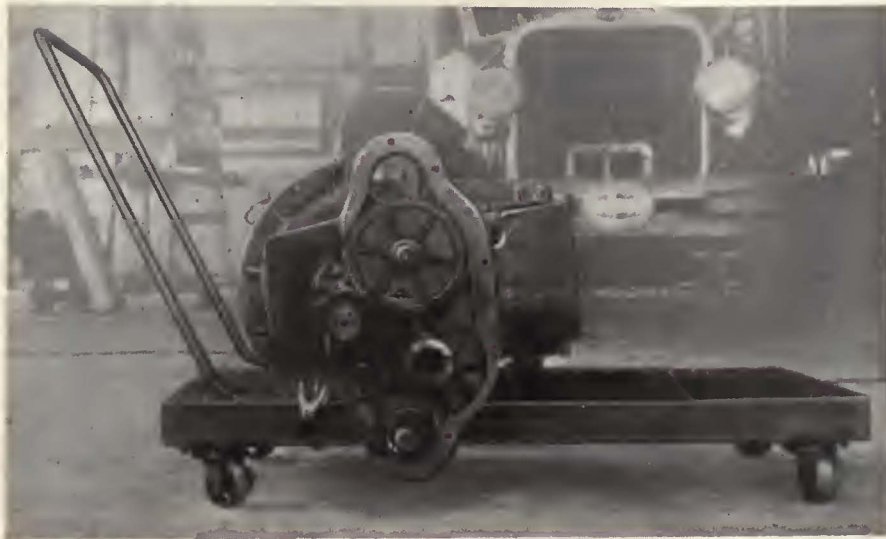
For bending and punching the long lengths of sheet iron used for the heater ducts, a special sheet-iron break and punch was constructed. The machine consists of three 10x12-in. brake cylinders mounted on an A frame with a light T-rail at the top of the A reinforced by a truss. The three brake cylinder push rods attach to an inverted T-rail at the lower ends. The tread of this rail is planed to a male 90 deg. V and the tread of the stationary T-rail at the bottom of the frame is planed to a female 90 deg. V. The sheet iron to be worked is placed between the two V's. An ordinary engineer's valve controls the air.

This device can be converted also into a gang punch for punching sheets up to 9 ft. long. This is done by attaching a home-made gang punch in the two V rails.



Special electric spot welder used in heater installation

Handy Devices Used in Bus Maintenance



This truck has been found convenient for transporting bus engines around the shop and has facilitated maintenance work

Rugged Hand Truck

TRANSPORTING bus parts around the shop of the Surface Transportation Company, bus subsidiary of the Third Avenue Railway, New York, N. Y., has been facilitated since the design and construction of a number of hand trucks, as shown in the accompanying illustration. The side and end framing is made from $3\frac{1}{2}$ x 2-in. yellow pine joists and is surfaced with yellow pine planks 12 in. wide and 1 in. thick.

The length of the platform is 48 in. and the width 24 in. A swivel roller is installed on each corner of the platform. These rollers are $3\frac{1}{2}$ in. in diameter and $1\frac{1}{8}$ in. face. The height of the platform above the floor is $7\frac{1}{2}$ in. The rollers are spaced 40 in. centers on the long sides of the platform and 20 in. centers on the short

side. A U-shape handle made of $\frac{3}{8}$ -in. round iron and 40 in. long is bolted to one end of the platform.

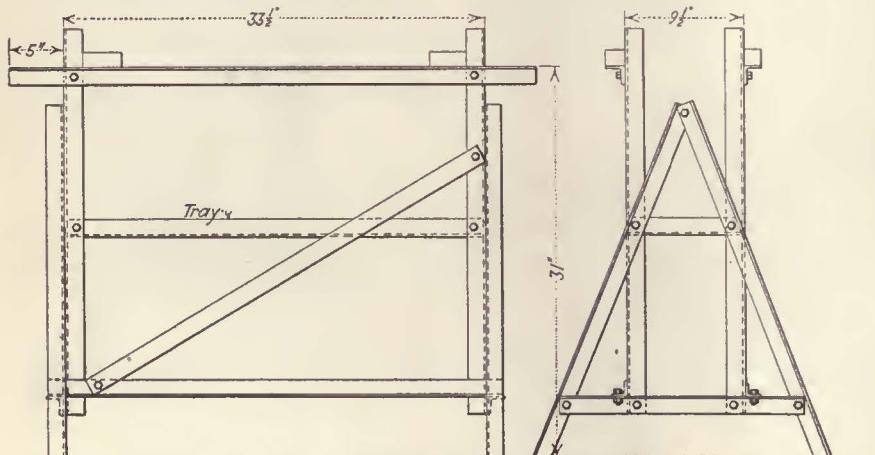
Front Axle Assembling Stand*

BY HOY STEVENS

*Assistant Superintendent of Maintenance
Cleveland Railway, Cleveland, Ohio*

IN AN overhaul shop the problem presented itself as to how to support the front axle most conveniently while various parts such as bushings, springs, steering knuckles and, in the case of newer equipment, brake shoes and diaphragms, were being assembled and adjusted. This was accomplished in a convenient manner in our shop by the stand shown in the accompanying illustration. The stand may be con-

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.



Stand used in the Cleveland Railway garage supporting front axle during overhaul

structed so that it can be adapted to almost any make of axle. Our stand is built to fit a White Model 50 B and Safeway double-deck units. It was constructed from material on hand, which happened to be $1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{3}{16}$ -in. angle iron.

The cost of the stand depends upon the material that is used and the efficiency of the labor, which, in our case, brought the expense down to a little less than \$8.

Cooling System Flushing Machine

BY DEL A. SMITH

*General Manager
Department of Street Railways
Detroit, Mich.*

FOR thoroughly flushing the radiator and cylinder block of a bus engine, the Department of Street Railways in Detroit has designed a simple but effective machine. The device consists of a 4-cu.ft. air tank, supplying air under pressure at 40 lb., against a line of water under 30 lb. pressure.

The two lines, merging into one, are directed into the radiator or engine block, forcing air and water in the direction opposite to the regular flow of the cooling system. The result



Portable flushing machine for bus engine cooling systems

is a "thumping" effect of the water, caused by a greater pressure of the air against a heavier product, loosening the sludge, scales and other foreign matter which lodged in the cooling system. This machine can be

used to advantage also in conjunction with the well-known regular "boiling process."

Mirrors Improve Pit Lighting

MIRRORS are used in the base of repair-pit light recesses in the Walden garage of the International Railway, Buffalo, N. Y. As shown in the accompanying illustration, a $\frac{1}{4}$ -in. plate mirror is placed directly beneath the 75-watt, inside, frosted lamp in the side-wall recess of the repair pit.

Three such recesses are spaced uniformly in each side of the pit, with



Mirror reflects upward the light of the 75-watt lamp in pit wall recess

a seventh pit light located in the short-end wall. The mirrors in these recesses reflect a large share of the available illumination upward to the underside of the bus which is run over the pit for inspection or repairs.

After experimentation 10 deg. was found to be the right angle at which to tilt the mirrors from the horizontal, to secure the maximum of reflected light. To prevent possible deterioration of the silver backing of the mirrors, a rubberized paint was applied to the cement base of each recess permanently. This system not only provides better light for the mechanics but it results in better workmanship also.

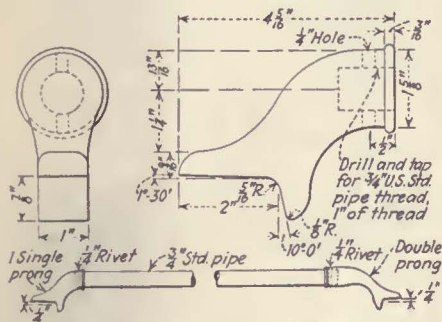
Track and Line Maintenance Practices

Track Gage Assures Exact Spacing of Rails*

By JOSEPH CROYLE

General Foreman Cleveland Railway, Cleveland, Ohio

ADVANTAGES resulting from the use of a track gage designed by the Cleveland Railway are twofold. First: the prongs conform to



Track gage designed by Cleveland Railway fits contour of the rail head

the contour of the rail on the gage side, thus making the proper contact between rail and instrument and insuring a true gage when the instrument is fitted snugly between the rails by the spikers. Second: the connecting bar to which the prongs are fastened is raised in order to clear the guard of all guard-rails, thereby eliminating interference and allowing the gage to rest firmly upon the rail.

The Cleveland Railway has adopted as standard on tangent track a gage of 4 ft. 8 $\frac{3}{4}$ in., and for curved track, 4 ft. 8 $\frac{3}{4}$ in. In order to avoid any

confusion on the part of the spikers, two track gages are used: a straight track gage enameled black and a curved rail track gage enameled red. This arrangement enables the spikers to select the correct track gage immediately.

Previously, it had been the experience of this company that the spikers were unable to maintain an exact gage. The new gage was designed to overcome this difficulty, and, by its use, the company has been able to

secure track built exactly to the desired gage.

Stationary Track Department Crane*

By C. B. HALL

Chief Clerk Virginia Electric & Power Company, Norfolk, Va.

LOADING and unloading of heavy materials by means of a stationary crane, instead of by hand, has brought about a marked saving in



Stationary crane used in storage yard of the Virginia Electric & Power Company for handling materials resulted in a considerable saving in labor expenses, as well as a reduction in the number of accidents

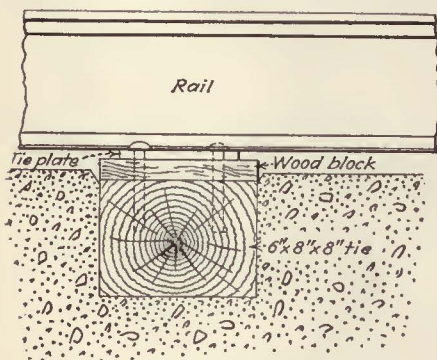
*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

time and labor in the storage yard of the Virginia Electric & Power Company, and has also resulted in a considerable reduction of personal injury cases. The crane is equipped with a 55-ft. boom and has a lifting capacity of 3 tons at an angle of 45 deg. It is motor driven, an old GE-62 street car motor being used for this purpose, with a hand operated turning mechanism. Its cost was \$225. The crane is used for lifting heavy bridge timbers, rails, frogs, switches, scrap materials, etc., in both loading and unloading from railroad cars to the ground, and on company cars for distribution on the road. Heavy materials are now being handled at from 12 to 15 cents per ton, whereas the hand method, prior to the crane installation, usually cost \$1 per ton.

Raising Paved Track to Proper Grade*

BY A. E. GLEASON
Assistant Superintendent of Construction
Louisville Railway

DURING the last several years a considerable amount of track in Louisville has been damaged by underground work, mostly sewer construction in the business section of the city. This sewer work was carried on by tunneling from shafts, at various points, and caused the tracks to sink in a number of places from $\frac{1}{2}$ to 3 in. In most instances it was



Wood blocks on old ties used to raise track to grade

found that the entire track foundation had gone down and was solid at the new level. Because of the short headway of cars, repairs had to be made at night, and in a manner that would interfere as little as possible with traffic. Oak blocks were cut 8x12 in. ranging from $\frac{1}{2}$ to 2 $\frac{1}{2}$ in. in thickness. Two $\frac{1}{2}$ in. holes were bored in these blocks for spike holes, as shown in the accompanying illustration.

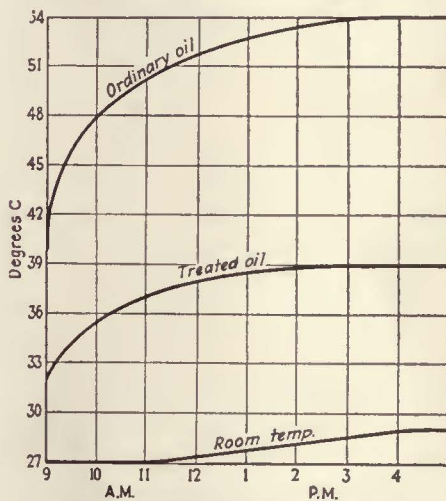
*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

tion. The low places in tracks were excavated to the top of ties. A block of the proper thickness with a standard tie plate bringing the rail to the proper level was placed on each tie and fastened with a long spike. Tie-rods were renewed where needed to hold track to gage. Concrete was placed and paving laid. In addition to the great saving in time, this method of repair saved the labor and material that would have been used had excavation been carried to bottom of ties and track tamped with concrete, as had been the practice in the past under similar circumstances.

Synchronous Converter Lubrication*

BY F. W. BRAUND
Superintendent of Power Conversion
Cleveland Railway, Cleveland, Ohio

OVER a period of years a high grade mineral oil, with a life of twelve months, has been successfully used by the Cleveland Railway in



Treated oil for converter bearings showed lower temperatures than ordinary oil in test at Cleveland

synchronous converter bearings in manually operated substations. A fairly even temperature is maintained by the attendant by opening or closing doors, windows or ventilating equipment or stoking a boiler. In automatic substations, however, openings for ventilation are fewer, heating

The new Maintenance Contest will start after the annual convention in Atlantic City. Many equipment men have already indicated that they will submit contributions

equipment is unnecessary, and, with no attendant available, extremely high and low operating and room temperatures are encountered. With the installation of the automatic control, the problem arose of furnishing the bearing during summer months with a heavy viscous oil, and then removing and storing this oil in the fall in order to supply bearings with a less viscous oil for winter use.

SUMMARY OF CONVERTER BEARING TEMPERATURE TESTS

Time	Room Temperature, Deg. C.	Bearing Temperature Ordinary Oil, Deg. C.	Bearing Temperature Treated Oil, Deg. C.	Temperature Difference, Deg. C.
9:00 A.M.	27	40	32	8
9:15 A.M.	27	45	34	11
9:45 A.M.	27	47	35	12
10:00 A.M.	27	48	35.5	12.5
3:30 P.M.	28	54	39	15
4:00 P.M.	29	54	39	15
4:30 P.M.	29	54	39	15
5:00 P.M.	29	54	39	15

Many tests were made to discover an oil the viscosity of which changed but little between temperatures of 0 deg. F. and 160 deg. F. Such an oil finally was obtained and temperature tests were made, showing an average reduction in running temperature of 15 deg. C. in favor of the new oil. This oil, a treated product containing a portion of edible tallow, will function in extreme temperatures with a viscosity change of but 2 per cent.

Reclaiming Steel Tubular Span Wire Poles

OXIDIZATION at the ground level has partially destroyed some of the steel tubular span wire poles on certain lines of the Third Avenue Railway System, New York, N. Y. These are being reclaimed by means of reinforcing sleeves. A tube 30 in. long and of the proper inside diameter is split longitudinally by means of a cutting torch. The halves are clamped over the oxidized surface. These clamps are made of $\frac{7}{8}$ -in. material and are 6 in. wide and 16 in. long. They are clamped together by means of $\frac{7}{8}$ -in. bolts. The splits are welded and the ends of the sleeve are welded to the pole.



Economical method of reclaiming span-wire poles by reinforcing sleeves

New Products for the Railways' Use

New Dead-end Sling

MUTILATION of corner or dead-end poles has been eliminated through the development of a new type of dead-end sling by the American Cable Company, New York. This sling consists of a shackle and cotter-pin bolt which are



How dead-end sling is attached to post

merely steel cylinders slipped over the unseized ends of preformed wire rope, then by means of 100 tons hydraulic pressure so processed as to cold flow the steel into the interstices of the wire rope, thereby locking it to the rope with unfailing security. This new type of dead-end sling is being adopted by several public utilities and railroads.

Tap Grinder Newly Developed

DEVELOPMENT of a new machine for tap grinding is announced by the J. G. Blount Company of Everett, Mass. This machine, driven by a specially designed 1½ hp. Westinghouse type SK motor, is applied to the grinding of tap flutes by the use of a taper arbor on the end of a spindle, using various sizes of grinding wheels. For the grinding of small taps, wheels of small diameter and width are used, while, on larger taps, grinding wheels up to 6 in. in

diameter and ½ to ¾ in. wide are employed.

These grinders are self-contained, being driven by a special direct connected totally enclosed, ball-bearing motor with a speed range of 4,000 to 7,000 r.p.m. The motor is controlled by a field rheostat, so that any grinding speed may be obtained up to 7,000 r.p.m. A smooth finish can be obtained by the inherently close speed regulation of the drive.

Carbon Paste Used in Welding

WHERE missing sections of metal parts are built up by welding, the use of carbon paste, manufactured by the Oxweld Acetylene Company, New York, has been found of advantage for supporting loose pieces and making walls so that the molten metal will stay where desired. It is necessary to pack the paste tightly to give a satisfactorily smooth job, and thus save grinding or machining after the welding is completed.

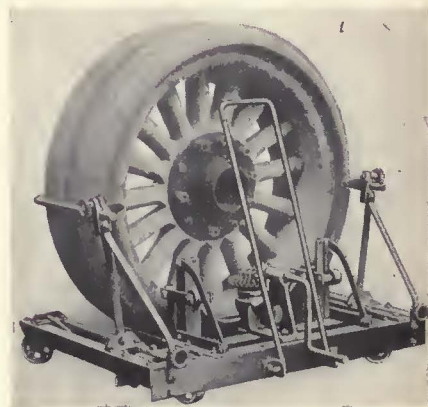
The accompanying illustration shows a cast-iron support for a drill table on which carbon paste has been used to form a bottom support for welding metal. Near the center of this casting is a ¼-in. threaded hole for a set-screw, part of which was broken out. This hole was filled carefully and after the welding it was unnecessary to redrill the hole. When cold the carbon paste is removed easily, and the inside is of correct contour so that no finishing is necessary.



Cast-iron support for a drill table on which carbon paste is used to hold welding metal

Wheel Dolly for Removal of Bus Wheels

THE use of this new dolly for handling bus wheels is said to make a job that is ordinarily difficult and dangerous, much easier and safer with a resultant saving in time and



Taking off wheels from buses or trucks is speeded up considerably with the use of a Manley wheel dolly

labor. This bus wheel dolly has just been announced by the Manley Manufacturing Company, Bridgeport, Conn., as an addition to its complete line of garage equipment.

Non-Corrodible Resistors for Railway Service

AN EDGEWISE-WOUND, non-breakable and non-corrodible resistor, weighing about one-half as much as cast grid resistors of corresponding capacity, has been introduced by the General Electric Company. It is particularly suited to railway application where vibration and exposure tend to shorten the life of the more fragile cast grid types.

The resistor units are of unbreakable, non-corrodible ribbon rolled from special alloy. The ribbon is wound edgewise over heat-resisting and mechanically strong insulation, which is fitted over the edges of reinforced punched steel bars. The units themselves are supported on

steel rods with secondary insulation of mica. The six-unit resistor weighs approximately 47 lb., and the four-unit one approximately 37 lb., about half the weight of cast grid resistors.

Space is conserved by having the units elliptically shaped. The special alloy ribbon has a temperature coefficient which results in only a slight variation in resistance whether hot or cold, and the specific resistance of the alloy is extremely high, so that it is possible to use a relatively large cross-section for the conductor. Rigidity, with sufficient thermal capacity to care for abnormal conditions such as large currents on grades, pulling in dead cars, etc., is thus obtained.

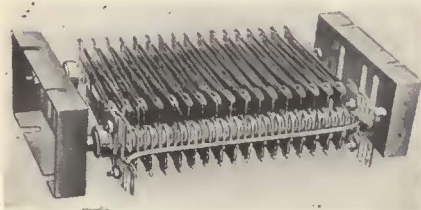
The few joints are copper to copper, affording minimum contact resistance. Terminals at the ends of the resistor frame simplify the connection of the leads, and clamp terminals for connecting intermediate turns of each unit permit accurate adjustment of each resistance step.

Any single-coil unit may be replaced without disturbing the others. Both the four-unit and six-unit resistors of the new style, known as Type EW, are interchangeable with Types CG and RG Form A and BG Form A-4 resistors, all having identically located supporting bolt holes. In many instances, however, fewer boxes are needed than are necessary with the cast grid types.

Unbreakable Resistor

DUR-RISTOR, a new unbreakable resistor with a continuous resistance element, is announced by Cutler-Hammer, Inc. of Milwaukee, Wis. Designed to meet the need for a resistor which would give maximum service under the most severe operating conditions, it is vibration-proof, unbreakable, non-corrodible, light of weight and compact.

The main body of Dur-ristor—the resistance element—consists of two continuous, unbreakable strips, which are made of a rust-proof, non-corrodible alloy. They are proportionally ribbed on the sides as well as



New resistor designed to meet severe operating conditions

on the turning edges. A new method of supporting the strips, combined with the ribbing, permits the strips to expand and contract freely during temperature changes. The entire resistor is made unbreakable and permanent by the elimination of brittle material and by the use of mica for all insulation. All Dur-ristors, regardless of ampere rating, are of equal size. The thickness of the resistance strip is the only part that varies in size, i.e. according to ampere rating. Dur-ristor is adaptable for any standardization plan for resistor banks, and is used with equipment where minimum resistor maintainance is required.

Metal Coat Applied by Spray Gun

A CONVENIENT means of applying a thin coat of metal to surfaces needing protection or re-sizing is offered by the Metals Coating Company of America in the form of a "MetaLayer" spray. It simultaneously melts, atomizes and



Metal in wire form fed into this gun may be sprayed on any metal or non-metallic material

applies a coating of molten metal of any desired thickness to metallic or non-metallic objects. The tool has been used to fill surface defects in castings, to build up undersize metal parts, to protect metal parts against corrosion, to apply decorative metal coatings, and for many special uses. The manufacturers claim that wood, metal, tile, pottery and even glass can be coated with the spray.

The coating metal is fed into the spray in the form of wire, and any of the commercial metals may be thus applied. The tool combines the following elements in it: An oxy-acetylene melting flame; a compressed air turbo-motor which feeds the metal into the flame in the wire form; a compressed air jet which atomizes the

metal and a 3-way valve which controls the burning gases, the motor and the spray, so that all operate in unison.

Safety Starter for Shop Motors

CONTROLLED by the new Lincoln safety push button, an improved starter which starts a shop motor directly across the line has been recently placed on the market by the Lincoln Electric Com-



Starting switch and push-button control

pany, Cleveland, Ohio. Installation of the starter is simple. Only four screws are required to hold it in place. Releasing two other screws permits the contactor panel to swing out, thus making lead contacts easily accessible. A cover of the drop-hinge type incloses the entire mechanism and permits installation of starters closely grouped, a 2-in. clearance between starter boxes being ample for easy accessibility. Long life is assured to contact points by the wiping action, which prevents pitting, and by the cadmium plated steel shields, which provide an instantaneous thermal and magnetic quench for arcs. Arc chimneys are of heavy pressed magnesite. The relay armature has a cushion action and is provided also with replaceable bronze bearings and actuated by a coiled spring.

The Lincoln safety push button provides an additional safety factor to the Lincoln across the line safety starter in that the red stop button encircles and protects the green starting button, so that it is impossible to close the starting circuit unintentionally. The push button can be mounted on the side of the starter box or arranged for remote control.



A.E.R.A. Program Announced

DETAILS of the program of the 48th Annual Convention of the American Electric Railway Association now are available. The convention will be held at Atlantic City in the new municipal auditorium.

The formal sessions of the American Association will open at 10 a.m. on Monday, Sept. 30, while the sessions of the Accountants' Claims, Engineering and Transportation and Traffic Associations will begin on

Tuesday afternoon. As in former years there will be a series of luncheon conferences at which specific topics will be discussed.

The exhibit will be open beginning Saturday, Sept. 28, and will be available to delegates until noon the following Friday. Monday afternoon and Wednesday morning have been set aside for inspection of exhibits, and no meetings will be held.

Following is the program as revised up to the time of going to press.

American Association

Monday, Sept. 30, 10 a.m.

Auditorium Ball Room, Second Floor

JAMES P. BARNES, Chairman

General Subject—*Today's Transit Task*

Welcome.

Address of the President—James P. Barnes, president Louisville Railway, Louisville, Ky.

Report—Managing Director Charles Gordon, American Electric Railway Association, New York, N. Y.

Revision of Constitution and By-Laws.

Routine.

"At the Public's Service," by W. L. Willkie, general counsel Northern Ohio Power & Light Company, Akron, Ohio.

"Better Cars and Buses," by M. B. Lambert, transportation sales manager Westinghouse Electric & Manufacturing Company, New York, N. Y.

"Men and Machinery," by W. E. Wood, president Virginia Electric & Power Company, Richmond, Va.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 1—"Fares," G. H. Clifford, sponsor.

No. 2—"Industrial Relations," Edward Dana, sponsor.

No. 3—"Interurbans," Charles H. Jones, sponsor.

No. 4—"New Cars," T. Fitzgerald, sponsor.

No. 5—"Public Relations," Lucius S. Storrs, sponsor.

Inspection of Exhibits

2:30 p.m.

This afternoon has been set aside by the officers of the association for the inspection of manufacturers' exhibits. The official business of the afternoon is the inspection of exhibits, and every delegate is urged to take advantage of the opportunity to visit the manufacturers' booths, where the most modern equipment and latest appliances are on display.

Tuesday, Oct. 1, 10 a.m.

Auditorium Ball Room, Second Floor

JAMES P. BARNES, Chairman

General Subject—*Traffic Regulations*

Report—Committee on Nominations—W. H. Sawyer, chairman, president Stevens & Wood, Inc., New York, N. Y.

Election of officers.

"Increasing Street Capacity," by Elmer T. Stevens, chairman transportation section Chicago Association of Commerce.

"Basic Regulation Principles," by Col. A. B. Barber, manager transportation and communication department Chamber of Commerce of the United States of America, Washington, D. C.

Address, by E. F. Wickwire, vice-president Ohio Brass Company, Mansfield, Ohio.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 6—"Motor Bus, Interurban and Long Distance Operation," B. W. Arnold, sponsor.

No. 7—"Traffic," D. L. Fennell, sponsor.

No. 8—"Education and Training," Jesse S. Hyatt, sponsor.

No. 9—"Small City's Problem," A. C. Spurr, sponsor.

No. 10—"Taxation," Harold L. Geisse, sponsor.

ADVISORY COUNCIL EVENING

Tuesday, Oct. 1, 8:30 p.m.

Auditorium Ball Room, Second Floor

J. N. SHANNAHAN, Chairman

Plans are under way for an interesting program under the auspices of the Advisory Council. Announcement will be made as soon as the details are completed.

Informal dancing—Music by Roger Wolfe Kahn's orchestra.

Wednesday, Oct. 2, 10 a.m.

Inspection of Exhibits

This morning has been set aside by the officers of the association for the inspection of manufacturers' exhibits. There will be no sessions of the American Association this morning. The Round Table Luncheon Conferences listed below and also the affiliated sessions will be held in the afternoon. The official business of the morning is the inspection of exhibits, and every delegate

is urged to take advantage of the opportunity to visit the manufacturers' booths, where the most modern equipment and latest appliances are on display.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 11—"Motor Bus, City Operation," D. E. Blair, sponsor.

No. 12—"Financing," R. P. Stevens, sponsor.

No. 13—"Merchandising," G. A. Richardson, sponsor.

No. 14—"The Manufacturer's Interest in Public Transportation," Cornell S. Hawley, sponsor.

No. 15—"Motor Bus Maintenance Methods," Adrian Hughes, Jr., sponsor.

Thursday, Oct. 3, 10 a.m.

Auditorium Ball Room, Second Floor

JAMES P. BARNES, Chairman

General Subject—Progress

Award—Electric Traction Speed Contest—T. Fitzgerald, chairman, vice-president Pittsburgh Railways, Pittsburgh, Pa.

Routine.

"Benefits of Unified Transportation Systems," by Thomas N. McCarter, president Public Service Co-ordinated Transport, Newark, N. J.

"Outlook for Interurbans," by Dr. Thomas Conway, Jr., president Cincinnati, Hamilton & Dayton Railway, Philadelphia, Pa. Installation of officers.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 16—"Publicity and Advertising," E. B. Atchley, sponsor.

No. 17—"Freight," Julian M. Bamberger, sponsor.

No. 18—"Safety," R. N. Graham, sponsor.

No. 19—"Management," D. W. Pontius, sponsor.

No. 20—"Motor Bus Design," C. W. Stocks, sponsor.

Accountants' Association

Tuesday, Oct. 1, 2:30 p.m.

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Report—Representative of the Accountants' Association at the Annual Convention of the National Association of Railroad and Utilities Commissioners—W. L. Davis, auditor Lehigh Valley Transit Company, Allentown, Pa.

Discussion.

Report—Committee on Standard Classification of Accounts—M. W. Glover, chairman, general auditor West Penn Railways, Pittsburgh, Pa.

Discussion.

Report—Sub-Committee on Bus Accounting—E. A. Tuson, chairman, general auditor Public Service Co-ordinated Transport, Newark, N. J.

Discussion.

"Depreciation," by Thomas Conway, Jr., president Cincinnati, Hamilton & Dayton Railway, Philadelphia, Pa.

Discussion.

Report—Committee on Nominations.

Election of Officers.

Wednesday, Oct. 2

RITZ-CARLTON HOTEL, 1 P.M.

Accountants' informal luncheon, followed by round table discussion of accounting problems.

Thursday, Oct. 3, 2:30 p.m.

"The Position and Responsibilities of the Auditor in a Railway Organization," by

G. J. Bunting, vice-president in charge of accounting Illinois Central Railroad, Chicago, Ill.

Discussion.

Report—Committee on Stores Accounting—R. A. Weston, chairman, special accountant the Connecticut Company, New Haven, Conn.

Discussion.

Report—Committee on Fare Collection—E. A. Tuson, chairman, general auditor Public Service Co-ordinated Transport, Newark, N. J.

Discussion.

Report—Committee on Resolutions.

Installation of Officers.

Presentation of Past President's Badge.

New Business.

Claims Association

Monday, Sept. 30, 1:30 p.m.

Informal Claims Luncheon

RITZ-CARLTON HOTEL

Tuesday, Oct. 1, 2:30 p.m.

Reading of Minutes of Previous Meeting.

Address of the President.

Report of the Executive Committee.

Report of the Secretary-Treasurer.

"Efforts of the Bench and Bar to Correct Ambulance Chasing Evils in New York City," by A. C. Mayo, trial attorney Third Avenue Railway System, New York, N. Y.

Formal discussion by:

Bert C. Wood, general claim agent Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio.

P. W. Klabunde, general claim agent the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

General Discussion.

"Traumatic Surgery," by a Representative of the American College of Surgeons, Chicago, Ill.

Discussion.

Report—Committee on Safety—Bert C. Wood, chairman, general claim agent Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio.

Discussion.

Wednesday, Oct. 2, 2:30 p.m.

"The Effect of the Massachusetts Compulsory Liability Insurance Acts Upon the Number of Accidents, the Number of Suits and the Size of the Verdicts," by P. G. Carleton, general counsel Eastern Massachusetts Street Railway, Boston, Mass.

Discussion.

"The Extent to Which Compulsory Insurance Has Been Adopted in Connecticut and Its Effect Upon the Number of Accidents, Suits and Verdicts," by Seth W. Baldwin, attorney the Connecticut Company, New Haven, Conn.

Discussion.

Thursday, Oct. 3, 2:30 p.m.

"What a Claim Agent Can Do for His Company and His Community Through a Public Safety Campaign," by C. E. Redfern, claim agent United Electric Railways, Providence, R. I.

Discussion.

"The Importance to Companies of Claims Men Attending Annual Conventions of the American Electric Railway Claims Association," by Wallace Muir, general attorney Kentucky Traction & Terminal Company, Lexington, Ky.

Discussion.

Report—Committee on Nominations—Wallace Muir, chairman, general attorney Kentucky Traction & Terminal Company, Lexington, Ky.

Election of Officers.

Installation of Officers.

Presentation of Past President's Badge.

Engineering Association

General Meeting, Tuesday, Oct. 1, 10 a.m.

FRANK H. MILLER, Chairman

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Electric Railway Journal Maintenance Contest Award.

Paper by H. H. Adams, superintendent shops and equipment Chicago Surface Lines, Chicago, Ill.

Discussion.

Discussion and moving pictures—Use of Cylindrical Wheel Treads in Place of Conical Wheel Treads.

General Meeting

Thursday, Oct. 3, 2:30 p.m.

FRANK H. MILLER, Chairman

Report—Committee on Revision of Rules—W. W. Wysor, chairman, chief engineer United Railways & Electric Company of Baltimore, Baltimore, Md.

Report—Committee on Co-operation with U. S. Department of Commerce—E. P. Goucher, chairman, engineer of way and structures Capital Traction Company, Washington, D. C.

Paper by Edwin W. Ely, chief Simplified Practice Division, Bureau of Standards, Department of Commerce.

Discussion.

Paper by A. E. Harvey, superintendent of construction Kansas City Public Service Company, Kansas City, Mo.

Discussion.

Report—Committee on Nominations—R. H. Dalgleish, chairman, chief engineer Capital Traction Company, Washington, D. C.

Election of Officers.

Installation of Officers.

Presentation of Past President's Badge.

New Business.

POWER DIVISION

Tuesday, Oct. 1, 2:30 p.m.

Committee Room 3, Second Floor

W. E. BRYAN, Chairman

Report—Standing Committee on Power—W. E. Bryan, chairman, superintendent of power St. Louis Public Service Company, St. Louis, Mo.

Reports of Committees:

No. 1—Manual Review—J. Walter Allen, chairman.

The Convention Reported!

ELECTRIC RAILWAY JOURNAL'S October number will be devoted to a report of the Atlantic City Convention. Published immediately following the close of the sessions, it will contain a complete account of the proceedings.

News of the Industry

Sliding Scale Fare Expected in St. Louis

The Public Service Commission is expected to issue a formal order permitting the St. Louis Public Service Company, St. Louis, Mo., to put into effect the new sliding scale fare plan suggested by City Counselor Muench at a public hearing held by the commission on Aug. 20.

Under the Muench plan the company will sell 12-ride books for 90 cents good for use in any one week. If a bookholder rides more than twelve times in the week he is to pay 5 cents for each additional ride. The single fare for adults will be 10 cents. The fare for children between the age of five and twelve years remains 3 cents. The universal transfer system now in effect on all of the cars and bus lines in St. Louis will be continued.

At the outset of the hearing Mr. Muench submitted a formal statement explaining the city administration's views. He said in part:

"Some means must be found to retain the railway. The problem of service at a reasonable cost that at the same time gives the operators a fair return on the value of their property, is one which has confronted every community in this country during the past ten or fifteen years. It still confronts most of them.

"To some extent increased expenditures and loss of patrons have had to be compensated for through an increase in rates; however, means should be found to retain a large number of the car riders, and to bring back those who are patronizing competitive means of conveyance, by innovations or improvements in the service and by fare concessions."

COMPANY PREPARED TO TRY PLAN

The statement then reviewed how competition had eaten into the patronage of the company with nothing done in the way of a fare concession except the 25-cent Sunday pass.

It pointed out that shortly after the company applied for a flat 10-cent fare and four rides for 35 cents, and the commission suspended this schedule for 120 days from Aug. 1, the matter of making a concession in rates to the regular consumer came up for consideration. At the request of the commission several conferences were held and finally the company proposed a flat 10-cent fare for casual riders and 16-ride book for \$1 and extra rides in any one week at 5 cents. He said:

"The reaction to this proposal on the part of the public and the press was that the regular car riders would be obliged to buy more rides than they would normally use in a week in order to obtain a reduction in the fare."

His proposal of 12 rides for 90 cents was made to meet this objection.

Stanley Clarke, president, said that the company is willing to try the Muench plan "although we are convinced that we have not more than a fifty-fifty chance that it will prove successful."

Pending the promulgation of the new schedule, the company has restricted the sale

of tokens on its cars and buses. The company desires to have a minimum number of tokens in the hands of the public when the 10-cent fare for casual riders goes into effect.

Interstate Line Expands Its Freight Facilities

A permit for the erection of a new freight house at 443 South First Street, Louisville, Ky., to cost \$30,000 has been issued by the city building inspector's office to

the Louisville & Southern Indiana Traction Company, subsidiary of the Interstate Public Service Corporation. The building is to be part of the company's new freight terminal at that point.

The company operates the interurban service between Louisville and Indianapolis. For several months it has been cut off from direct connection over its own rails into Louisville due to reconstruction work by the Big Four Railroad on its bridge, over which the interurban operated. Meanwhile passengers have been brought across from Southern Indiana by bus.

"Deadlock Committee" in Chicago

Every effort being made to reach settlement so new grant can go before voters in fall

THE appointment of a "deadlock committee" has offered what promises to be a satisfactory solution of an acute situation in Chicago's long drawn out struggle for a new railway ordinance. This committee was appointed on Aug. 16 by Col. A. A. Sprague, acting chairman of the citizens' committee, whose help was solicited when the Council sub-committee reached a deadlock in its efforts to write an ordinance in which the rate of return is the principal bone of contention between the city and the transit companies.

As matters stood early in the week commencing Aug. 19, unless an agreement was reached during the week it will be impracticable to submit the franchises to a referendum at the judicial election in November. In that case a referendum will have to go

over until the next Mayoralty election, unless a special election be held not later than Feb. 1.

Prof. Charles M. Thompson, dean of the college of commerce at the University of Chicago, is chairman of the new committee. Other members are David A. Crawford, president of the Pullman company; John A. Carroll, head of several south side banks; Victor A. Olander, prominent labor leader, and John Stuart, president of the Quaker Oats Company. The last named takes the place of George A. Ranney, vice-president of the International Harvester Company, who was originally named, but was unable to accept. Both Dean Thompson and Mr. Carroll are members of the citizens' traction settlement committee.

Negotiations came to a deadlock on Aug. 13. Colonel Sprague pointed out the chief reasons for the lack of progress as: the construction of subways, the rate of return to the company, and its financial structure. Since the engineers have as yet made no report, no difference of opinion is involved over the subway matter. The other two points he defined as "purely financial problems" to be weighed and tested by men versed in financial matters. As the result of Colonel Sprague's suggestions, the committee was appointed and held a preliminary session on Aug. 19.

On Aug. 20, the new committee, together with the present transit sub-committee of the City Council, opened public hearings. After collecting expert data and information on financial structure, rates of return and the ratio between stocks and bonds, the committee will express its views, acting in an advisory capacity to the City Council, which is charged with the duty of writing the ordinance, subject to review by the voters.

As stated before, the real bone of contention is the rate of return. The companies' attitude, set forth in a written statement at the beginning of negotiations, asks a "just and reasonable return" on all money invested in the property, that return to be determined by the local transit commission which would be appointed by the Mayor, with the approval of the City Council. The city, represented by Walter Fisher, stands for an agreed rate of return on the present investment, which is

COMING MEETINGS

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

Aug. 30—Maryland Utilities Association, Pilmhimmon Hotel, Ocean City, Md.

Sept. 10-11—Central Electric Railway Master Mechanics' Association, Fort Shelby Hotel, Detroit, Mich.

Sept. 28 - Oct. 4—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium.

Sept. 30-Oct. 4—National Safety Congress, Chicago, Ill.

Oct. 23-24—Public Utilities Association of West Virginia, Wheeling, W. Va.

Nov. 6-7—Association of Electric Railway Equipment Men, Middle Atlantic States, Richmond, Va.

Nov. 7-8—Iowa Electric Railway Association, Operators Section, annual convention, President Hotel, Waterloo, Iowa.

Nov. 21-22—Public Utilities Association of Virginia, annual meeting, Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va.

Jan. 23-24, 1930—Central Electric Railway Association, Statler Hotel, Cleveland, Ohio.

Jan. 27-29—Electric Railway Association of Equipment Men, Southern Properties, Birmingham, Ala.

about \$260,000,000. On new money put into transportation, the Fisher plan provides that only its actual cost be paid, plus a reward for economy and efficiency in service. Alderman E. L. Frankhauser, chairman of the Council sub-committee, supports this view.

When Mr. Fisher asked information concerning the financial structure of the new corporation, the lawyers for the companies replied that details had not yet been worked out. Mr. Fisher desires that the new financing be by issuance of bonds. Company attorneys say that the Fisher plan is a new and untried scheme, that no utility company in the country is now operating under such a system, and that under the Fisher plan it will be difficult, if not impossible, to finance the many extensions needed. For the first ten years it has been estimated that \$135,000,000 will be spent for extensions, and another \$100,000,000 for the following ten years.

For three weeks the city and company representatives have debated only "basic principles" and "fundamentals."

One-Man Car Proposal Rejected by Des Moines Men

The union, by an almost unanimous vote at a special meeting, has rejected a proposal made by Walter J. Cummings, president of the Des Moines Railway, Des Moines, Ia., which would have given the city one-man operation and would have provided a maximum hourly increase of 8 cents for the trainmen.

The present maximum wage for trainmen is 59 cents an hour. The proposed agreement was for a flat increase of 5 cents an hour, with 1 cent additional each year for three years.

The position of the union is that the 25-year agreement signed with the Des Moines City Railway in 1915 is binding upon the new owners of the property in spite of the fact that under the terms of the receivership sale, held on June 22, the Federal District Court approved the transfer of the property to Mr. Cummings and associates without the famous two-man car contract.

Apparently the one-man car clause in Mr. Cummings' proposal was the only objectionable feature, as the men expressed themselves in favor of the pension and life insurance provisions, as well as the check-off and several other clauses relating to working conditions.

The company agreed to set aside \$18,000 annually for retirement and disability pensions. Any member of the union who had served twenty years or more and had reached the age of 65 years was to be eligible for a monthly pension of \$58. The same payment was to be made in a case of total disability in the company's service. The proposed agreement provided that in case of death of any member of the union his beneficiary was to receive \$1,000 life insurance, to be provided by the company.

The negotiations between union leaders and railway officials have been carried on with good will on both sides. J. Ben Wiley, veteran secretary of the union, in addressing the 600 members of the union, complimented Mr. Cummings and General Manager Gifford on their "square dealings" and credited them with "laying their cards on the table."

Conferences have continued since the rejection of Mr. Cummings' proposal, but were declared off for the time being on Aug. 21.

Eighth Week of New Orleans Strike

Company Maintains Its Position and Increases Service on All Lines. Council Battles Jitneys

NO PROGRESS has been made toward a solution of the deadlock at New Orleans. The most recent offer of the union to accept John A. Ryan, Washington; Rabbi Stephen Wise, New York; or Secretary of Labor Davis, as an arbitrator was refused by the New Orleans Public Service, Inc., which declared that the company itself must be the only judge of whether its property shall be operated on an open or closed shop basis.

Failure of this offer to receive more favorable consideration has dampened much of the still current hope that an amicable settlement of the strike could be reached. As a result, persons in touch with the situation were of the opinion that the final outcome will depend largely on the result of the present jitney fight. If the city is sustained in its warfare against the jitneys, it will mean the elimination of this mode of transportation in the face of the costly indemnity bonds. If this happens, it was pointed out that the lot of the striking carmen, many of whom have already been replaced by permanent employees, will be altogether hopeless.

With the strike entering its eighth week, interest is centered in the outcome of a court battle instituted by jitney drivers in an effort to prevent police from interfering with the operation of the 10-cent automobiles. The jitney war came as an aftermath to last week's riotous scenes at the city hall when a mob of 1,000 striking carmen and union sympathizers attacked acting Mayor Walmsley and members of the Commission Council in the Council Chamber. A police captain shot and slightly wounded three men before the mob was controlled and the hall cleared of fighting men. Next day the Council ordered the law enforced to compel jitney drivers to obtain \$5,000 indemnity bonds, and otherwise to conform to the city and state traffic regulations.

Police arrested hundreds of jitney drivers, the majority of whom later obtained their release in the Recorder's Court when the city was unable to offer conclusive proof that the jitney drivers were charging or accepting fares from passengers.

The police activity, however, resulted in the elimination of a considerable number of the jitneys and in a corresponding increase in the number of street car riders.

In their perplexity the jitney drivers filed suit in the civil court for an injunction to restrain the police from interfering with the operation of the jitneys. The city lost the first round in this battle when the court overruled a motion to dismiss the suit and ordered it tried on its merits. The case was being heard by the court on Aug. 22, but a decision will probably not be reached before the end of the week.

While attorneys for the city and the jitney drivers are exchanging verbal blows, the merry game of hide-and-seek between police and the jitney drivers continues, with the traveling public still making limited use of the jitneys and of private conveyances in going to and from their work. Many cars continue to operate empty in off peak hours, but during the peak most of them carry capacity loads.

Fast Work at Mount Tom

The temporary waiting room, restaurant and observatory on the summit of Mount Tom, recently erected by the Holyoke Street Railway following the loss of the large Summit House by fire, is 40 x 60 ft. in dimensions and the height, from the first floor to the 8,000,000-cp. beacon light on the tower, is 65 ft. The first floor contains the restaurant and the second floor is used as an observatory. From the tower a searchlight is thrown on the Barnes Airport, between Holyoke and Westfield. In the event of the erection of a larger building, the present structure will be turned into a pavilion on Little Mount Mountain or some other part of the Mount Tom property.

Erection of the new building is re-

Telling Bostonians What Goes On in Their Own City



The front page of the fifth edition, just out, of the Boston Elevated Railway guide book is a cartoon-style presentation of Boston with some of the principal features and their approximate location. This design, printed in several colors, was drawn by William Duncan of the Massachusetts Art School, the students of which were invited to enter a competition for designs for the cover.



Fast work was done on temporary structure on Mount Tom

garded as notable for speed, considering the conditions encountered. All the material was transported up the mountain in the two cars ordinarily used for passengers. Steel was fabricated in dimensions to permit of this handling and special fastenings were used to bind the metal to the cars. The steel was delivered by the Palmer Steel Company, Springfield, at the carhouse in Holyoke and conveyed by the railway to the site, where it was erected by the Casper Ranger Construction Company, Holyoke. The outer walls are faced with corrugated sheet metal, covered with asbestos. George E. Pellissier, chief engineer of the railway, designed the structure.

The fire occurred on May 2, the vote to erect the new building on May 11, plans were in preparation May 13, construction started on May 16 and work was completed on June 1. The building was officially opened on July 1. It was necessary to build a new water tank and connections.

There are 28 spotlights on the building and long parallel strings of light from the building to the upper station, 500 ft. distant, to light up the premises as viewed from a distance.

The dining room contained in the old building is much missed as a place for large meetings, but the receipts at the new building for July were about the same as at the old house in July, 1928.

Many Topics Discussed

Competition afforded by gasoline driven vehicles hour, holds place of interest at meeting of Wisconsin Utilities Association

AUTOMOBILE competition was discussed in practically all the papers and reports presented at the seventh annual convention of the Transportation Section, Wisconsin Utilities Association, held Aug. 15 and 16 at Green Bay. In his opening address Chairman Henry Cordell, Chicago, North Shore & Milwaukee Railroad, urged that street traffic be regulated with more sympathetic regard for public transportation patrons, rather than to conform to the wishes of the individual motorist. Cars must be made more inviting architecturally and must be more harmoniously furnished, said A. F. Tegen of the Milwaukee Electric Railway & Light Company, in developing the argument that the industry problem today is to furnish rail equipment that will surpass the comfort and convenience of the automobile.

Ways and means of attacking the parking problem were described by J. B. O'Connell, Chicago Surface Lines. For their own interest and for the good of the community, railway properties should take the initiative in analyzing the use of the streets. Parking restrictions should be tightened gradually, Mr. O'Connell said,

meanwhile showing business men that the process is an asset, rather than a liability to them.

The very success and popularity of the automobile is proving its undoing, according to C. Edward Thorneycy, Chicago, North Shore & Milwaukee Railroad, who outlined the advertising campaign being conducted by the North Shore and associated companies. Newspapers, car cards and billboards are directing the attention of the public to the number of automobiles on the roads and their badly congested condition, and the convenience of high-speed electrified transportation. Free parking at terminals is intended to encourage the use of automobiles between stations and points not served by electric railway lines. In every conceivable manner of publicity, the campaign is hammering home the slogan "The Steel Highways Are Always Open," together with "Go the Carefree Way."

The second day's session was opened with an address by President G. W. Van Derzee of the Wisconsin Utilities Association. After referring to the unwarranted abuse and unscrupulous attack directed against the utility industry as a whole

during the past year, Mr. Van Derzee emphasized the importance of employee education. The human element, he said, is the most important in the long run. "If contacts between the men and women who are responsible for the service and those who use it are not up to or better than the standards of public contact which one expects to receive in successful merchandising organizations of today, our job of service is not well done."

MANY POINTERS ON CAR CLEANING

Considerable discussion followed the presentation of a report on car cleaning, by John H. Kuony of the Milwaukee Electric Railway & Light Company. The report was concluded with a set of instructions for performing the various cleaning operations. It costs on the average \$100 a year to keep each car clean. The problem is of doing the best possible job at the least expense. A cleaning agent other than water must be used at frequent intervals, the report held. A carefully planned method must be followed on a regular time or mileage schedule. Mr. Kuony told of a promising scheme being tried out in Milwaukee. This consists of the application of wax to newly finished jobs or on any cars with a good finish. More time is required at first than for normal cleaning, but afterward the car can be cleaned merely by wiping off the waxed surfaces with a dry cloth. Waxing every six months is sufficient, he said, to maintain the necessary protective film.

A rotary brush type of washer, used with gratifying success by the North Shore system, was described by Kenneth M. Wilkins of that company. The cars are driven through, under their own power, in three minutes, when both sides are cleaned with a solution and rinsed with water at 300 lb. pressure. An additional five minutes is required for hand washing of the two vestibules. With one man at the hose and one motorman, the machine handles fifty units a day, Mr. Wilkins said, at a total cost of 47.5 cents each. The quality of the cleaning is uniform, whereas with the manual method it falls off at the end of the day when the cleaners become fatigued. The cost is 63 cents a car for hand work where long-handled brushes are used.

An outstanding feature of the convention was the report of the committee on standard maintenance practice. This took the form of a maintenance guide, submitted as an 84-page printed pamphlet containing complete and yet simple instructions for the foremen and employees actually doing the work. The guide can be secured by properties outside the association at a price of \$1 a copy, to cover the cost of printing. This guide was merely a start, to be adapted to local conditions, and was not intended to destroy initiative. It was compiled primarily by the supply members of the committee, but their suggestions were reviewed and approved by the operating members.

A paper on safety—the essential in transportation—was presented by A. A. Oldfield. This urged adequate recognition of the safety expert. He should be permitted to function without undue interference and should have the whole-hearted co-operation of other departments. A. L. Thomas described the conference work being done by the Chicago, North Shore & Milwaukee Railroad to improve relations between the platform men and the passengers. This was carried on by the conference method. In 2½ years complaints from the public had been cut down from an average of ten to two a week.

Two-Cent Fare Advance in Miami

The City Commission of Miami, Fla., on July 29 signed a one-year agreement with the Miami Beach Railway for the collection and payment to the city of the additional 2-cent fare which went into effect on Aug. 1. The new agreement includes a clause protecting the railway from operating deficits should the number of passengers riding the cars decrease.

The commission also has agreed that the railway shall receive a fee of not more than 5 per cent for collecting the additional 2 cents, and that the company shall make an accounting to the city on the tenth of each month and pay the money by the fifteenth of each month for the collections made during the preceding month. Fares collected in corresponding months of 1927 and 1928 will be used as the basis for computing the payment to be made to the company by the city in the event of operating deficits.

Another provision of the agreement states that the company shall collect a 5-cent fare from pupils attending school "up to the age of eighteen years between the hours of 7 a.m. and 5 p.m. on school days." Provision is further made that school pupils must purchase school tickets from the company in order to obtain the 5-cent fare.

Receipts of the 2-cent increase will be placed in a municipal sinking fund for retiring a \$1,018,000 bond issue, the money of which was used for the purchase of railway equipment.

Some time ago, Commissioner Reeder made it plain that the interest charges and the sinking fund payment, called for under the terms of a bond issue made by the city to provide funds under which the railway was extended at the city's behest and with city funds, had become a dead weight on the tax payers. Apparently the hope is to ease this burden on the city through an advance in fare.

New Working Agreement Arranged in Providence

Members of the Amalgamated Association at Providence, R. I., have voted to accept the new contract between the union and the United Electric Railways which has been the subject of negotiations between officials of both organizations since June 1.

The executive board of the union recommended five demands, regarded as of minor importance, relating to working conditions on cars and buses and two questions pertaining to power house employees. The members concurred in the opinion that these seven points be laid before the railway officials by the union's agreement committee. The five demands pertain to the work of spare men on cars and buses, and the points relating to the power house employees stipulate that the last man hired be the first man laid off, and that the company use no discrimination against union men in the matter of vacations and the six-day week.

The principal changes in the agreement include an increase in wages for all employees ranging from 1 cent an hour for motormen, conductors and bus drivers to 7½ cents in the bridge building department, a readjustment and shortening of hours, a guarantee of seven hours' work in not more than two shifts daily for spare motormen and conductors, and the elimination of the requirement that men transferred from

cars to buses shall have had a driver's license for at least two years.

The contract is for two years and is retroactive to June 1. Under its terms employees will receive back pay ranging from \$5.60 to about \$21, with a few of the men drawing sums in excess of the latter figure.

The contract adopted in 1927 expired at midnight on May 31 of this year. Since that time the men have continued to work under the terms of the old contract with the expectation that any changes in wage scales embodied in the new agreement, would be retroactive.

Change in Gary Fares Sought

The Gary Railways, Gary, Ind., has asked authority to readjust its fare structure in the city. It would establish a cash fare of 10 cents, a rate of twelve tokens for \$1, and a weekly "nickel" ticket for regular patrons to be sold for 40 cents and entitling the holder to ride as often as desired during the week for a 5-cent cash fare. The company would issue free transfers to connecting car and bus routes. School children's tickets would remain at six for 25 cents.

The proposed schedule of fares calls for the elimination of the three fare zones in Gary, Hammond and East Chicago, thus doing away with the present double fares in these cities. Such a step would reduce the fare between Gary and Hammond, for instance, from 24 cents, or three 8-cent fares, to 20 cents, or two 10-cent cash fares, and would permit Gary passengers to ride anywhere within the city limits for a single fare.

Under the rate structure now in effect, riders in Gary pay a cash fare of 8 cents. Tokens are sold at fourteen for \$1 and a charge of 2 cents is made for transfers between cars and buses. No change in present cash or commutation rates on the Hobart, Crown Point and Valparaiso divisions is proposed by the company.

According to the petition, net earnings show a return of only 4 per cent on the present value of the company's properties. Present net earnings, it is declared, are insufficient to attract the additional capital needed for improvements and extensions demanded by the riding public.

"Stolen from the T.C.C."

Officials of the Toronto Transportation Commission, operating the municipal railway and bus lines in Toronto, Ont., have had "Stolen from the T.C.C." frosted on the glass of every electric light bulb used in the 38,000 or more sockets from which electric energy is drawn in an ordinary day's operation of the system. "Stolen from the T.C.C." has also been burned deep in the wooden legs of the camp stools used during periods of emergent traffic conditions on the Grey Coach Lines, Ltd. According to Eustice Smith, secretary, the commission was losing quite a few bulbs. They were even being removed from the street cars. Since the personal little statement has been affixed on every electric light bulb the losses have become practically negligible. Mr. Smith is reported to have said:

"We figured that if the average person has to sit at home night after night on a stool marked 'Stolen from the T.C.C.' and see 'Stolen from the T.C.C.' on his electric light bulbs he is going to feel rather guilty sooner or later. At night the lettering looms up like a barn in a fog when one of the bulbs is turned on."

Labor Federation on New Orleans Strike

The executive council of the American Federation of Labor, in a public statement issued on Aug. 20 at Atlantic City, N. J., at the closing session of its quarterly meeting, declared the federation "will co-operate in every possible way" with the Amalgamated Association in carrying the New Orleans strike to a successful conclusion. The executive council directed the officers of the federation to investigate the policies of public service corporations in general, to determine their attitude toward labor, and, in consequence, the attitude of the federation toward them. A statement issued by William Green, president of the federation, said in part:

"The executive council is deeply interested in the strike situation in New Orleans. It expresses the hope that the strikers will continue the strike until a satisfactory settlement is reached. It calls upon all the people of New Orleans to assist the striking street car men in every reasonable and honorable way. The executive council will co-operate with the Amalgamated Association in every possible way in carrying on the strike to a successful termination."

"In view of the attitude of the utility at New Orleans toward labor the executive council directs the officers of the American Federation of Labor to conduct an investigation of the policies of public service corporations, including holding companies, in order to determine their general attitude toward labor and the settlement of labor disputes. The future attitude of the American Federation of Labor toward public service corporations and holding companies will be determined in the light of such facts as said investigation may disclose."

Union Charges St. Louis Award Terms Are Not Met

Members of the Amalgamated Association employed by the St. Louis Public Service Company, St. Louis, Mo., in a letter to Mayor Miller on Aug. 15 charged that the company has failed to live up to certain provisions of an arbitration award made by the Missouri Public Service Commission on May 20 last. The union says the company failed to grant a 4-cent an hour increase provided for shop men. It also charges that the company failed to comply with the state commission's stipulation that the tripper runs should not exceed 10 per cent of the regular runs.

Road Builders to Study Traffic

M. O. Eldridge, assistant traffic director, Washington, D. C., as chairman of the committee on traffic of the American Road Builders' Association, has named sub-committees to study every phase of the traffic problem. The findings will be presented at the association convention and road show in Atlantic City next January. The collection of accident statistics and analysis of accidents will be in charge of a group headed by Burton W. Marsh, Pittsburgh, Pa., which will also study traffic flow maps and spot maps, the necessity for uniformity in state and city vehicle laws and the question of why and where parking should be restricted or eliminated entirely. All questions dealing with regional planning will be in charge of the group headed by Dr. J. Gordon McKay, Cleveland, Ohio.

Franchise Discussion Reviewed at Columbus

At the invitation of Benjamin W. Marr, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, Harry Allensworth, accountant and consulting engineer, has been inspecting the books of the company on behalf of the Council. Mr. Allensworth, his task completed, is now assembling the figures so they can be digested by members of the Council. After the Council has a clear picture of the status of the company's finances and volume of business, company officials will confer with the City Council to work out a franchise acceptable to both.

As matters stand at present it appears likely the railway franchise proposition will again come before the Council for discussion during September. The company has been operating without a franchise for several years, due to a lack of agreement between the Council and the company as to the fare.

When an ordinance is finally passed by the Council it must be placed before the voters for approval.

Briefs Filed in New York "L" Fare Case

In a brief filed on Aug. 16 with the New York Transit Commission the Interborough Rapid Transit Company renewed its plea for an immediate temporary fare "in excess of 5 cents" on its elevated lines, pending final decision on its application of June 19 for a 10-cent fare on that system. The brief declared that the commission has jurisdiction and power to alter the elevated fare regardless of the decision of the United States Supreme Court against a 7-cent rate on the combined subway and elevated network.

Dismissal of the application was urged in a joint brief filed by Samuel Untermyer, special counsel for the commission, and Corporation Counsel Hilly. It declared that the commission was without jurisdiction because the fare was contractual by virtue of the elevated extension certificates of 1913, which were executed at the same time as the subway fare contract.

Binghamton's Color Contest Successful

The Triple Cities Traction Company, Binghamton, N. Y., successor to the Binghamton Railway, has been conducting a contest for a monogram for the new company. A prize of \$10 was offered to the winner. The contest closed Aug. 1, but the winner has not yet been selected. One hundred and sixty-five persons submitted 294 designs. Most of them came from the Triple Cities, Binghamton, Johnson City and Endicott—but New York City and Buffalo were on the list.

The company also asked for suggestions for color for cars and buses with the following result:

Sixty-six persons made 78 suggestions, 24 of which favored the company's present color, red. Among the comments contained in the replies were the following:

"You cannot find a better color."

"Have never seen better."

"It seems to me the present color is as good as any."

"I think the present color is much

more attractive than dingy green and yellow seen in other cities."

"The present color scheme of your cars and buses is in every way most desirable."

The present color, therefore, will be used for the body of the car, but the color of the upper part may be changed.

Other suggestions were: Dark green, 8; light green, 11; orange, 9; yellow, 7; blue, 11, still others suggested chocolate brown and cream, olive green with cream trim, royal purple with white trim, canary yellow with dark trim, apple green with lemon yellow trim, dust gray with burnt orange trim.

Special School Fare Arranged in Duluth

A 5-cent fare for school children has been agreed upon by the Duluth Street Railway, Duluth, Minn., and city officials. The regular rate in Duluth is 10 cents cash and six tokens for 45 cents. Starting Sept. 3 school children will be able to buy ten tokens for 50 cents good between the hours of 7:30 a.m. and 5 p.m. The new plan is an outgrowth of a recent increase in fare for Duluth. The city appealed, and a citizens' committee was appointed to study the question. The result was the suggestion that the appeal be abandoned if the company would agree to a special rate for children.

The Radial Railway Issue at Toronto

Reeve Fred Lundy, a member of the county traffic committee, authorized by the York County Council to inquire into the proposed action of the Toronto Transportation Commission of discontinuing the Metropolitan Radial service on Sept. 30, says that, according to the evidence already at hand, the county would be able to present a strong case to the Toronto City Council when the committee appears before that body next September and registers opposition to the proposal of the Toronto Transportation Commission to substitute service by bus for that now furnished by the radial railway. The county is said to feel that the deficits said to exist in the operation of the radial line have been overestimated, and to be convinced that a definite contract "forbids the closing of the service without the consent of the county." Colonel Lennox, counsel for the county, has intimated that the county will seek an injunction to prevent the stopping of the service on Sept. 30, if a satisfactory agreement had not been reached by that time.

Late News Briefs

Philadelphia, Pa.—The Public Service Commission has agreed that the hearing on the Universal Cab Company's application for a certificate of convenience should be adjourned until the Philadelphia Rapid Transit Company has had an opportunity to prepare its case in opposition.

Detroit, Mich.—Del A. Smith, general manager of the Municipal Street Railway, and Police Inspector Edward A. Mitte, director of traffic, have informed the Council that removal of the Soldier's and Sailor's Monument would expedite traffic on Cadillac Square.

Los Angeles, Cal.—The Board of Public Utilities and Transportation has approved the application of the Los Angeles Railway for a 21-year franchise to double track Grand Avenue for its electric line, from Jefferson Street to Santa Barbara Avenue, a distance of about 1 mile, instead of operating over its private right-of-way east of Grand Avenue, as at present.

St. Louis, Mo.—Sam W. Greenland, vice-president and general manager of the St. Louis Public Service Company, has sailed from New York for Europe to join Mrs. Greenland, who is ill in The Hague. Mrs. Greenland was touring Europe with the Advertising Club delegation to the international convention of that organization held in Berlin recently.

Baltimore, Md.—To provide faster and more convenient car service from the Guilford and Homeland sections of Baltimore to the downtown area, the United Railways & Electric Company has consolidated the Gilmor Street and Guilford Avenue line, known as No. 1, and the Guilford line, known as No. 11. On the new route the No. 11 cars use the Guilford Avenue elevated road, which saves considerable time. Moreover, residents of the Guilford section now reach the downtown shopping district without transferring. The company has cut the headway of the line from fifteen to ten minutes.

New York, N. Y.—Samuel Untermyer, special counsel for the city, has refused the proposal of Justice Frankenthaler to send the Interborough Rapid Transit fare case before a referee. Mr. Untermyer stresses his intention to restrict the case to the simple issue of the Transit Commission's power to alter the contract rate fixing the fare at 5 cents.

Louisville, Ky.—The Public Utilities Bureau has announced that it has suggested to the Louisville Railway that several stops be eliminated on various lines, since these stops are close to other stops and comparatively few passengers ever enter or leave cars at the locations. The Louisville Railway is studying the situation with a view to increasing speed on all its lines. Dropping of stops where they are not absolutely necessary is a help in faster schedules.

Boston, Mass.—Rapid transit service to Milton will be started at the Ashmont end of the Cambridge-Dorchester tunnel on Aug. 26. The opening had to be postponed from Aug. 17 because of the inability of the Boston Elevated Railway to complete track construction on the high-speed line between Ashmont and Milton. The transit department is pushing the work to provide rapid transit all the way from Harvard Square to Mattapan Square, using trains of the Boston "L" from Harvard to Ashmont stations, and high-speed trolleys from Ashmont to Mattapan.

Montreal, Que.—A recent meeting of the local executive committee and the Tramways Commission has revived talk about possible subway construction. The general impression prevails that neither the company nor the city is ready to subscribe to a project involving the expenditure of \$100,000,000. It is learned that, because of the heavy cost, the city might be called upon to help finance the project and possibly to grant exclusive concessions to the Montreal Tramways for the building of the underground system.

Recent Bus Developments

350 Miles of Route in Puget Sound System

The transportation department, consisting of North Coast Transportation of the Puget Sound Power & Light Company, Seattle, Wash., Pacific Northwest Traction Company and Portland-Seattle Stage Company, is now settled in its new headquarters on the second floor of Central Terminal.

This new organization consists of all major transportation units belonging to the Puget Sound Company. It includes the two interurban lines between Seattle and Everett and between Bellingham and Mount Vernon; operates over 350 miles of main line stage routes reaching from Vancouver, B. C., on the north to Portland, Ore., on the south, and 42 miles through the White River Valley to Auburn and on into the hills at Enumclaw. Eighty stages are operated, and a check of the payrolls on April 15 shows 384 employees.

It is estimated that the combined gross revenue from the interurbans and stages for the year 1929 will be \$2,225,000.

At the start of the summer season eight new stages were placed in service on the Seattle-Vancouver, Portland-Seattle routes, to help materially in the handling of vacation business and give equipment sufficient to permit many of the stages now in operation to be placed in the paint shop. All of the stages will be known as the North Coast Lines.

Work on the new depot at Tacoma, which will be known as Central Terminal, was completed so that the structure could be opened for business by June 1. The opening of this depot permitted stages to be loaded under cover instead of on the streets as at the present time. It also helped the company in handling the Tacoma business, as practically all passengers come to the terminal to board the stage instead of being picked up along the streets, the method employed at present.

New Buses for Gadsden

Delivery has been made to the Alabama Power Company of four new buses recently purchased for use in Gadsden to meet the additional demand for transportation facilities resulting from the industrial activities at the Goodyear Plant and for the replacement of the old bus now in use on Ewing Avenue Line. The chassis are equipped with 29-passenger street car type bodies. A feature of the buses is the Tropic-Aire heating system, which utilizes the heat from the cooling water of the engine. A radiator is installed in the front of the bus and is so connected to the cooling water circulating system that the water from the engine jacket can be bypassed through this radiator before it passes to the radiator in front of the engine. The heat is then circulated through the bus by means of a fan placed behind the radiator. This system gives a clean, odorless and uniform heat. The color scheme is a yellow body trimmed in orange. The fenders and head are blue and the top gray-green. The inside of the body has a cream colored ceiling, cherry panels and a brown linoleum floor. A garage and shop is now under construction for the maintenance and

storage of the new buses. A 15,000 gallon gasoline tank and pump are also being installed at the garage to carry a supply of gasoline for the buses and for other automotive equipment in use in Gadsden.

De Luxe Bus Service in Baltimore

The United Railways & Electric Company, Baltimore, Md., has been authorized by the Maryland Public Service Commission to establish de luxe bus service between the fashionable Roland Park section of the city and the downtown district. The route will be 6½ miles each way and the fare will be 25 cents one way. Seven de luxe White buses will be used on the line. They will be the last word in comfort. Each will seat nineteen passengers. Company officials hope to have the line in operation by Oct. 1. The Public Service Commission made a slight change in the downtown section of the proposed route, but this met with the approval of the company. A ten-minute headway will be maintained during the peak hours and a twenty-minute headway during the rest of the day. The finish will be Alexandria blue with trimmings of desert sand.

Big Chartered Bus Business

During the last two months the number of buses of the Public Service Co-ordinated Transport, Newark, N. J., chartered by organizations and groups of friends for summer outings has shown a large increase over any similar period since the chartered service was organized. On July 18, the Prudential Life Insurance Athletic Association and its friends chartered 111 Public Service buses to carry some 3,300 persons on an excursion to Asbury Park; on Aug. 2, employees of the Wright Aeronautical Corporation of Paterson chartered 107 buses to take some 3,000 persons on an outing to Lake Hopatcong. Another large order has been received to take members of the Hudson County Republican Club on an outing to Sea Girt. In addition to these large orders several hundred buses have been chartered to individuals and groups of friends for outings.

By Bus and Limited from Indianapolis to Cincinnati

Service over the old Indianapolis & Cincinnati Traction Company's line never did penetrate closer to Cincinnati than Connersville, Ind., but the new company, the Indianapolis & Southwestern Traction Company, which purchased the old road some months ago at receiver's sale, has established fast bus connection between Cincinnati and Connersville to connect direct with the new railway service, particularly "The Southeastern Limited" trains, which provide unusually fast service. Southwestern limiteds make no local stops, but no extra fare is charged. Seats may be reserved by telephoning the ticket offices. Porter service is provided. Through service by electric railway from Indianapolis to Cincinnati was the dream which circumstances conspired to prevent the late Charles L. Henry from realizing.

Contractual Factory Service Upheld

Employees of the Mount Hope Foundry in North Dighton have a right to associate together and hire a bus to transport them to and from their work. In the action in which this right was established the Eastern Massachusetts Street Railway sought to prevent John Ingham, Dighton, from transporting men to and from their work, but Judge Lummus of the Suffolk Superior Court ruled they were within their rights as was Ingham. Many of the men at the plant live in Somerset. Five years ago they formed a club and hired Ingham to carry them to the foundry in his bus. They said the service by railway was not dependable, but this was denied by the company. While he decided Ingham had the right to transport the employees of the foundry to and from their work, Judge Lummus ruled Ingham should be enjoined from accepting other business. The route of the Ingham bus parallels that of the railway.

Railroad Protests New Service

Contention that the Hart Motor Coach Company secured local licenses for operation of buses in fifteen towns and one city between Winchendon, Mass., and Williamstown, Mass., by way of the Mohawk Trail, for the new corporation known as the Hart Mohawk Trail Lines without divulging the true owners was made when the Massachusetts Department of Public Utilities heard the petition of transfer of the certificate of public necessity to the new concern. Winchendon Selectmen and representatives of the Boston & Maine Transportation Company appeared as objectors.

Counsel for the Boston & Maine said he understood the Hart Mohawk Trail Lines was a subsidiary of the Boston, Worcester & New York Street Railway. He opposed the granting of permits in Western Massachusetts territory because the Boston & Maine operates trains in that territory. The Boston & Maine Transportation Company expressed a willingness to tie up its Gardner and Greenfield line with Winchendon and serve the town.

Substitution Before State Commission

The Westchester Street Transportation Company, Inc., has applied to the Public Service Commission for authority to substitute buses for electric cars on a portion of its route in Tarrytown and Elmsford; town of Greenburg and White Plains. It also seeks to operate buses in Tarrytown and White Plains not included in but forming a route connecting with the White Plains-Tarrytown line.

As noted previously in the *ELECTRIC RAILWAY JOURNAL*, the various municipalities have consented to the proposed substitution of buses and these will be filed with the commission when it conducts a hearing on the petition.

The extension of routes was formally authorized by the board of directors of the Westchester Street Transportation Company on July 30. The rate of fare proposed is 10 cents for a ride in zone one; 15 cents for transportation between zones one and two, and 25 cents for a continuous ride from zones one to three.

The franchises granted by the several municipalities provide for the removal of tracks on streets where they are not imbedded in the pavement and their removal when the municipalities do paving or repaving.

At any time after ten years the company is to be permitted to terminate the operation of buses and to exercise its rights to operate electric cars on tracks.

No More Meterless Cabs in Worcester

The Worcester, Mass., license board has decided that operation of flat-rate taxicabs, which have been competing with the Worcester Consolidated Street Railway through a 35-cent rate to any place in the city, has proved unsuccessful. The board has not acted to require all cabs to meter the service, but it has refused to grant any more licenses for meterless cabs. The companies that operate cabs on the flat-rate basis are said to be ready to return to the meter basis, but each is waiting for the other to take the initiative.

New Carrier Rules in Oklahoma

Electric railways operating buses over the public highways of Oklahoma, outside of incorporated cities and towns and all other bus carriers, are affected by House Bill No. 19, which considerably increases the taxes on bus operators carrying persons and property between fixed termini or over a regular route. House Bill No. 19 amends Chapter 113, Session Laws of 1923, repeals Sec. 5 of that act. It was approved by the Governor on June 24, and became effective immediately.

The section of the present law which is repealed provides that no vehicle weighing more than 15,000 lb., including its load, shall be permitted to operate over the public highways of the State without special permission of the Corporation Commission. The new schedule of taxes for regular motor carriers operating between fixed termini or over regular routes designated as class "A" follows: Each passenger motor vehicle seating capacity not to exceed seven, 3 mills per mile seating capacity from 8 to 11, 5 mills per mile; seating capacity from 12 to 17, 7 mills per mile; seating capacity from 18 to 23, 9 mills per mile; seating capacity from 24 to 29, 11 mills per mile; seating capacity from 30 to 36, 12.5 mills per mile; seating capacity in excess of 36, 15 mills per mile. The tax is computed on the basis of the number of miles covered in schedule per day for 30 days per calendar month, regardless of whether motor carrier carries out such schedule.

Motor carries engaged in the transportation of property will pay two-fifths of a cent per mile on distances traveled, mileage to be determined on the same basis as applies to passenger motor carriers. Lower taxes are provided for class "B" and class "C" motor carriers. In addition to the above each motor carrier upon filing application with the Corporation Commission for a certificate of convenience and necessity shall pay the commission a fee of \$100 and upon filing an application for transfer of certificate shall pay the commission a fee of \$50.

Direct Service by Bus to Iowa Fair Grounds

The Tri-City Railway, Davenport, Ia., will provide model transportation to and from the Mississippi Valley Fair and Exposition this year, and with the added advantage to riders of transfer privileges, involving a saving in fares. R. J. Smith, general manager, said a few days ago:

"We believe we are in a position this year to realize what has been our desire ever since the fair was inaugurated. The advent of the fair was coincident with the wane of street car travel. Our car lines were not near enough to the grounds to provide direct service, and the bus was still an experimental vehicle of transportation, particularly mass transportation. Nevertheless we were not neglectful in providing motor coach service, such as was possible with the equipment at hand. This year, however, with our reserve fleet augmented by seven new coaches, we will be in a position to offer fairgoers regularly scheduled, dependable service.

"Furthermore, we have found it possible to provide transfer privileges which we think will be attractive. While the regular fare of 25 cents on the fair motor coach is not disturbed, yet with returning passengers a transfer is issued to any local line in Davenport. Upon payment of the established fare on any local line a transfer will be issued which on presentation to the motor coach operator reduces the fare to the grounds to 25 cents.

Mount Vernon, N. Y.—There was a brief ceremony in front of the new City Hall Building on Aug. 17, following which representatives of the South Westchester Bus Company, a subsidiary of the Third Avenue Railway, owner of the franchises, and city officials inspected the four routes which were opened for service the following morning. The fare is 10 cents, with a number of transfer points connecting with trolleys.

Pittsfield, Mass.—Early substitution of buses for trolley cars by the Berkshire Street Railway in the southern part of Berkshire County, Massachusetts, is forecast by the action of municipal authorities of Pittsfield, Lenox, Stockbridge and Great Barrington in granting the company's petition for the change. Other towns are expected to take similar action.

Worcester, Mass.—The local license board has rejected the petition of the Boston, Worcester & New York Street Railway for a permit to operate through the city on a Boston-Albany bus route. This is the second time the request has been refused. It was made in behalf of the Hart Motor Coach Lines, a Boston, Worcester & New York subsidiary. The Boston & Maine and the Boston & Albany Railroads opposed the application of the Hart lines.

Indianapolis, Ind.—The Greenville Transportation Company has asked the Public Service Commission to remove limitations in the company's certificate for a bus route between Winchester and Union City, in the event the Union Traction Company's petition to abandon its railway line between Muncie and Union City is granted. At present the company operates under a limited certificate issued in deference to the Union Traction Company protest.

Worcester, Mass.—Under an agreement reached between the Selectmen of Millbury and the Worcester Consolidated Street Railway a bus line will be substituted for the present railway line between Millbury and Worcester, the first suburban trolley line built out of this city.

Medford, Mass.—The Boston Elevated Railway has announced restoration of three bus lines in Medford. The North Cambridge-Medford Square bus, the Riverside Avenue line and the North Street Medford-Arlington Center services were changed on Aug. 3 in consequence of operating losses. Officials say the lines as restored must pay if they are not to be withdrawn permanently.

Columbus, Ohio—Sept. 23 has been set by the Public Utilities Commission as the date for the hearing on the plea of the Columbus Railway, Power & Light Company for permission to discontinue railway service between Columbus and Westerville. If the abandonment is authorized, the company will substitute buses. The company says that its losses on the railway line which for years it has operated to Westerville have been steadily increasing. Westerville is about 15 miles from Columbus.

Fitchburg, Mass.—The Department of Public Utilities has ordered that the certificate of public convenience and necessity, granted the Suburban Bus Lines, Inc., in 1926, be revised and amended to restrict the buses from discharging passengers on Main and Summer Streets in Fitchburg between Upper Common and the Lunenburg line. While operating in the opposite direction they are not to stop to take on passengers between the points mentioned. The Fitchburg & Leominster Street Railway asked this restriction.

Bennington, Vt.—The Vermont Public Service Commission has granted the Berkshire Street Railway's petition for a permit to replace trolley service between Bennington and the Massachusetts state line with a bus service. Four buses will be put in service soon, to run every two hours through the day and evening.

Indiana Harbor, Ind.—A temporary injunction restraining Frank Dolatowski, local bus owner, from operating his buses over any of the routes of the Shore Line Motor Coach Company within or between East Chicago, Hammond and Whiting has been granted by Judge Greenwald of the Lake County, Superior Court. The Shore Line contended that Dolatowski is offering it competition in violation of a ruling by the Indiana Public Service Commission.

Pasadena, Cal.—The Pacific Electric Railway has applied to the Railroad Commission for a certificate of public convenience and necessity to operate an auto stage service between Montana Street and Lincoln Avenue in Pasadena, and Woodbury Road and Lake Avenue here, a distance of 4.3 miles. The application is the result of conferences held with representatives of the Altadena Chamber of Commerce and other associations and of the engineering department of the Railroad Commission, at which the company agreed to furnish the proposed service.

Financial and Corporate

O'Fallon Ruling Reflected in Indiana

Commission there modifies its stand in regard to evidence in pending consolidation case

EVIDENCE of a change in attitude in the matter of its consideration of valuation factors is contained in order No. 9499 issued by the Indiana Public Service Commission, the purport of which is to rescind, set aside and declare of no effect that portion of an order issued on Oct. 24, 1928, which stated that the commission in the matter of the petition of the Indiana Electric Corporation, Central Indiana Power Company, Terre Haute, Indianapolis & Eastern Traction Company, et al., "will consider only valuations based upon original cost" in connection with interurban, bus and railway properties.

Order No. 9499 points out that the recent decision of the Supreme Court of the United States in the O'Fallon case makes it clear "that in a matter of this kind it is necessary to consider all pertinent evidence as to the value of the property, as to the cost of reproduction and the cost of reproduction depreciated."

The issue goes back to Oct. 24, 1928, on which date the commission approved an order outlining procedure to be followed in the conduct of the cause looking toward the consolidation of the companies mentioned. In regard to the valuation of interurban, bus and railway properties involved, the order included the following provision:

"As to the interurban, motor bus and street railway properties involved, the commission will consider only valuations based upon the original cost. Appraisals on the basis of the cost of reproduction for the transportation properties would result in valuations too high to be used as the basis for any issuance or exchange of securities. The historic cost of utility property of this kind certainly ought to be a sound basis for consideration of this cause, representing as it does the actual money invested in the property. Appraisals on the cost of reproduction basis reflecting only present day prices would be far in excess of the actual money cost of the property. The commission within the last few months has had an appraisal made of certain interurban property with the result above indicated."

As the commission now sees it the declaration that it would consider only valuations based upon the original cost of the interurban, bus and railway properties obviously is not in harmony with decisions of the Supreme Court of the United States which must be regarded as controlling in the valuation of public utility property, particularly the recently decided O'Fallon case. In order to arrive at a legal valuation in a matter of this kind, it is necessary to consider all pertinent evidence as to the value of the property involved, including evidence as to the cost of reproduction and the cost of reproduction depreciated. The O'Fallon case makes this very clear.

The commission is now of the opinion that in the conduct of this cause it should hear all pertinent evidence as to the value of all property involved and should not,

before the hearing of any evidence, be committed to a policy which would confine it to an original cost basis only. It is of the opinion that the portion of the order approved Oct. 24, 1928, relating to a consideration of valuation upon an original cost basis only as to interurban, bus and railway properties should be rescinded and ordered that the previously quoted section be deleted.

Louisville Brief Filed

Arguments to uphold its contention for a fare of 10 cents with three tickets for 25 cents are contained in a brief filed by counsel for the Louisville Railway, Louisville, Ky., in the Federal District Court. The brief is the second filed since the hearing, the first being devoted to argument on the jurisdiction of the court. The brief concludes with the statement that should the company earn all that the city's testimony suggests and a fair rate of return is no more than 7 per cent, the company would barely earn a fair return on as much as \$21,105,850, "the lowest fair value that could be justified even upon the prejudiced testimony of defendants' witness Hubley. On every other basis of computation suggested by the testimony the proposed rates will afford far less than a fair return upon the fair value of plaintiff's property which it has devoted to the public service. . . ."

The brief said the favorable rate of return of 1926 is not likely to be equalled in the immediate future at the present rate schedules and cited the falling off in passengers carried in the last five years. The decrease in the period was from 70,204,876 to 66,997,370, the brief said. It set up the value of the property used and useful on the basis of testimony by the various experts as being from \$24,486,000 to more than \$28,000,000.

Only Liberal Terms Will Promote Flow of Capital

The St. Louis Transportation Survey Commission on July 11 decided to direct its future consideration to the formulation of a contract ordinance which will meet the city charter's provisions relative to street railway and bus company franchises.

Since Governor Caulfield vetoed the terminable permit bill, passed by the last General Assembly, and as he will be the head of the state government until 1933, there is no hope of putting through a similar law in the meantime. The Governor suggested that if the people of St. Louis want the terminable permit plan they can adopt it by amending the city charter, which restricts franchises to a 50-year period. The commission asked Rudolph Kelker, its consulting engineer, to draw up a report on the operation of the bus lines of the city.

At the meeting Mr. Kelker read a statement recommending the improvement and modernization of railway equipment, track extensions to newly settled sections and the use of high-speed buses equipped with pneumatic tires. He said that the flow of capital to permit needed improvements to be made will be largely determined by the conditions under which the companies are permitted to operate.

New Haven Finances Its Trolleys

The Department of Public Utilities in Massachusetts has authorized the New Haven Railroad to purchase from time to time Worcester Consolidated Street Railway first and refunding mortgage 20-year 4½ per cent gold bonds, dated Aug. 1, 1910, and similar bonds of the company dated Aug. 1, 1910, bearing extra coupons, making the rate of interest thereon 6½ per cent per annum at not more than the face value of the bonds and accrued interest thereon, for the purpose of facilitating the refunding of Worcester Consolidated Street Railway's funded debt. The department has also approved the purchase by the New Haven of \$300,000, face value, of demand notes of Springfield Street Railway at not more than face value of the notes, plus accrued interest, for the purpose of providing Springfield Street Railway with funds for rehabilitation of its transportation system.

What Will Boston Do About It?

The Boston *Herald* is asking what, if anything, has been done about co-ordinated transit. It will be recalled that the big job done by the last General Court was the passage of an Elevated bill which creates a Transit District made up of the cities and towns served by the Elevated, its affairs to be managed by five trustees who would study proposed new routes and report on them to a Transit Council. This Council, also created by the act, is to be made up of the mayors and chairmen of selectmen of the communities of the district; recommendations from the trustees, if approved, to be referred by the council to the General Court. The act also authorizes the district to acquire from the city of Boston, with the consent of the Mayor and City Council, all the subways and rapid transit lines which the city now owns in its "proprietary capacity," and thereafter to acquire from the commonwealth the Cambridge tunnel. In other words, the act contemplates the unification of the transit system of Greater Boston under centralized management. As the *Herald* sees it, the big item in the program is the taking over of these facilities by the new Transit District. That cannot be done without the favorable action of the Mayor and the Council. The *Herald* says:

"We have been waiting these many weeks for some sign of interest on their part in this extremely important proposal. We do not argue the merits of the plan now, but we do raise the question if it is not high time for the city authorities to take the public into their confidence and let us know their views and probable intentions. Does the city accept, or reject, the act?"

Deal for Twin City Company Rumored

According to the Canadian *Financial Post* rumors are current in St. Paul and Minneapolis that a change in stock control of the Twin City Rapid Transit Company is impending, and it is said that the H. M. Bylesby interests, which control the Northern States Power Company, centering in the cities mentioned, will acquire control and become the dominant factor in a short time. Canadian directors say no hint of any such change had previously reached them. They were unable to offer an opin-

ion as to whether or not the plan was likely to go through. Twin City Rapid Transit Company owns the entire railway systems in St. Paul and Minneapolis. The total mileage of the lines in the cities and throughout the surrounding urban districts, when reduced to single track, covers more than 516 miles. The company also owns all the local bus lines operating in coordination with the railway service. Several suburban bus lines are also under the same ownership.

Relocation Hearing at East Chicago

Public hearing on the appeal of the Chicago, South Shore & South Bend Railroad from the refusal of the City Council of East Chicago, Ind. to permit the railroad to relocate its tracks there were conducted by the Public Service Commission on Aug. 6.

Notice of the company's intention to prosecute its appeal, which was filed last May, recently was served on the East Chicago board of public works after officials had been advised by the board that, in view of the City Council's refusal to take any action in the matter, it would be futile to pass a new franchise.

Negotiations looking toward the removal of the South Shore Line tracks from Chicago Avenue, the principal business artery, and the construction of a new right-of-way through the south portion of the city were begun nearly a year ago. The original franchise, providing for removal of the tracks to grade location along the Grand Calumet River, was approved by the board of works last December and was sent to the City Council with favorable recommendations. During the ensuing months, however, the franchise has been held in committee.

Property at Hammond to Be Sold

Suit for foreclosure and application for the appointment of a receiver for the Hammond, Whiting & East Chicago Railway has been filed in the United States District Court in Hammond, Ind., by the First Union Trust & Savings Bank, Chicago, and Emile K. Boisot of California, trustees under the mortgage.

The bill was filed by F. C. Crumpacker of the law firm of Crumpacker & Fredricks, counsel for the trustees. He alleges that the street railway has defaulted in payment of interest on its first mortgage bonds since Feb. 1, 1923.

It is expected that sale of the property under the foreclosure proceedings will result from the filing of the suit by the trustees. A syndicate of local business men of East Chicago, Whiting and Hammond has been formed to bid for the property if it is put up for sale in the Federal Court. The Midland Utilities Investment Company has a minority interest in the syndicate.

The Hammond, Whiting & East Chicago Railway operates a system of electric railways in Hammond, Whiting, East Chicago and Indiana Harbor. The service of the railway is interconnected with that of the Chicago Surface Lines.

Minnesota Road Sold at Foreclosure

The Minneapolis, Anoka & Cuyuna Range Railway, Minneapolis, Minn., was sold on Aug. 20 to W. D. Lovell, contractor and engineer, for \$25,000, subject to approval by the Federal Court. Mr. Lovell announced no plans for the road, which operates as a trolley line between Minneapolis and Anoka, Minn. The sale was conducted by E. P. Burch, who has oper-

ated the line two years or more under receivership. The sale was to satisfy claims of bondholders, the trustee being the American Mortgage Company of Boston, Mass. The road started in 1913 as the Minneapolis & Northern equipped with gas-electric engines. It has 16 miles of trackage and operated 12 under lease. It has two electric locomotives, six electric cars and shops and stations. It is now fully electrified.

Railway and Bus Associates Buys Pennsylvania Properties

The United Power & Transportation Company, Philadelphia, Pa., has sold its interest in the Schuylkill Valley Traction Company and the Lebanon Valley Street Railway to the Railway & Bus Associates. Unofficially the purchasers are believed to be Associated Gas & Electric Company.

Oakland, Cal.—The period for the deposit of securities of the Key System Transit Company under the reorganization plan has been extended to Sept. 20.

Philadelphia, Pa.—The disputed extra dividend of \$600,000 announced by the Philadelphia Rapid Transit Company several weeks ago has been distributed, the way having been cleared by the withdrawal of a taxpayer's suit seeking to block the transaction.

Hudson, N. Y.—Application will be made to the Public Service Commission by the Eastern New York Utilities Corporation for authority to abandon the trolley line between Albany and Hudson, as a result of action taken by the directors of the New York Power & Light Corporation.

Pensacola, Fla.—The Gulf Power Company plans to suspend operation of trolley cars on the Belt line, which serves the residential section of Pensacola near Pensacola Bay.

Newark, N. J.—A hearing will be held here on Sept. 25 by the Public Utilities Commission on the application of the receivers of the Morris County Traction Company for permission to dissolve the company. Public Service Co-ordinated Transport is now furnishing service by bus over the route of the supplanted trolley between Newark and Dover.

Plattsburgh, N. Y.—The Public Service Commission has consented to the abandonment by the Plattsburgh Traction Company of a portion of its route known as the north loop of the Belt Line here, a distance of 1.52 miles. The city authorities were in accord with the plan and permission to discontinue service and remove the tracks has been granted by the Common Council.

Dover, N. H.—The Central Park Theater here, owned by the Massachusetts Southeastern Railway, was destroyed by fire on Aug. 6 with a loss of \$20,000. The stock company playing at the theater lost costumes and scenery.

Salem, N. H.—The Massachusetts Northeastern Street Railway will sell Canobie Lake Park at Salem, N. H., at public auction on Sept. 14. The park covers about 50 acres. There are many pavilions, buildings and a dance hall. The railway will also sell the brick car-house and other property at the park.

Conspectus of Indexes for August, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years	
				High	Low
Street Railway Fares* 1913 = 4.84	Aug. 1929 7.76	July 1929 7.76	Aug. 1928 7.65	June 1929 7.76	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	Aug. 1929 146.4	July 1929 147.5	Aug. 1928 142.5	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	Aug. 1929 231.0	July 1929 230.0	Aug. 1928 229.7	Aug. 1929 231.0	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Aug. 1929 200.8	July 1929 199.0	Aug. 1928 204.5	March 1924 206.8	July 1929 199.0
Eng. News-Record Construction Cost (General) 1913 = 100	Aug. 1929 205.9	July 1929 204.8	Aug. 1928 207.3	March 1924 224.7	Nov. 1927 202.0
U. S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	July 1929 98.0	June 1929 98.4	July 1928 98.3	Nov. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	Aug. 1929 12.63	July 1929 12.49	Aug. 1928 13.19	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	July 1929 153.5	June 1929 154.8	July 1928 152.8	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	July 1929 161.6	June 1929 160.0	July 1928 161.1	Nov. 1925 171.8	April 1929 159.3
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	July 1929 129.2	June 1929 135.2	July 1928 130.2	Feb. 1929 140.4	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	July 1929 197.8	June 1929 102.2	July 1928 100.7	Feb. 1929 110.1	May 1924 84.4
Business Failures Number	July 1929 1581	June 1929 1477	July 1928 1455	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	102.09	84.72	32.07	122.95	23.13

*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 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Personal Items

Brooklyn Surface Lines Personnel Announced

William Siebert, long in service, in charge under Mr. Menden.
Many other changes made

INCIDENTAL to the unification of the surface lines of the Brooklyn-Manhattan Transit Corporation and the Brooklyn City Railroad as the Brooklyn & Queens Transit Corporation on July 1, many changes were made in the surface transportation department. William Siebert continues at the head of this department; S. S. Hamilton remains assistant superintendent of transportation; C. A. Drew as superintendent of schedules; W. E. Box as superintendent of employment and instruction, and William Luhrssen as chief clerk. F. J. Brennan joined Mr. Siebert's staff as assistant to the superintendent of transportation. Mr. Brennan previously was assistant superintendent of transportation of the Brooklyn City Railroad. The activities of the employment and instruction divisions for the surface lines have been centralized under Mr. Box, except as to badges and photographs. This change eliminates the separate employment, instruction, badge and photograph divisions of the Brooklyn City Railroad. In connection with the merger of the surface lines, a number of changes in the assignment of division superintendents, day depot masters and night depot masters were made by Mr. Siebert. These were noted in detail in *ELECTRIC RAILWAY JOURNAL NEWS* for Aug. 3, page 115.

MECHANICAL DEPARTMENT UNDER W. G. GOVE

The mechanical department of the Brooklyn & Queens Transit Corporation is headed by W. G. Gove, and L. J. Davis is engineer of car equipment. Mr. Niles Persons continues as superintendent of surface line shops and P. S. Scott is made general inspector. S. Engebretson, formerly general foreman at 52d Street shop, was transferred to Fresh Pond shop in the same capacity. The new foreman at 52d Street shop is W. F. Platt, formerly foreman carpenter there. In the inspection shops, George Siebert as foreman was placed in charge of both the 9th Avenue and Franklin Avenue shops. C. L. Knight also is foreman in charge of both the 24th Street and Nostrand Avenue Garage.

H. J. Kolb becomes chief engineer, way and structure, for the new company. The Surface Roadway Division has its headquarters at 849 Nostrand Avenue and F. L. Finch is head of the division. The former headquarters of Mr. Finch, as head of the B.-M. T. surface track division at Smith and 9th Streets, will no longer be used as track division headquarters. W. H. Wharton is superintendent of buildings for the new company and retains his headquarters at 1130 Atlantic Avenue. T. Neilson becomes assistant superintendent of buildings. C. E. Wilcox joins Mr. Kolb's staff as office assistant in charge of records and correspondence and J. A. Rosenberger as special inspector.

Interest naturally centers around Mr. Siebert, the man who will direct the operat-

ing of the 500 or more miles of surface lines with their 1,200 cars, and who presumably will be responsible for the operation of the company's motor bus lines when the event of their operation emerges from the tangled meshes of consideration by city officials. Mr. Siebert is one of life's mystery men—men known widely and favorably in their own communities but still escaping the spot light of publicity. Not even Harding, Pulitzer prize-winning cartoonist, when he was on the Brooklyn *Eagle*, discovered Mr. Siebert, or if Harding did discover him then the elusive Mr. Siebert had his own way again and succeeded in escaping publicity. It is a way that has made Mr. Siebert camera-shy to the extent that the *ELECTRIC RAILWAY JOURNAL* could not secure any portrait of him suitable for half-tone reproduction. That's how diffident is Mr. Siebert.

But about the man. Over in Brooklyn in 1928 at a banquet to him, more fragmentary facts about him came to light than ever before. The occasion was the completion by him of 40 years of service with the surface lines there. Many of the men who attended had worked with Mr. Siebert for years, but in addition there were the county clerk, Supreme Court justices, and others prominent in public life.

From this, that and the other sources, it appears that Mr. Siebert began his railroad career in 1887 as a conductor on the Nostrand Avenue horse-car line. His advance through the ranks was steady until he finally was in charge of the Ridgewood Depot. Then came the turning point—his appointment to the post of superintendent of transportation of the surface lines in 1907.

MR. SIEBERT'S APPRECIATION OF THE WORK OF THE RANK AND FILE

Out of a clear sky one day about twenty years ago, Mr. Menden, now the president in Brooklyn, sent for Mr. Siebert to come downtown and see him. When Mr. Siebert arrived at Mr. Menden's office, he told Mr. Siebert he wanted him to take the job of superintendent. Here's Mr. Siebert's own version of what took place:

"I told him I did not want the job as nobody seemed to last long in that job, and I had a family to take care of. He said he thought I would be able to handle myself satisfactorily in the job and finally told me to take a week to think things over and then come back to see him. I went back a week later and told him again that I didn't want the job. But I didn't know he had been talking with Harry Crowe and some of the others who knew me downtown and they had told him just to tell me to try my hand at the job and I would stick at it. At any rate, when I told him I still didn't want the job, he simply said he'd have to have someone downtown and asked me to go inside and help him out temporarily. That was

more than twenty years ago and I'm still helping out."

He has no mistaken notions about things. He can do most anything in railroading, has done most everything, and, when occasion requires, still does most everything, but knows that as a policy that is a mistaken one. He can delegate tasks and he does delegate them. In a gracious compliment to the men under him, Mr. Siebert once said:

"One man cannot run a railroad. We sometimes say we are running it but that isn't true. We must have the co-operation and support of every man in the organization from switch-boy to president, and unless we have that our efforts to run the railroad to satisfy the public and the management are bound to fail. I have been fortunate in having enjoyed that loyalty and support in a generous degree and I owe all of whatever success I have achieved to each and every one of you."

No encomium to the man could possibly give a better clue to the underlying philosophy that is Mr. Siebert's than this statement made on one of the very few occasions on which he broke his customary silence.

B. C. Cobb Elected to Commonwealth & Southern Board

B. C. Cobb, New York, chairman of the board of the recently organized Commonwealth & Southern Corporation, has been elected a director of the Georgia Power Company; Magor Car Company; Pullman E. Patterson, Macon, Ga. Mr. Cobb also is the chairman of the board of the Allied Power & Light Corporation, and for three years served as chairman of the advisory council of the American Electric Railway Association.

Mr. Cobb is president of the Tennessee Electric & Power Company and a director of the Nashville Railway & Light Company. He is also president of the Commonwealth Power Company and the Penn-Ohio Edison Company, which, together with other public utilities, were recently consolidated with the Southeastern Power & Light Company.

Mr. Cobb was born in Boston on Aug. 13, 1870, and after leaving school was first employed by the Pennsylvania Railroad. Later he was one of the organizers of Hodenpyl, Hardy & Company. In 1928 this company and Stevens & Wood, Inc., were acquired by the Allied Power & Light Corporation, of which Mr. Cobb became chairman.

C. C. Brown in the Quarter Century Club

Chester C. Brown, auditor of the New York State Railways at Syracuse and Utica has completed 25 years of service. Mr. Brown entered the employ of the company on July 1, 1904, when, under Hague, Comstock & Walker, managers and construction engineers of the Rochester & Eastern line, he accepted a position in Canandaigua. His first job was that of freight handler. After about six months, he was promoted to freight agent at the Canandaigua office. Still later the same year, Mr. Brown was appointed general freight and express agent of the Rochester & Eastern, which position he held for about two years. Following this, he occupied the position of paymaster on the Rochester & Eastern and Rochester & Sudus Bay lines.

In February, 1907, following the change of ownership, Mr. Brown was placed in

charge of the Canandaigua office, where he remained until 1909, when he was transferred to the Rochester office. In August, 1919, he was appointed chief clerk by J. M. Joel, general auditor, and served in that capacity until Dec. 1, 1923, at which time he was appointed auditor of Utica, Oneida and Syracuse lines, with headquarters at Utica. He becomes the 341st member of the company's Quarter Century Club.

Darius E. Peck Elected Vice-President of General Electric

Darius E. Peck, assistant manager of the law department of the General Electric Company since 1920, has been elected vice-president and general counsel of the company. At the same time Allen H. Jackson, vice-president and general counsel since 1922 and associated in the company's law department since 1902, retired from active service, having served the company wisely, ably and loyally.

Mr. Peck was born at Hudson, N. Y., in 1877. He is a graduate of Williston Academy at Easthampton, Mass., and of Yale University. He was admitted to the bar in 1901. He practiced law in New York City from 1902 until 1913, when he became a member of the law department of the General Electric Company and moved to Schenectady. Seven years later he was named assistant manager of the department, a position he held until his promotion to vice-president and general counsel.

Mr. Peck has also had considerable experience in the public utility field. In 1915 he was elected secretary, treasurer and a director of the Schenectady Illuminating Company, the Mohawk Gas Company, and the Schenectady Power Company, succeeding James O. Carr. In 1920, at the time of the organization of the Adirondack Power & Light Corporation, he was elected a director and secretary and served for several years. When the Mohawk Hudson Power Corporation was formed in 1925 he became secretary of that company, serving until April of this year. He is at present a director of the New York Power & Light Corporation.

Mr. Jackson was born in Schenectady in 1864. He was graduated from Union College in 1886 and from the Albany Law School two years later. He entered the office of his father, Judge Samuel W. Jackson, of the State Supreme Court, and practiced law in his home city until 1892, when he went to New York with the law firm of Chanler, Maxwell & Philip. Three years later he returned to Schenectady and entered into partnership with his father. This association continued until 1902.

Beginning about 1900, Mr. Jackson had his first contact with General Electric affairs, previous to his actual entry into the company's organization. It was at this period that the National Electric Lamp Association was undergoing organization at Cleveland. At the request of the late Hinsdill Parsons, general counsel of the General Electric Company, Mr. Jackson assisted in bringing about the formation of the national association. His work at that time was a forerunner to his direct employment by the General Electric Company in December, 1902, as one of its attorneys, under Mr. Parsons. Mr. Jackson became counsel to the company in 1911, and after Mr. Parsons' death in 1912, he became the head of the law department.

In 1922, the year in which Gerard Swope succeeded E. W. Rice, Jr., as president of the company and Owen D. Young succeeded the late Charles A. Coffin as chairman of the board, Mr. Jackson was made vice-president and general counsel.

Coach Company Promotes J. E. McCarthy

John E. McCarthy has been elected a vice-president of the Fifth Avenue Coach Company, New York. He will continue to serve as secretary and his title is vice-president and secretary. Mr. McCarthy's career with the Fifth Avenue Coach Company began when he started to work as a stenographer in 1914. Within two years of his entering the service he was appointed general bookkeeper. In that capacity he handled the accounts of four corporations and became so thoroughly familiar with the business that he was made chief clerk in 1918. In 1922, Mr. McCarthy was transferred to the president's office and received the title of assistant to the president. On Nov. 5, 1924, he was appointed assistant secretary of the company, and on March 1, 1925, he became secretary, succeeding in that capacity Samuel E. Morrow, who retired at that time.

B. G. Noah General Superintendent at Duluth

B. G. Noah has been appointed general superintendent of the Duluth Street Railway, part of the Duluth-Superior Traction, in charge of all departments of operation in Duluth, Minn., and Superior, Wis.



G. B. Noah

For the past two years Mr. Noah has held the position of assistant to the vice-president, going to Duluth from Chicago where, for ten years, he was connected with the Chicago Surface Lines as electrical engineer in charge of power station design and electrical testing. Mr. Noah received his technical training in electrical engineering in Chicago.

The principal departments of operation which will be under Mr. Noah's direction are: Engineering and roadway department under John Carson, chief engineer and T. A. Armstrong, roadmaster; mechanical department under R. J. Crawford, master mechanic; the operating departments in Duluth and Superior under William S. Byers, superintendent, Duluth division, and Alfred Williams, superintendent, Superior division, and schedules and publicity under R. B. Thompson, superintendent of schedules.

Herbert Warren, vice-president and general manager of the company, explains in a bulletin announcing the appointment, that "the increasing burdens of management other than operation, make the change necessary."

Preston S. Arkwright, president of

the Georgia Power Company, has been elected president and member of the directorate of the Columbus Electric & Power Company. The Columbus company is a subsidiary of the Commonwealth & Southern Corporation, which, through the Southeastern Power & Light Company, likewise controls the Georgia Power Company.

Harold Smith Elected Vice-President of Westinghouse

Harold Smith, general solicitor of the Westinghouse Electric & Manufacturing Company, has been elected vice-president. Mr. Smith entered the legal department of the Westinghouse Company in 1919 and was appointed general solicitor in 1926. Prior to that time he was engaged in the practice of law in Chicago being a member of the firm, Glennon, Cary & Walker. He is a graduate of Northwestern University (LL.B. in 1905), and at Yale (LL.M. in 1906), and he also studied at the University of Chicago. He is a member of the bar of the States of New York and Illinois.

John C. Higgs, for five years chief engineer of the power station of the Jacksonville Traction Company, Jacksonville, Fla., is to be transferred to Tampa, where he will become assistant superintendent of the power station of the Tampa Electric Company. The Jacksonville Traction Company and the Tampa Electric Company are under executive management of Stone & Webster, Inc. T. J. Hunt, chief engineer of the Winter Haven Power & Ice Company, will succeed Mr. Higgs at Jacksonville.

Frank J. Miller, appointed by Governor Patterson as a member of the Oregon Public Service Commission to fill the vacancy caused by the death of Louis E. Bean, has been elected chairman, the post occupied by Mr. Bean at the time of his death. Mr. Miller was the first secretary of the original Oregon Railroad Commission, serving from 1891 to 1893. In 1909 he was elected as a member of the Railroad Commission, and later was appointed to serve out an unexpired term. In January, 1910, Mr. Miller took office on his election as commissioner, serving continuously until January, 1919.

E. D. Spicer, superintendent of the refrigeration department of the General Electric Company, has been made assistant manager of the Schenectady works. Mr. Spicer was graduated from Cornell University in 1912 with the degree of mechanical engineer. In 1924 he went to the General Electric Company in the manufacturing general department. In December of the same year, he joined the staff of James A. Smith, superintendent of the Schenectady works, and, in March, 1925, he was placed in charge of the insulator and carbon brush department.

H. W. Olcott, Jr., has been transferred to Indianapolis and promoted to the position of manager of publicity and advertising there for the Interstate Public Service Company and Central Indiana Power Company subsidiaries—a group of electric, gas, and local and interurban railways, absorbed early this year by the Midland Utilities Investment Company, with which he is now associated as assistant publicity director.

J. K. Bruce Under New London Scale

The London County Council has decided that the scale of salary attaching to the position of general manager of the Council's tramways shall in future be £2,000 a year, increasing after four years service at that remuneration by annual increments of £250 to £3,000 a year. J. K. Bruce, who has been general manager for several years, is transferred to the new scale, and his salary is now increased to £2,500, increasing thereafter in accordance with the scale.

C. E. Eveleth Vice-President in G. E. Engineering Department

Charles E. Eveleth, who since 1927 has been a vice-president of the General Electric Company associated with C. C. Chesney and W. R. Burrows in the management of the manufacturing department of the company, has been transferred to the engineering department, and, as vice-president, will be associated with E. W. Allen in the direction of that department's affairs.

Mr. Eveleth will give special attention to the problems of the designing departments and works laboratories. Mr. Allen will direct his attention to the

work of the commercial engineering, the contract service and district engineering departments.

Mr. Eveleth has been in the employ of the General Electric Company since 1899.

H. R. Cranford, the Toledo Edison Company, Toledo, Ohio, has accepted the chairmanship of a new committee of the National Association of Purchasing Agents, Inc., to be known as National Committee To Co-ordinate Activities of Affiliated Associations. The object of the committee will be to assist affiliated associations in the several districts to schedule their various activities to co-ordinate with those of other associations in the same district.

Fred N. Wardwell, formerly assistant engineer of the New York Central Lines, has joined the Rome Wire Company, Division of General Cable Corporation, as railroad sales engineer. He will be located at the division's executive office at Rome, N. Y. Mr. Wardwell has had wide railroad experience. During the past eleven years with New York Central, he has been closely identified with the electrification and equipment projects of its lines, having had direct supervision of the material inspection bureau of the electrical department. He was also technical advisor to the purchasing and stores department.

Daniel Corliss Frost

Daniel Corliss Frost, manager of the Lynchburg Traction & Light Company, Lynchburg, Va., died on July 23. He had been in a coma for several days when he suffered a second attack of a malady which had affected him since last April.

Though exceedingly modest in demeanor, Mr. Frost was widely known and held in high regard locally. He went to Lynchburg to manage the plant known as "The Spoke Works," which, after a few years' operation by the Philadelphia owners, was closed. He held several positions as manager of industrial plants in Lynchburg and was for a short time with the Chesapeake & Ohio Railway before taking the position as superintendent of the local railway late in 1902. This position he held until about a year ago when the gas company was separated and he became manager of the railway service.

He took an active interest in public affairs in his early years in Lynchburg and during the incumbency of Mayor G. Woodson Smith was a justice of the peace. He was a member of the Rotary Club, Oakwood Country Club, Spex Club, Chamber of Commerce, a director in the Interstate Fair Association and the Commercial Savings & Loan Bank. He was interested in the collection of first editions and particularly interested in books on Virginia and Abraham Lincoln.

He attended the public schools in Philadelphia but went to work early in life with the Charles Scott Wheel Manufacturing Company, which sent him to Lynchburg. He was born at Laurel, Delaware.

Edward Early

Edward Early, assistant treasurer of the United Railways & Electric Company, Baltimore, Md., died on Aug. 2. He was 64 years of age. He was stricken with a heart attack while in his office in the Court Square Building and died soon afterward. Mr. Early was a native of Baltimore. He was educated in the public schools there. A number of years ago he entered the treasurer's office of the Western Maryland Railway and in 1913 joined the treasurer's office of the United. He was made assistant treasurer about a year later.

New Franchise Draft in Jacksonville

Austin Miller, city attorney of Jacksonville, Fla., has been requested by the public service committee of the City Council to prepare a "fair and legal" Jacksonville Traction Company franchise for the committee's consideration.

The text of the letter to Mr. Miller follows in part:

"In view of the fact that you are familiar with the former franchise, which was repealed, this committee feels that it is your province to prepare a draft of a proposed franchise that will be fair, just and equitable to the city and to the Jacksonville Traction Company. To the end, therefore, that this important matter may be disposed of without unnecessary delay, the committee requests that you prepare a franchise you think fair and legal, and that you furnish the committee with a draft thereof within the next 30 days."

Since the repeal of the former ordinance each side has made concessions, the attitude of the company toward a new grant being reviewed in *ELECTRIC RAILWAY JOURNAL NEWS* for Aug. 10, page 118.

Obituary

Charles Currie

Charles Currie, former vice-president and general manager the Northern Ohio Power & Light Company, Akron, Ohio, with which he was actively connected from 1901 to 1916, died on Aug. 14 while on a motor trip in Massachusetts.

Mr. Currie was born in Toronto, Ont., on March 8, 1868. The family moved to London, Ont., and at an early age Mr. Currie went to work for the London Street Railway. Later he became superintendent of that company.

When the Everett-Moore Syndicate took over the London Street Railway and a number of other utilities in Canada and the United States, Mr. Currie was made superintendent of railways at Lima, Ohio. Later he was transferred to Cleveland as superintendent and went thence to Akron, finally becoming vice-president and general manager. When the Hodenpyl-Hardy interests took over the Northern Ohio Power & Light Company in 1916, Mr. Currie returned to Cleveland to join the Cleveland Trust Company. At the time of his death he was a director of the Northern Ohio Power & Light Company, president of the London Street Railway and a director of the Lake Shore Electric Company. Mr. Currie was 61 years old.

Gaylord Thompson

Gaylord Thompson, general manager of the Trenton & Princeton Traction Company, Trenton, N. J., died on Aug. 15. He had been ill for a long time and had been confined to his home for the past two years.

Mr. Thompson was a native of New York City. He was graduated from New York University in civil engineering. He

later became affiliated with the Ohio Electric Company in Cincinnati. Sixteen years ago he removed to Trenton and was made general manager of the Trenton & Princeton Traction Company. He was a member of the American Society of Civil Engineers and the Trenton Engineers' Club.

Ora Taylor

Ora Taylor assistant superintendent of the southern division of the Pacific Electric Railway, Los Angeles, Cal., died on July 28. Mr. Taylor was 59 years of age. He went to Los Angeles 28 years ago from Knoxville, Ia. He entered the service of the Pacific Electric Railway in August, 1912, as a conductor's instructor on the western division. One year later he was appointed trainmaster of the western division, which position he held until January, 1920, when he was appointed assistant superintendent of the southern division.

A. K. Baylor

Armisted K. Baylor, General Electric commercial engineer and veteran of the electrical industry, died suddenly on Aug. 1. In 1891 Mr. Baylor went to the Thomson-Houston Electric Company at West Lynn, Mass., and moved to Schenectady, N. Y. in 1894, when the headquarters and main offices of the company were established there. In 1896 he became manager of the traction department of the British Thomson-Houston Company, later becoming general sales manager abroad. After fourteen years he re-entered the General Electric organization in the United States, and for several years was in the commercial general department. Mr. Baylor was 61 years old.

Industry Market and Trade News

Bids Received for Equipment for New York's New Subway

Final bids for steel cars, substation power and motor equipment on New York's new Manhattan subway were opened on Aug. 20 by Commissioner Daniel L. Ryan of the Board of Transportation and referred to the engineering department for computation.

For the installation of motors and control equipment, the Westinghouse Company bid \$2,532,470 and the General Electric Company \$2,547,070.

Bids were received for the 300 steel cars to be used from the following five companies: The American Car & Foundry Company; Magor Car Company; Pullman Car & Manufacturing Corporation; the Pressed Steel Car Company, and the Standard Steel Car Company.

These five bids were made on tabulated items and not for a lump figure. They will be computed by the board's engineering department and the total bids in each instance announced as soon as computed.

The delay in specifying the amounts entailed in the bids by the car manufacturers, it was explained, results in the fact that this is the first time in history that the city of New York has received, opened and computed bids for its own rapid transit.

Four bids were also received for installation of power equipment for substations of the new subway. These bids, tendered by the General Electric Company, Westinghouse Electric Company, Fishbach & Moore, Inc., and the Erickson Engineering Company, Inc., were also referred for computation to the engineering department.

All bids for the subway work are now in, with the exception of the one for the illumination of the new circuit.

Examination will begin before the Board of Transportation within a day or two on the reliability and experience in such construction work of the concerns involved in the bidding.

Recent Bus Orders

The electric railway industry continues to be one of the principal purchasers of bus equipment, and new orders are being placed without interruption. The Wheeling Traction Company, Wheeling, W. Va., recently ordered five 20-passenger Studebaker parlor car buses, while the Eastern Massachusetts Street Railway, Boston, Mass., ordered four Studebaker 21-passenger de luxe street car buses. The Brooklyn & Queens Transit Corporation of Brooklyn, N. Y., accepted delivery of four A.C.F. 33-passenger street car type buses, leased for a period of one year, and to the Boston Elevated Railway of Boston, Mass., were delivered five A.C.F. 40-passenger Metropolitan coaches. The Virginia Electric & Power Company recently placed an order for ten Twin Coaches of the 40-passenger urban type with the Twin Coach Corporation of Kent, Ohio, while the Denver Tramway Corporation ordered one 23-passenger A.C.F. urban coach from the A.C.F. Motor Company and one Mack 29-passenger city type bus.

The El Paso Electric Company recently placed an order for one White 54-A bus. Yellow Coaches were ordered by various bus divisions of electric railway companies, and the following deliveries were made:

The Atlantic City & Shore Railroad, Philadelphia, received four Z-29 passenger buses; the City Light & Traction Company, Sedalia, Mo., one W city service type bus; the Wisconsin Gas & Electric Company, of Kenosha, Wis., took delivery of one Z-29 bus. Two Z-29 coaches will go to the Illinois Power & Light Company of Champaign, Ill., and the Wisconsin Power & Light Company of Janesville, Wis., took seven W city service type buses, while four W city service buses were delivered to the Sioux Falls Traction Company at Sioux Falls, S. D., and six buses of the same type were accepted by the Potomac Edison Company of Hagerstown, Md. An order of one bus of the same model was placed by the Erie Coach Company of Erie, Pa.

The Capital Traction Company of Washington, D. C., contemplates ordering three 21-passenger buses. Mack buses were ordered extensively also by several electric railway properties, and some recent orders follow below:

The Lehigh Valley Transportation Company, of Allentown, Pa., two model AB four-cylinder 29-passenger, city type buses; the Tompkins Bus Corporation of West New Brighton, N. Y., 24 Mack model AB four-cylinder 29-passenger city type buses; the Connecticut Company, New Haven, Conn., three Mack model AB four-cylinder 29-passenger city type buses; the Northampton Street Railway, Northampton, Mass., two Mack model AB four-cylinder 25-passenger, city type buses; the Boston-Worcester & New York Street Railway Company, of Framingham, Mass., one model BK 29-passenger parlor car bus and the Buffalo & Erie Coach Corporation of Fredonia, N. Y., has accepted delivery on two model BB four-cylinder 177½-in. wheel-base chassis.

Cleveland's New Electric Locomotives

The first of the 22 electric locomotives for use in the newly electrified railroad zone in Cleveland has been completed at the Erie, Pa., works of the General Electric Company. The locomotives, being constructed by the American Locomotive and General Electric companies, weigh 204 tons each, with 150 tons on the driving wheels, will handle the equivalent of seventeen 75-ton cars, and will have a maximum speed of 70 m.p.h.



Electric locomotive to be used in the electrified zone of the Cleveland Union Terminal

W. B. & A. Orders Trailers

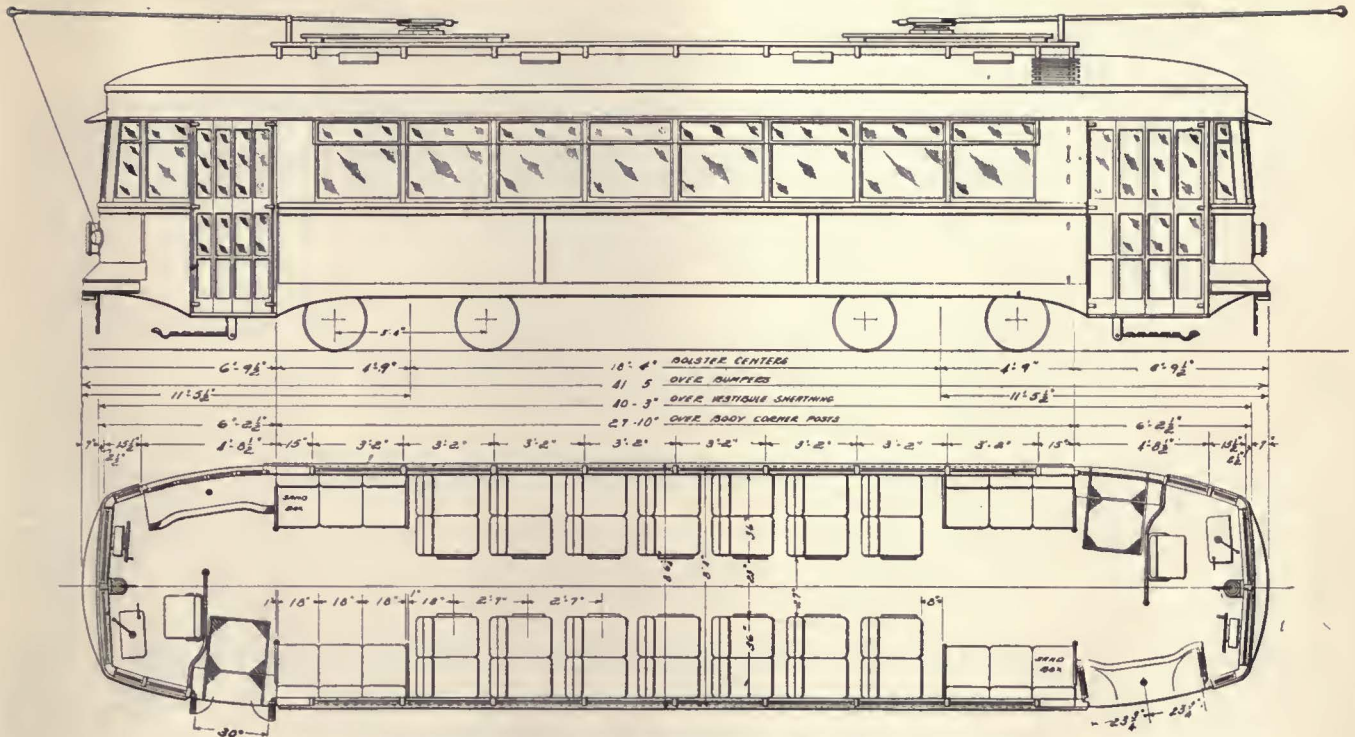
Detailed description of the nine trail cars ordered last April by the Washington, Baltimore & Annapolis Electric Railroad for service between Baltimore and Annapolis, announcement of which was made in the June, 1929, issue of ELECTRIC RAILWAY JOURNAL, is now available and is published below:

Air brakes.....	Westinghouse ATM
Axles.....	Brill A.S.T.M. A-20-27
Car signal system.....	Westinghouse electro-pneumatic
Couplers.....	Tomlinson MCB tight lock
Curtain fixtures.....	Excel No. 40
Curtain material.....	Pantasote
Destination signs.....	Keystone
Doors.....	Folding
Floor covering.....	N. Y. Belting & Packing Co.
Glass.....	3/16-in. plate
Hand brakes.....	Peacock
Heat insulating material.....	Salamander
Heaters.....	Railway Utility Company
Headlining.....	Agasote
Interior trim.....	Mahogany
Journal bearings.....	Plain
Journal boxes.....	Brill semi-steel
Lamp fixtures.....	Electric Service Supply Company
Painting scheme.....	W. B. & A. standard green
Roof type.....	Arch
Roof material.....	Poplar, canvas covered
Sash fixtures.....	O. M. Edwards
Seats.....	Brill No. 201
Seat spacing.....	2 ft. 11 in.
Seating material.....	Genuine leather
Slack adjusters.....	American Brake Company, type J
Steps.....	Stationary
Step treads.....	Kass
Trucks.....	Brill 27-MCB-3
Ventilators.....	Nichols-Lintern
Wheels.....	36 in. diameter

St. Louis Car Company Builds Electric Locomotive

A combination electric switching locomotive was delivered July 16 by the St. Louis Car Company, St. Louis, Mo., to the Illinois Central Railroad for use at the Chicago terminals. The locomotive weighs 90 tons and is designed to utilize any of three different types of power. It cost \$70,000, and was built in 60 days at the St. Louis shops of the car company. The new unit is 45 ft. in length and is provided with 1,000 h.p. in traction motors. It can utilize oil-electric power, trolley or third rail and storage battery.

Although the Illinois Central plans to use the locomotive for switching purposes, it can be used for road freight and will attain a speed of 35 m.p.h. Two 155 h.p. oil engines are used to drive the electrical generators. In its switching operations the locomotive will pull a 3,000 ton train, or the equivalent of 55 loaded freight cars.



The new Greensboro cars are 41 ft. 5 in. over all and seat 40 passengers

Five Cars for Greensboro, N. C.

The North Carolina Public Service Company, Greensboro, N. C., recently placed an order for five new cars with the Perley A. Thomas Car Works, High Point, N. C. These cars are now being delivered to the railway by the car builder. They are of the double-end type, arranged for one-man service, with front entrance and rear treadle-controlled exit doors. A feature of this car is that the motorman will be seated when operating the controls. The window spacing in front of the car is so arranged that he has a clear view of the street in front of him, and the visibility is not obstructed by wide posts. The flooring of the cars is made up of 1 1/2 in. square rubber tiles of two colors. The total weight of the car is 33,200 lb., and the length over all is 41 ft. 5 in. The length over the body posts is 27 ft. 10 in. and the width over all is 8 ft. 6 1/2 in., while the height from rail to trolley base is 10 ft. 7 in. An all-steel construction is used for the body. The type of car is one-man, double-end, double-truck, and the seating capacity is 40 passengers. A detailed list of the equipment follows:

- Air brakes..... Westinghouse
- Car signal system.... Consolidated Car Heating Co.
- Conduit..... Duratube
- Control..... K-75
- Couplers..... Car builder's
- Curtain fixtures.... Adams & Westlake Company
- Curtain material..... Pantasote
- Destination signs.... Hunter Sign Company
- Door mechanism.... Consolidated Car Heating Co.
- Gears and pinions.... Nuttall
- Hand brakes..... Peacock staffless
- Heaters.... Consolidated Car Heating Company
- Headlights..... O. B. illuminated type
- Headlining..... Agasote
- Lamp fixtures.... Dome, Dayton Manufacturing Co.
- Motors..... Four Westinghouse No. 510—35 H.P.
- Painting..... Ecamel
- Registers..... R-11 with electric back
- Roof material.... Wood slats, canvas covered
- Sash fixtures.... Adams & Westlake Company
- Seats..... Double deck reversible
- Seating material.... Leather
- Slack adjusters.... American, type E
- Step treads, "Kass" Morton Manufacturing Company
- Trolley catenary.... Ohio Brass Company
- Trolley base, form 4.... Ohio Brass Company
- Ventilators..... Railway Utility Company
- Wheels..... Davis

Manufacturers!

The CONVENTION EXHIBIT

Opens Officially at 9 a.m.
MONDAY, SEPT. 30

The Exhibit Committee desires to have everything ready and complete by
SATURDAY NOON,
SEPT. 28

At which time freight doors will be closed

Ship Exhibits Early and Be Ready by Noon Saturday,
SEPT. 28

Gears on Montreal Cars

On page 818 of the August issue of *ELECTRIC RAILWAY JOURNAL* it was stated that the 106 new cars for the Montreal Tramway were to be equipped with Nuttall, Grade BP gears. This statement was inaccurate in that only 76 of these cars are to be equipped with Nuttall and 30 with Tool Steel gears, the latter being manufactured by the Tool Steel Gear & Pinion Company, Cincinnati, Ohio. The 25 two-car trains recently ordered will be equipped with Tool Steel gears.

Automatic Block Signals for Illinois Terminal System

The Illinois Terminal System has ordered from Union Switch & Signal Company materials for the installation of automatic block signals of the colored light type on about 240 miles of track between Staunton and Peoria, Ill., and from Springfield to Mackinaw Junction, Ill.

Lackawanna Contracts Let

Car and meter awards have been made for equipment for the electrified line out of New York

CONTRACTS for the construction of 141 all-steel electric vestibuled motor cars, equipped with roller bearings, by the Pullman Car & Manufacturing Company, Chicago; the construction of 230 horsepower motors and the necessary control equipment for each of these cars by the General Electric Company, Schenectady, N. Y., and for the conversion of a similar number of the latest model of the present suburban coaches as vestibuled trailer cars by the American Car & Foundry Company, Berwick, Pa., have been made by the Lackawanna Railroad. This equipment is for use on commuter trains connecting Hoboken, Montclair, Gladstone and Dover, N. J., comprising 70 miles of route or 160 miles of track, the electrification of which is now under way. The delivery of completed cars is promised, beginning in June next year. President J. M. Davis of the Lackawanna announced the placing of the contracts on Aug. 23.

This equipment can be operated in units of two cars—a motor and a trailer or coupled to form trains of two, four, six, eight, ten or twelve cars. Each motor car will be 71 ft. long and weigh 148,000 lb. complete with electrical equipment, while the trailers will weigh 113,000 lb. each, making the weight of a complete unit 261,000 lb., exclusive of passengers. Each motor car will seat 84 passengers and the trailers 78 or 82 passengers, making a total of 162, or 166 passengers for each unit.

Commuters have repeatedly declared the present coaches are the most satisfactory suburban cars the Lackawanna ever had, but the new equipment will be an improvement over that now in service. They will have the same well distributed lighting arrangement, the same ample knee room between cross seats, slightly wider aisles and be equipped with the most modern type of inclosed electric heaters.

Two-Car Trains for Montreal

Of the 156 new cars which are being ordered by the Montreal Tramways during the present year, the last 50 are to be equipped as complete four-motor units for regular all-day service if necessary, with provision for coupling together for train operation at rush hours. Each of the units of the train is a standard new type car, uniform in size, construction and appearance, with the exception of the straightening of the vestibule platforms for the coupling equipment.

It is intended to operate the second unit as one-man safety cars in all-day regular service on lines suitable for such, but which have very heavy rush-hour traffic. At such periods the units will be coupled to the one-man cars to form the train, the operator of the one-man car taking the duties of conductor of this unit for the time being. These cars are being equipped with the recently developed Westinghouse variable automatic master control system, Westinghouse 510-A2 motors and Tomlinson mechanical and electrical coupler. An acceleration of 3 m.p.h.p.s. and a correspondingly higher rate of braking will be obtained by these cars.

Twenty-five of the units will be of the single-end, double-truck, one-man safety type, seating 54 passengers each and weighing approximately 37,600 lb. The other 25 cars will be of the single-end, two-man type, seating 42 passengers. Over-all dimensions of the two types are the same, with a length over the corner posts of 46 ft. 2 in.; width, 8 ft. 4 in., and height from rail to top of trolley board of 11 ft. 1 in. Bolster centers are spaced 22 ft. 7 in., and the wheelbase is 5 ft. 4 in. Equipment specifications, which are substantially the same on both types, are as follows:

Air brakes.....Canadian Westinghouse Company
Safety car equipment type E relay and quick release
Armature bearings.....Bronze—babbitt lined
Axles.....4-in., 4½-in. gear seat
Bumpers.....Hedley anti-climber
Car signal system.....Faraday, 600 volt
Compressor, Canadian-Westinghouse Company
DH-16

Conduit.....Standard metal conduit
Control, Westinghouse variable automatic master control
Couplers.....Tomlinson form 10
Curtain fixtures.....National Lock Washer Company
Curtain material.....Pantastote
Destination signs.....Keystone
Door mechanism, National Pneumatic Company
GOF, 4½-in. M. engine
Doors, folding.....Front—air operated
Rear—treadle air operated
Fare boxes.....Cleveland Fare Box Company
Finish.....Enamel
Color scheme, M. T. Co. standard green and cream
Floor covering.....Wood slat and Kass tread
Gears and pinions.....Tool Steel Gear and Pinion Co.
Glass.....Selected 21 oz.
Gong.....12-in., foot operated
Hand brakes.....Peacock staffless
Hand straps.....Rigid wood hand rail
Insulating material.....Three ply salamaander
Heaters, Canadian General Electric Company, No. 1285, double element four circuit, 6-in. series
Headlining.....5/16-in. Agasote
Interior trim.....Cherry
Journal bearings.....3½-in. x 7-in. bronze, babbitt lined
Journal boxes.....Cast iron M. T. Company standard
Lamp fixtures, Safety Car Company, type DA comp. fixture
Motors.....Canadian Westinghouse No. 510-A2, 42 hp.
Gear ratio.....13-69
Roof, type.....Arch
Safety car device.....Canadian Westinghouse full safety equipment
Sanders.....O. W. Meissner Company, pneumatic
Sash fixtures.....Metal—Robert Mitchell Company
Seats.....Ottawa Car Mfg. Company, and Canadian Car & Foundry Company
Seat spacing.....2 ft. 6 in.
Seating material.....Rattan
Slack adjusters, American Brake Company, form E-1
Steps.....Irving Co., Saf-Kass
Step treads.....Kass
Track scrapers.....M. T. Company standard
Trolley base.....Nuttall Company US 20-C
Trolley catcher.....Keystone
Trolley wheels, Lyman Tube & Supply Company, Canadian Ideal wheel
Trucks.....Canadian Car & Foundry Company Type F-790
Ventilators, Railway Utility Company Honeycomb
Wheels.....Cast iron, 26 in. diameter
Fenders.....HB tender
Notes—Heaters have Railway Utility Company, thermostatic control.

an order of eleven trackless trolleys have been placed with the Twin Coach Corporation by the Utah Light & Traction Company of Salt Lake City. This statement should read as follows:

"Seven trackless trolley coaches have been ordered from the Twin Coach Corporation, while eight trackless trolleys were ordered from the Cincinnati Car Corporation by the Salt Lake City Company, making a total order of fifteen vehicles of this type."

Details of New Bedford Cars Announced

Additional details are now available covering the twelve cars recently ordered by the Union Street Railway, New Bedford, Mass., mention of which was made in the July issue of *ELECTRIC RAILWAY JOURNAL*. The cars are being built by the Osgood-Bradley Car Company, Worcester, Mass., and are practically identical in design with cars ordered from the same builder by the Altoona & Logan Valley Electric Railway, Altoona, Pa., and by the Scranton Railway.

The principal items are as follows:

Air brakes, Westinghouse straight air, variable load
Armature bearings.....Plain
Axles.....4½-in.
Car signal system, Consol. Car Heating Company
Compressors.....DH-16
Conduit.....Metal
Control.....Westinghouse "UM"
Destination signs.....Hunter-226 RB
Door mechanism.....National Pneumatic
Doors.....Folding
Energy saving device.....100 Amp. Economy Meters
Finish.....Lacquered
Floor covering.....Flexolith
Gears and pinions.....Westinghouse
Glass.....Plate in car body, non-shatterable in vestibules
Hand brakes.....Peacock vertical
Hand straps.....Porcelain rail only
Heaters.....Gold Car Heating Company
Headlights.....O. B. dash illuminating
Headlining.....Agasote
Interior trim.....Aluminum
Journal bearings.....Plain
Journal boxes.....Symington
Lamp fixtures, Electric Service Supplies Company, Twenty 30-volt lamps
Motors.....Four 510 E, 35 hp., inside hung
Painting scheme.....Pullman green and gold
Registers.....Rooke
Roof type.....Arch
Roof material.....Wood—canvas covered
Safety car devices.....Passenger emergency valve
Sash fixtures.....Brass sash
Seats.....Heywood Wakefield de luxe
Seating material.....Monkey grain brown leather
Steps.....Stationary
Step treads....."Kass" safety
Trolley base.....Nuttall lightweight
Trolley wheels.....Kalamazoo
Trucks.....Osgood Bradley
Ventilators.....Osgood Bradley exhaust
Wheels, type.....Steel, 27 in. diameter
Wheelguards.....Bradley truck guard

Fifteen Trackless Trolleys for Salt Lake City

The last part of the first paragraph under "Recent Bus Orders Numerous," appearing on page 816 of the August issue of *ELECTRIC RAILWAY JOURNAL*, states that

ELECTRIC RAILWAY MATERIAL PRICES—AUGUST, 1929

Metals—New York	
Copper, electrolytic, delivered, cents per lb.	18.
Lead, cents per lb.	6.75
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	7.15
Tin, Straits, cents per lb.	46.50
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	48.00
General service	31.50
Bituminous Coal	
Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	\$4.17
Somerset mine run, f.o.b. mines, net ton	1.87
Pittsburgh mine run, Pittsburgh, net ton	1.80
Franklin, Ill., screenings, Chicago	1.50
Central, Ill., screenings, Chicago	1.10
Kansas crushed mine run, Kansas City	2.50
Track Materials—Pittsburgh	
Standard steel rails, gross ton	\$43.00
Railroad spikes, drive, ½ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.40
Hardware—Pittsburgh	
Wire nails, base per keg	\$2.55
Sheet iron (24 gage), cents per lb.	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.55
Galvanized barbed wire, cents per lb.	3.25
Galvanized wire, ordinary, cents per lb.	3.15
Waste—New York	
Waste, wool, cents per lb.	13.
Waste, cotton (100 lb. bale), cents per lb.:	
White	12.5
Colored	9.5

Paints, Putty and Glass—New York	
Linseed oil (5 bbl. lots), cents per lb.	13.3
White lead in oil (100 lb. keg), cents per lb.	13.2
Turpentine (bbl. lots), per gal.	\$0.57
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York	
Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.15
Weatherproof wire base, cents per lb.	20.875

Paving Materials	
Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	\$150
Wood block paving 3½, 16 lb. treatment, N. Y., per cu. yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ½-in., carload lots, N. Y., per cu. yd., delivered	3.25
Cement, Chicago, in carload lots, without bags, f.o.b.	2.05
Gravel, ½-in., cu. yd., delivered New York	3.25
Sand, cu. yd., delivered New York	2.00

Old Metals—New York and Chicago	
Heavy copper, cents per lb.	14.00
Light copper, cents per lb.	12.00
Heavy yellow brass, cents per lb.	8.50
Zinc, old scrap, cents per lb.	3.15
Lead, cents per lb. (heavy)	5.00
Steel car axles, Chicago, net ton	\$16.75
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	18.50
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.25

New Des Moines Cars Received

Delivery was recently made of ten new cars purchased by the Des Moines Railway, Des Moines, Iowa. They are of double-truck, single-end design, arranged for one man operation. Individual leather upholstered seats are provided, arranged in pairs. Special attention has been given to interior decoration and lighting. Artificial illumination is provided by two rows of shaded lamps, directly over the seats. After arrival the cars were placed on public exhibition on a downtown street, where they aroused much comment as to their appearance and interior finish.

Ohio Brass Company, Mansfield, Ohio, announces the opening of its new office at 505 Insurance Building, Dallas, Tex. This office will be the headquarters of T. B. Jones, district sales manager for the company in the Dallas territory.

For your motorman's peace
of mind and yours

**PEACOCK
STAFFLESS BRAKES**

When a motorman has to
compromise the factor of
security because of ques-
tionable brakes, how
can you expect 100%
schedule meeting
and an accident-
free record?

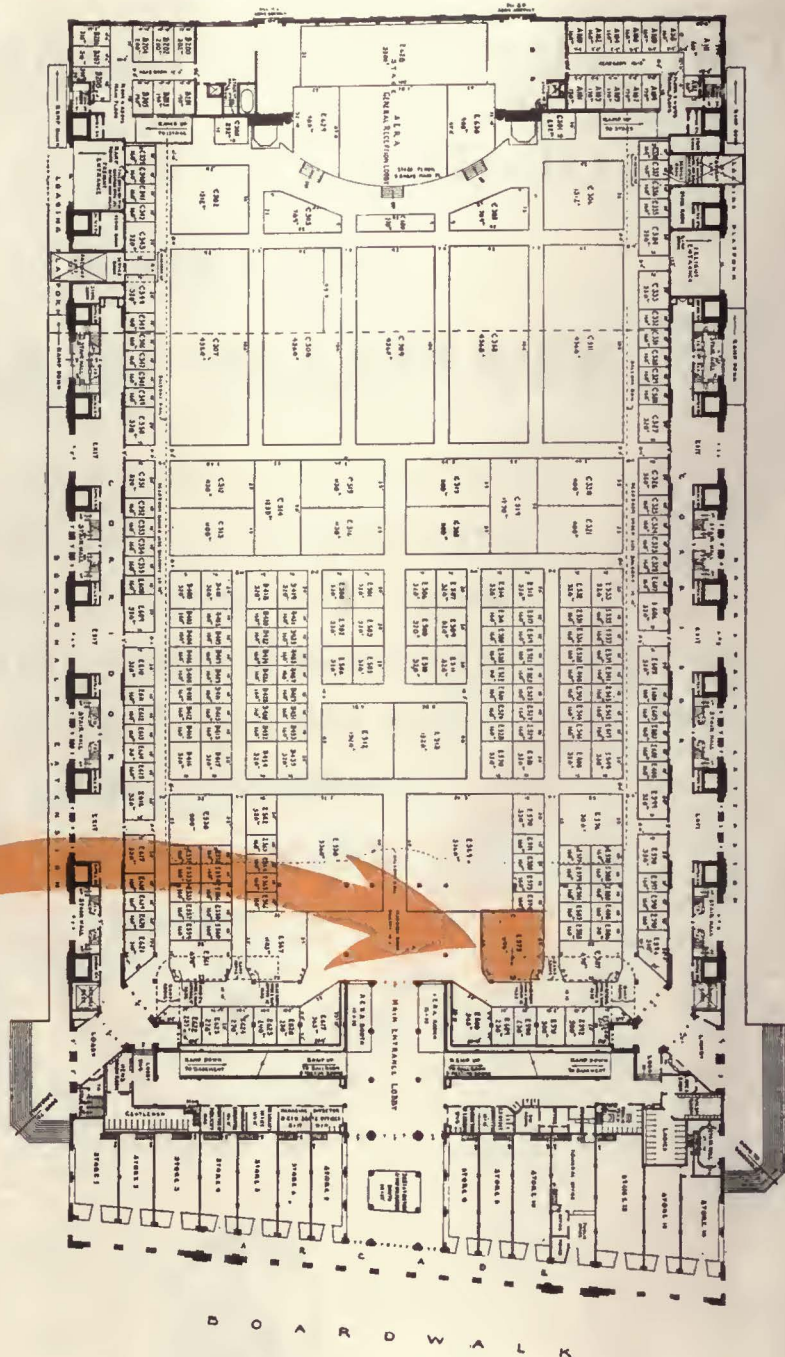


National Brake Company

890 Ellicott Square, Buffalo, N. Y.

Canada:—Lyman Tube & Supply Co., Ltd., Montreal

General Sales Office: 50 Church Street, New York City



Electric Railway Journal

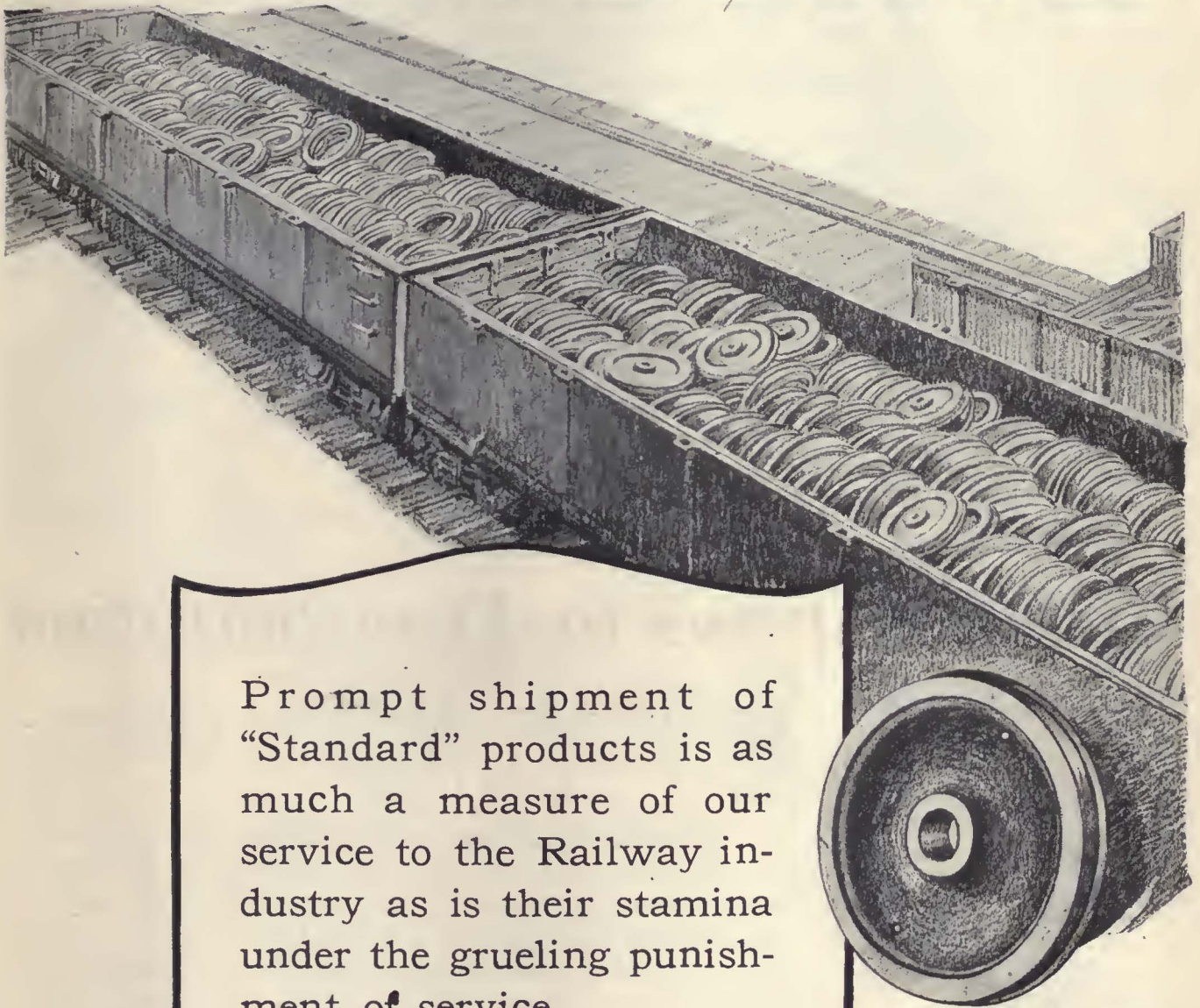
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BOOTH E575

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At the main entrance

STANDARD



Prompt shipment of "Standard" products is as much a measure of our service to the Railway industry as is their stamina under the grueling punishment of service.

WHEELS

AXLES

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ARMATURE SHAFTS



STANDARD STEEL WORKS COMPANY

CHICAGO
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WORKS: BURNHAM, PA.

ST. LOUIS
PORTLAND
SAN FRANCISCO



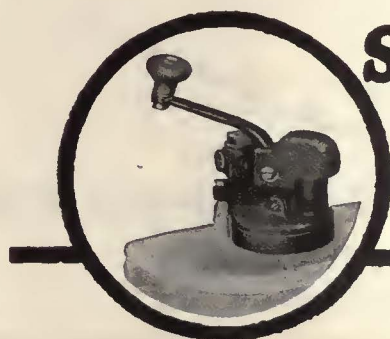
Giving Impetus to Transportation

SPEEDY transportation is vital to present-day conditions. Car riders want it; car owners need it.

An important factor in the realization of this objective is the Safety Car Control Equipment. It brings economic advantages that warrant additional cars . . . assures the quickest possible brake action . . . provides maximum convenience and flexibility in controlling entrance and exit. . . . safeguards operation by interlocking power, brakes, and doors and by centralizing responsibility.

Safety Cars are giving a noteworthy impetus to transportation service on hundreds of traction properties.

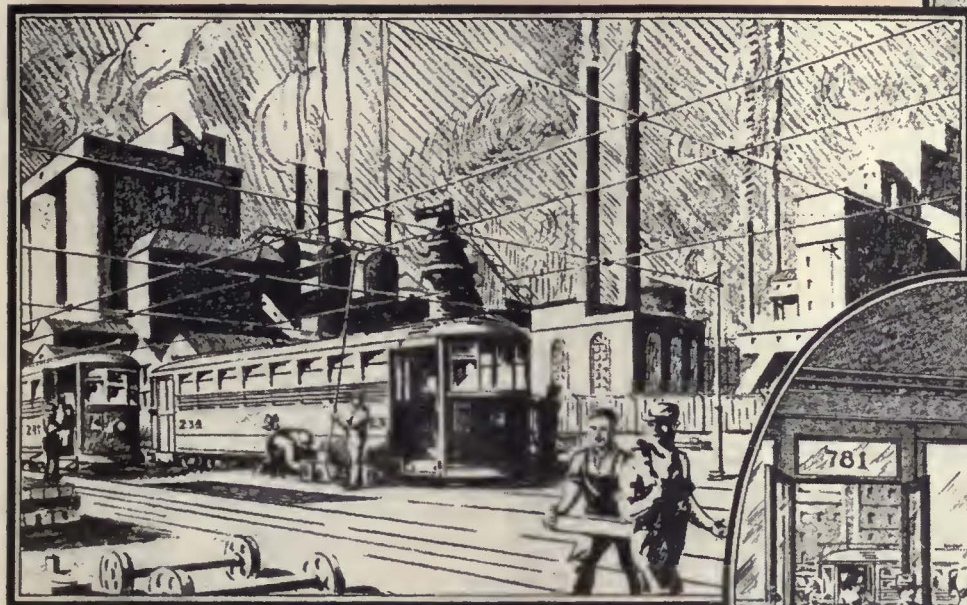
**MODERN
CARS
for
MODERN
SERVICE**



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



The Electric Railway is an outlet of the power, machinery, car building, and other industries. It works for all of them. But its greatest service is to the riding public. Likewise where advertising promotes many interests, its chief function is its service to the consuming public. To long survive, any business must convey its benefits to the ultimate consumer.

BARRON G.
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General Guarantees You at Least >>

a guaranteed
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Savings that
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THESE are excerpts from typical letters we have received. All testify to the unbelievable economies that General's Truck Balloon makes possible. What it has done for these operators it can do for you.

"This truck is running from warehouses to oil field locations in deep and bad sand. With the balloon we run with 70 lbs. air while with high pressure tires we used to have to deflate to that and less to get traction. This caused the tires to blow out prematurely. Tread wear is very slight and mileage much greater."

"We are entirely sold on the balloons you put on our van. After a fast 3,000 mile trip the tires showed no wear, no evidence of transmission of heat from the brake drum to the tire, which used to make our high pressure tires break down within a few thousand miles."

"Our last high pressure tires gave us about 22,000 miles. You will be interested to know that the balloons you put on our job have just been taken off after 57,750 miles—and are now being used as spares."

"Our run is 350 miles on high crown asphalt. Fifty miles of it is hilly, with sharp turns all the way. Because the Truck Balloon eliminates the slippage we had with high pressures we are now able to maintain speeds of 30 to 45 miles per hour. In ten months of operation with the Truck Balloon we have had no heat trouble whatever and tread shows comparatively little wear."



The New **GENERAL**

20% SAVING

reduction of rubber costs
 reduction of maintenance costs
 increase in route coverage
*quickly pay for the replacement
 of high pressure pneumatics*

CONSISTENTLY the pioneer in quality tire progress, General has again led the way with the new Truck Balloon.

Amazing results from actual use in every kind and type of service prove that the tougher the job is the greater the difference when you change to the Truck Balloon. It is the final solution of the toughest tire problems.

With the General Truck Balloon you get all the benefits of true low-pressure: greater cushioning of truck and load, easier steering, maximum traction and non-skid contact; you increase load capacity and at the same time can run at higher average speeds — thereby eliminating 90% of all high-pressure pneumatic tire troubles. You have none of the operating handicaps of solids. Both tire life and truck mileage are materially increased.

Everywhere that the change has been made the answer has been the same. Operators' eyes have been opened to the meaning of real tire savings.

Based upon actual, proved results, we predict that within three years high pressure pneumatic equipment will be obsolete in 90% of all truck operation.

Call in your General Tire Dealer and get the facts on what General's Truck Balloon will do on your job. Built in Akron, Ohio, by the GENERAL TIRE & RUBBER COMPANY.

*Be sure to specify the General Truck Balloon
 on the next truck you buy*

The complete
 General
 Commercial
 Line Includes:

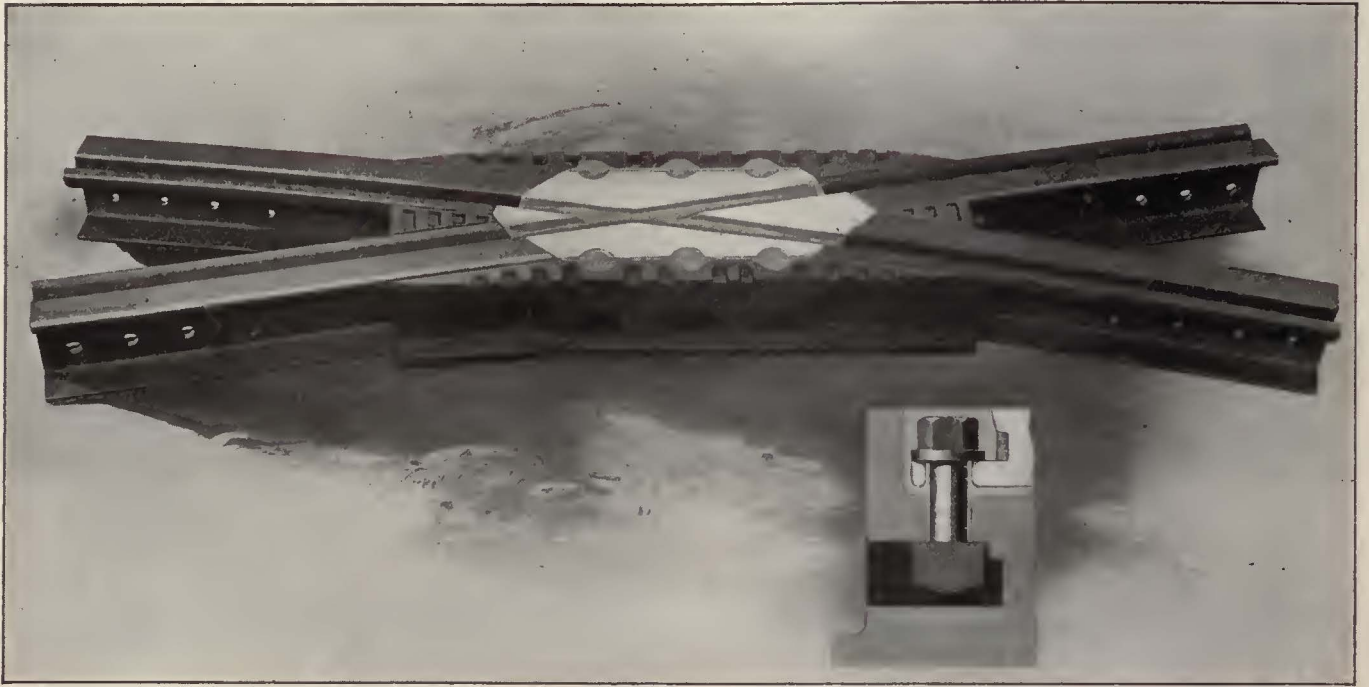
Dual-Grip truck cord;
 Truck Balloon; Bus Bal-
 loon; the "Jumbo" Ford
 and Chevrolet line; Ford
 Express Special; Heavy
 Cushion; Regular
 Cushion; Demountable
 Non-Skid Cushion; Heavy Duty
 speed and regular; high-
 heavy Non-Skid Cushion; Extra
 Air Center Cushion; non-
 skid and rib-tread; High
 Smooth Cushion.

Truck Balloon

LORAIN



TRACK SPECIALS



Iron Bound Hard Center Frog

This Lorain Frog is equipped with a bolted, Spelter-bearing, renewable Chrome-nickel Steel Plate.

The external Arms are rolled steel rails. They are firmly secured to the main structure which is semi-steel. Heat treated Chromium steel hold-down bolts are employed, having a minimum elastic limit of 100,000 pounds per square inch. The material which seals the bolts may be chipped away should it be necessary to renew the Plate.

Nuts are sealed against moisture with asphaltum.

Would you wish to have our quotations on this popular Lorain special of wide utility?

Write our nearest District Sales Office:

Atlanta · Chicago · Cleveland · Dallas · New York · Philadelphia · Pittsburgh

The Lorain Steel Company

General Offices: 545 Central Avenue, Johnstown, Pa.

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UNITED STATES STEEL CORPORATION



Quality Products

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

Dependable Service

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY

CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. Export Distributors—United States Steel Products Company, New York City

Lowest Operating Cost

... BRIGHTER LIGHTS

with this
specially designed
MOTOR COACH
BATTERY

BIGGER profits result from lower maintenance costs. And here's one way to help reduce maintenance charges. Be sure that the batteries you use on your motor coaches give you lowest operating cost per mile.

To accomplish this, hundreds of successful operators use the Exide Motor Coach Battery expressly planned for heavy motor coach service. This battery backs a generator of the right capacity on their coaches. They have bright, well-placed interior lights that furnish *reading comfort* and attract fares. Their headlights are continuously strong for on-schedule trips. And operating cost is reduced to a minimum because of the scientific construction of the Exide Motor Coach Battery.

Such scientific construction is the result of forty-one years' experience building dependable batteries combined with a thorough knowledge of motor



coach battery needs. The Exide Motor Coach Battery has the stamina for long running hours, the power for peak lamp loads, and the ruggedness for day-in-and-day-out service. A letter will bring you full information on this really remarkable battery.

Exide

MOTOR COACH BATTERY

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

Attractive service



DODGE MOTOR

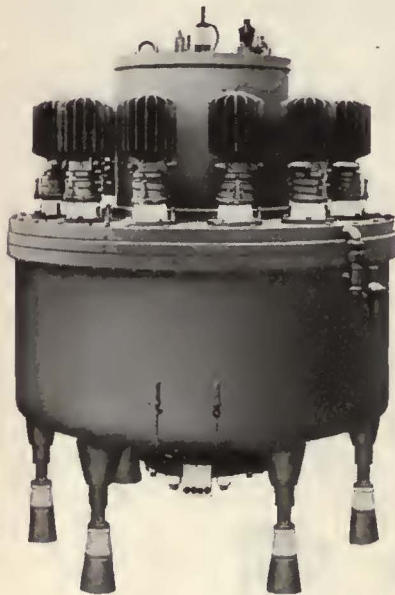
SOLD AND SERVICED BY

for your patrons at minimum cost

WITH Dodge Brothers Motor Coaches you give your patrons everything they want—the speed, quiet, safety, comfort and inviting appearance that only the finest of motor coaches can provide And the initial and operating costs are lower. Dodge Brothers 21-passenger street car type coach and 16-passenger Parlor Car fit the needs of operators everywhere.

**BROTHERS
COACHES**

DODGE BROTHERS DEALERS EVERYWHERE



A new horse that can be hitched with the old ones

Mercury arc power rectifiers can be used in conjunction with rotary converters now installed.

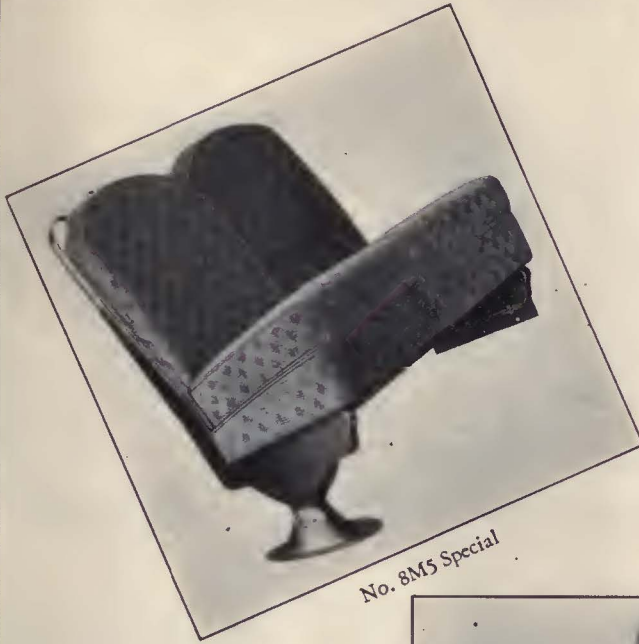
If the converter has a shunt characteristic it may be closely connected in parallel with a rectifier.

If the converter has a flat compound characteristic or an over compound characteristic, it may be connected in parallel with a rectifier provided sufficient distance intervenes between the two units. Remember, a rectifier may be installed anywhere, without special foundations, and without regard to the nuisance problem that would attend the noise and vibration of rotating machinery. Remember, too, that a rectifier can be operated at a distance as safely and conveniently as if the operator were in the same room.

The new horse can be hitched with the old. It will work better and more efficiently, give less trouble, and will be ranked as up-to-date equipment long after the old ones are obsolete.

AMERICAN BROWN BOVERI CO., INC.
CAMDEN, N. J.

AMERICAN BROWN BOVERI



No. 8M5 Special



No. 327-M Special



No. 190-P Recliner

See Them in Atlantic City!

In spaces 506 and 507 at the American Electric Railway Association Convention and Exhibit at Atlantic City September 28 to October 4, the latest Heywood-Wakefield railway seats will be on display. Since the last exhibition, we have developed several new, practical features about which you will want to know and which we will be pleased to show you. The three seats illustrated above, and many other patterns, will be exhibited at the Heywood-Wakefield space.

HEYWOOD-WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
 J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
 H. G. Cook, Hobart Bldg., San Francisco, Calif.

311 Railway Exchange Bldg., Chicago, Ill.
 A. W. Arlin, Delta Bldg., Los Angeles, Calif.
 The G. F. Cotter Supply Co., Houston, Texas

THE RAILWAY AND POWER ENGINEERING CORPORATION
 133 Eastern Avenue, Toronto; Montreal; Winnipeg, Canada

3750 MILES DAILY

The Aronimink Transportation Company operates a fleet of 27 modern vehicles which travel 3750 miles daily in serving the suburbs of Philadelphia. They have standardized on KOOLMOTOR PRODUCTS because they give—

- More efficient lubrication
- More economical vehicle operation
- Decreased expenditure for replacement parts

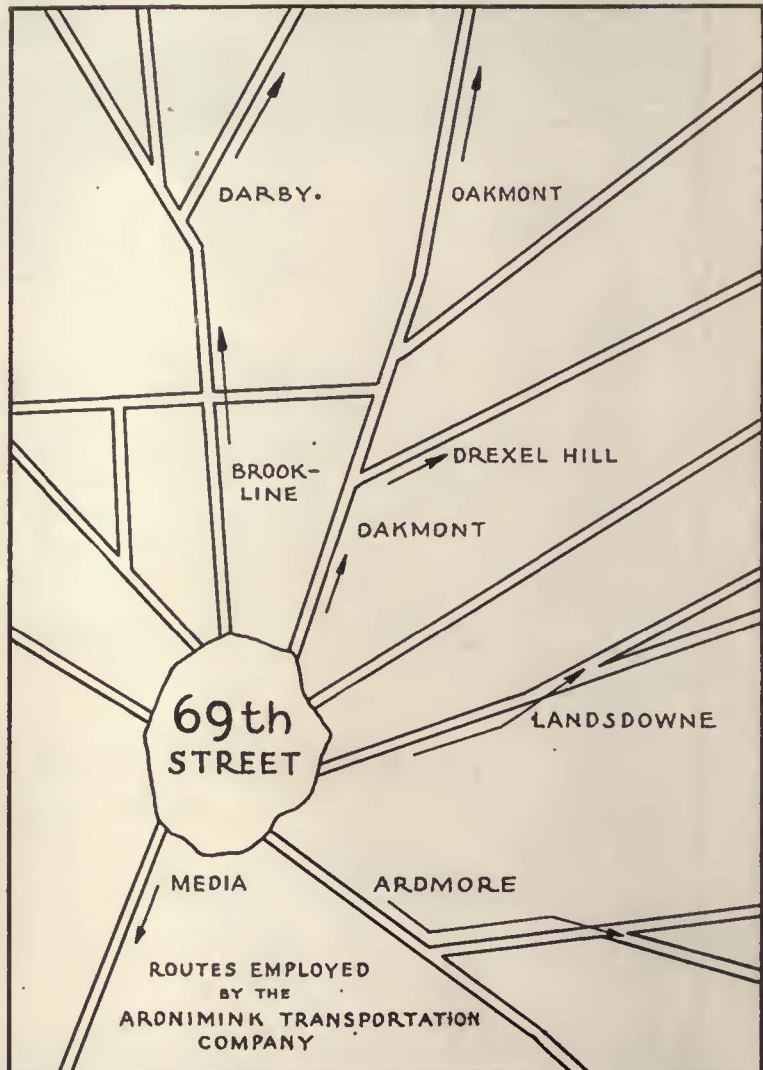
Koolmotor Products are refined entirely from the finest crudes of the Pennsylvania district without mixture with any other oils. They are tough, full-bodied, able to take the punishment of severe bus operation, and they stand up for miles after ordinary oil has broken down.

Our engineers will be glad to give you details of Koolmotor bus lubrication.

CITIES SERVICE COMPANY

60 Wall Street  New York City

KOOLMOTOR PRODUCTS



CITIES SERVICE COMPANY understands the problems of bus owners because it has had bus problems of its own. Several of its subsidiaries are transportation companies, operating fleets of buses. Cities Service brought its 67 years of experience in the oil business to the solution of their lubrication problems—and it offers you the benefit of this experience.



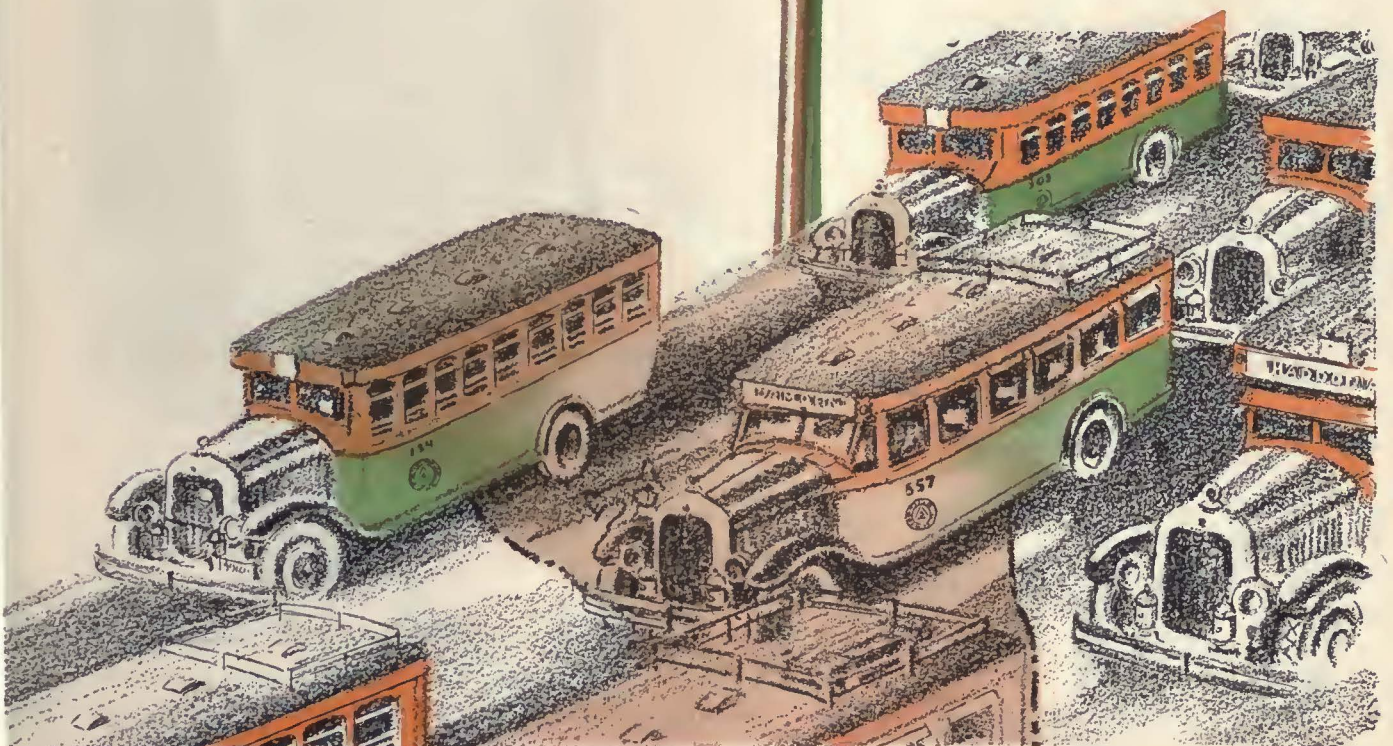
... give

KOOLMOTOR

*a severe test in
Transportation*

PRODUCTS

*Aronimink
Company's Fleet*



A 100% user Tells Why you should install Ohmer Registers

HAVE you ever wondered just *how* OHMER Registers speed up service and increase profits?

Here are some of the ways . . . given by a 100% user of OHMER Registers, Mr. W. D. Allen, of the Hamburg Railway Company, Buffalo, N. Y.

Read what Mr. Allen says about the *ease of handling rush hour business*.

"We find it (the Class 80 Register) adaptable on our short heavy city runs as well as on our suburban runs with variable rates of fare. Some of our routes are quite heavily traveled, averaging 50 to 60 passengers per trip during the morning and evening hours, and our operators are quite able to handle the loads with proper dispatch and keep on schedule time."

And here's what Mr. Allen writes about *protecting fares*.

"Receipts are issued to all passengers and are collected on their departure. This not only prevents over-riding but affords the company positive immediate means of field checking."

Quoting Mr. Allen on *faster auditing*:

"The master sheet has speeded up the auditing of our trip sheets and affords us at a glance the needed information for an 'on and off' check."

About *maintenance* Mr. Allen writes:

"Regarding the maintenance of these registers, we have found it very normal. In fact, the minor mechanical difficulties which we have encountered we feel arose from inexperienced or extremely careless operation."

The Hamburg Railway Company is 100% OHMER equipped.

"The receipt of our last order makes us 100% users of OHMER Registers on both our buses and street cars. We have tried various ways of registering and accounting our fares and are satisfied that your register fills our every want."

OHMER Registers will do the same for you

Increase the profits from every bus and street car you operate. Do it with the same type equipment that is cutting costs and increasing profits for the Hamburg Railway Company and thousands of other transportation companies the country over. Install OHMER Registers on every one of your cars and buses and bank extra money every month.

Find out all about OHMER Registers . . . about the models best suited to *your* business. Write today for catalog and any other information you would like to have.



The Class 80 Register

This is the type register which is installed on the buses of the Hamburg Railway Company in Buffalo. This type register "accomplishes everything that is necessary," according to Mr. Allen.

OHMER
REG. U.S. PAT. OFF. AND OTHER COUNTRIES
FARE REGISTER COMPANY
DAYTON, OHIO, U. S. A.



Passenger comfort combined with attractive simplicity feature the interior of the lightweight one-man interurban.

Despite severe automobile competition, these lightweight interurban cars of the Kentucky Traction & Terminal Company paid for themselves in three years.

Complete Car Replacement

Returns Investment In Five Years With

CINCINNATI CARS

At Lexington, Kentucky



Quotations from an article, in the August, 1929, issue of Electric Railway Journal, by Mr. F. W. Bacon, Vice President of the International Utilities Company

INVESTMENT

On Both Interurban

“ON a property of this size, facing the rapid growth in automobile competition, it was obvious that the possibilities for the development of transportation business were limited. The maximum length of ride on the city lines is not more than 1 mile, and under these conditions the effect of direct automobile competition and, in addition, their tendency to pick up passengers waiting for street cars, is particularly severe.” . . .

“Obviously, the question of greatest interest is whether or not the investment in new equipment was justified. We are quite convinced that it was. In fact, if we had attempted to continue operation of the interurban lines with the old equipment, this part of the property would have long since been abandoned.”

“On the most conservative basis of comparison with the old cars, the investment in the interurban equipment was liquidated within three years. This has been accomplished despite an average annual reduction in gross revenue of approximately 5 per cent. On the city lines the new car investment was liquidated within approximately a five-year period.”

LIQUIDATED

And City Lines - - -

PRIOR to the installation of new cars it had been found impossible to increase the revenue; in fact, the property was steadily losing ground in the face of growing automobile competition. It should be noted particularly that there has been an increase of 30.1 per cent in passenger car-miles operated for the five-year period with new equipment, compared to the preceding five years with the old cars. This brought an increase of 17.8 per cent in gross revenue, and an increase of 10.6 per cent in the number of revenue passengers carried. All of this is based upon a ten-year comparison—five years with old equipment and five years with the new cars. Operating expenses decreased only 1.3 per cent. The costs per car-mile, however, were reduced from an average of 20.9 cents for the old equipment, to 15.8 cents average over the five-year period with new cars, or a net reduction of 24.4 per cent. All operations in this comparison, both before and after the installation of new cars, were one-man. The net result of the investment in new cars has been (after deducting interest at the rate of $7\frac{1}{2}$ per cent on the new cars) to increase the gross income 50.9 per cent over the five-year period, while at the same time permitting service to be increased 30.1 per cent. The net annual return on the investment in new cars was 22.6 per cent. It seems quite obvious, therefore, that the investment in new equipment was amply justified.”



TRACK SAVING ALONE JUSTIFIES INVESTMENT



“**A**DDING together the amount creditable because of increased life of track through decreased wear and tear with light-weight equipment, and the direct reduction in maintenance cost, the total saving is approximately 10.7 per cent on the cost of the new cars. On the basis of a permanent property, therefore, the investment in new cars is justified by the figures for track economies alone. The facts of outstanding interest are not only the reduction in total cost, but in the track cost per car-mile operated, which is about half the former figure. The ton-mile information is approximate only, but on the basis shown represents about a 40 per cent decrease despite considerably increased car mileage. The costs for maintenance per mile of track during the latter periods—with increased age of the structure—in comparison with earlier years, seems of particular interest and significance.”

THE CINCINNATI CAR CORPORATION
CINCINNATI, OHIO



Gasoline *and* Motor Oil must work in harmony

GASOLINE and motor oil perform entirely different functions in a motor coach, yet the efficiency of the one has a marked influence on the other.

The fluid friction caused by too heavy a motor oil increases the consumption of gasoline, sometimes as much as 8%. A gasoline that does not ignite readily and burn completely produces excessive motor oil dilution—sometimes to the point of decreasing lubricating quality 50%. If you would get the most mileage from gasoline, the most efficient lubrication from motor oil, select a fuel and lubricant that work in harmony.

Red Crown Gasoline and Polarine Motor Oil have been refined to work in harmony, to give that perfectly balanced performance which insures efficient service and low cost operation. Red Crown burns clean, gives power and mileage. Polarine is rich and sturdy, supplies thorough, efficient lubrication to the motor.

Try this combination in one of your motor coaches. The combined operating cost of Red Crown and Polarine will be better than that of other fuel and motor oil.

Our engineering bulletin "Motor Coaches and Their Lubrication," is a thorough treatise on the subject. Any motor coach company executive will find in this bulletin valuable information.

Would you like to look over one of these bulletins? We will be pleased to send a copy at your request.

STANDARD OIL COMPANY (Indiana)

General Offices: 910 S. Michigan Ave.

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St. Louis
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STRUCTURAL STEEL

Fabricated STEEL STRUCTURES
for every purpose



Progress Picture, Power Station

Fabricated Structural Steel by
AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

Manufacturers of STEEL STRUCTURES
of all classes, particularly

BRIDGES AND BUILDINGS

Roof Trusses, Columns, Girders, Towers and Poles, etc.

General Office 71 BROADWAY, NEW YORK, N. Y.

Contracting Offices in Principal Cities



The motor coaches of the Fort Dodge, Des Moines & Southern Transportation Company, Boone, Ia., are 100% Goodyear-equipped

3,600 Bus Miles Daily in Iowa

A large motor coach operation in Iowa raises problems more acute than those encountered in many states. First of all, Iowa is rural, with many miles of country roads between its cities. Every type of weather and road condition has to be met. There are snow banks to buck in winter—a constant possibility of mud in any season.

It is a test to show what the famous traction of the Goodyear All-Weather Tread adds to a tire, as well as a test of straightaway mileage.

Consequently, these facts take on special interest. "Our routes cover 475 miles of Central Iowa highways, principally gravelled, with a meager percentage of paved roads. The regular scheduled bus mileage throughout the year will average 3,600 miles daily and will be somewhat augmented by special or charter bus operation.

"We have been extremely well impressed with not only the tire mileage obtained from Goodyear Tires, but also with the efficiency of Goodyear service during the past two years in which our thirty-three buses have been exclusively equipped with Goodyear Tires." These words were written by C. H. Crooks, President, Fort Dodge, Des Moines & Southern Transportation Company.

The highest individual distance traveled by a tire in this operation has been 70,601 miles. Another of these Goodyears has run 65,623 miles, and five more have each traveled more than 50,000 miles.

This certainly is an example of fitting the right tire to the hauling duty. Goodyear Truck and Bus Tire Service Station Dealers everywhere are equipped to render the same service to you.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service

GOODYEAR

*Our best friends
become
our poorest customers.*

A sad story—but true

THE railway lines that started to equip with "Tool Steel" gears and pinions 5, 10, or 15 years ago are now reaping the benefits in practically eliminating their gear purchases.

Our best friends are our poorest customers—figure it out for yourself.



The Tool Steel Gear & Pinion Co.
CINCINNATI, OHIO

TOOL-STEEL QUALITY
GEARS AND PINIONS

The Standard of Quality

The illustration shows a large gear with a smaller pinion meshing with it. The gear has markings: 'A. A. 74' on the left and 'FEB 19' on the right. The background is a dark, stylized banner.

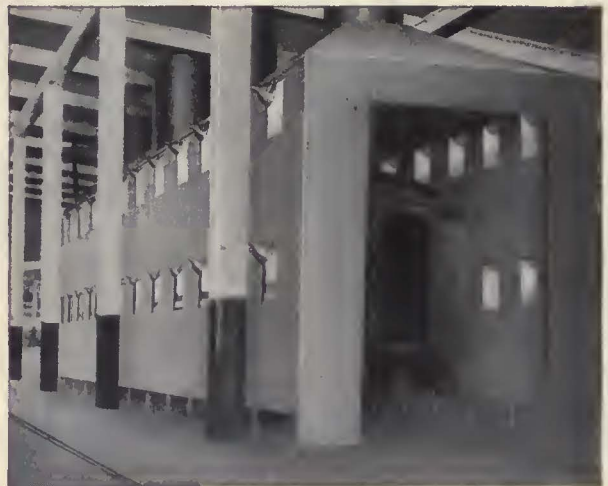


DeVilbiss Stationary Canopy Type Car Exhaust (Patent applied for)

MAINTENANCE factors in the electric railway field will find DeVilbiss has exactly met the highly specialized requirements of their finishing departments.

Every detail of DeVilbiss equipment for railway and bus finishing is designed for the particular task and the working conditions peculiar to the task. This fact is outstandingly revealed by DeVilbiss installations of exhausting equipment which assure speed, safety, economy, and perfect results.

It costs you nothing to learn how DeVilbiss equipment is serving the finishing needs of the modern electric railway operator.



DeVilbiss Tunnel Type Car Exhaust.

DeVilbiss

Spray-PAINTING FINISHING System

Spray guns of various types and sizes.

Pressure feed paint tanks and containers.

Air transformers and accessories.

Complete outfits from the smallest hand-operated units to the largest industrial installations.

Spray booths, exhaust fans and approved lighting fixtures.

Air compressing equipment

Air and fluid hose and connections

THE DEVILBISS COMPANY

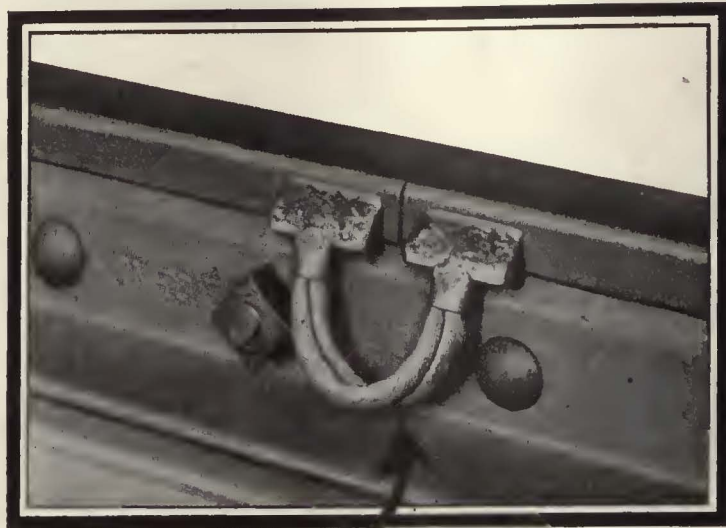
PHILLIPS AVENUE / TOLEDO, OHIO

NEW YORK PHILADELPHIA CLEVELAND DETROIT INDIANAPOLIS CHICAGO ST. LOUIS
SAN FRANCISCO WINDSOR, ONT.

Direct factory Representatives in all other territories

American Steel & Wire Company ARCON RAIL BONDS

"Trade Mark Registered"



Arcon "A" Bond in detail and installed

A NEW principle of design is embodied in Arcon Rail Bonds. *This is the open terminal.*

The open terminal has many distinct advantages. All terminals provide for *easy* arc manipulation. The end of the copper conductor is approximately one-eighth of an inch from the rail, and located in an open space which insures per-

fect welding of the copper wires. The sloping surface of the terminal after welding is a novel and important feature in arcweld bonds.

Be convinced by a practical demonstration which we will gladly give you at your convenience.

Prices and literature mailed upon request.

AMERICAN STEEL & WIRE COMPANY

Subsidiary of United States Steel Corporation

CHICAGO.....208 S. La Salle St.	ST. LOUIS.....506 Olive St.	NEW YORK.....30 Church St.	BALTIMORE.....32 S. Charles St.
CLEVELAND.....Rockefeller Bldg.	KANSAS CITY.....417 Grand Ave.	BOSTON.....Statler Bldg.	BUFFALO.....670 Ellcott St.
DETROIT.....Foot of First St.	OKLAHOMA CITY.....First Nat'l Bank Bldg.	PITTSBURGH.....Frick Bldg.	WILKES-BARRE.....Miners Bank Bldg.
CINCINNATI.....Union Trust Bldg.	BIRMINGHAM.....Brown-Marx Bldg.	PHILADELPHIA.....Widener Bldg.	DALLAS.....Praetorian Bldg.
MINNEAPOLIS-ST. PAUL.....Mercants Nat'l Bank Bldg., St. Pau	MEMPHIS.....Union and Planters Bank Bldg.	ATLANTA.....101 Marletta St.	DENVER.....First Nat'l Bank Bldg.
		WORCESTER.....94 Grove St.	SALT LAKE CITY.....Walker Bank Bldg.

UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle

Cutting the Cost of Trolley Pole Service!

THE actual cost of trolley pole service is not confined to the purchase price of the pole itself. What the pole can do from day to day to keep down delays, avoid traffic tie-ups and eliminate frequent repairs or replacement of poles—are factors that determine the ultimate cost of trolley pole service.

NATIONAL-SHELBY Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service.

In addition, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

NATIONAL TUBE COMPANY, Pittsburgh, Pa.
Subsidiary of United States Steel Corporation





Aluminum Busbars for long life—Lower Cost...

MORE than twenty years of hard steady service in this country has proven what Europe already knows. That Aluminum Busbars not only effect a real saving in cost, but perform their transmission functions steadily and reliably, day after day and year after year.

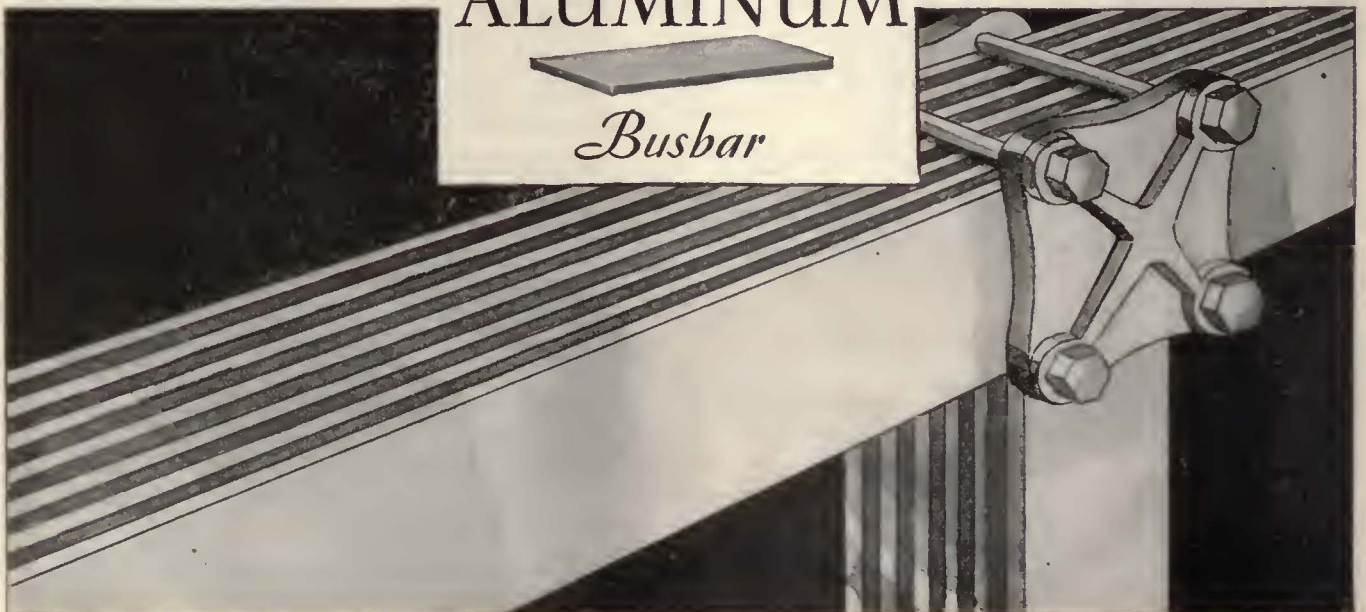
The booklet, "Aluminum Busbars," contains useful tables of weights, carrying capacities and physical properties. May we mail you a copy?

ALUMINUM COMPANY OF AMERICA
2463 Oliver Bldg., Pittsburgh, Pa.
Offices in 19 Principal American Cities

ALUMINUM



Busbar



◆◆ BEHIND THE PYRAMIDS—9 ◆◆



20 days in a unique furnace



View of part of a ring furnace

THE "green" blocks as they come from the moulding machines are entirely unsuitable for use as brushes, though they have gone through eight major manufacturing operations, and innumerable minor ones, all under accurate scientific control. The next operation is baking. This is done in an unusual ring-type furnace, of exclusive design. The blocks, or in the case of small brushes, the pre-formed brushes themselves, are packed in the furnace, which is then fired by gas to a high temperature, carefully kept within close limits. The entire operation takes about 20 days. During it, the pitch binder is carbonized, the blocks and brushes made mechanically strong, and the material given the proper degree of electrical conductivity.

This unusual ring furnace is so arranged as to make continuous operation possible. All operations necessary to this process—loading, heating, firing, cooling, unloading—are conducted continually. In design, in efficiency, and in closeness of temperature control this furnace is most unusual, in fact, unique in brush manufacture.

We feel that our pride in it is fully justified by its results.

Time and money are saved by this furnace, which savings are passed along to you. In addition, better quality brushes are made possible, with that degree of uniformity for which National Pyramid Brushes are famous.

An interesting moving picture film illustrating in detail the processes used in the manufacture of carbon brushes will gladly be shown on request to any organization of engineers or students

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide **UCC** and Carbon Corporation

Carbon Sales
Division



Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco



The Texas Company

announces

With the acquisition of the Penniman patent rights and in combination with other rights, The Texas Company is in a position to offer to the Electric Railways of the country a new power-saving principle of lubrication.

Speaking conservatively, a 20 per cent saving in power is assured — 33 per cent has been attained.

Executives of Electric Railways are invited to correspond with us to secure complete data.

THE TEXAS COMPANY

Lubricating Division

Dept. L, 17 BATTERY PLACE, NEW YORK CITY

NOTE—these savings do not require any radical change in present methods

GARY

WROUGHT STEEL WHEELS



The unvarying dependability of Gary Wheels is a natural result of (1) extensive steel-making knowledge, (2) long wheel-making experience, and (3) a policy of making every wheel that leaves the plant maintain and add to the reputation the Gary Wheel enjoys.

Illinois Steel Company

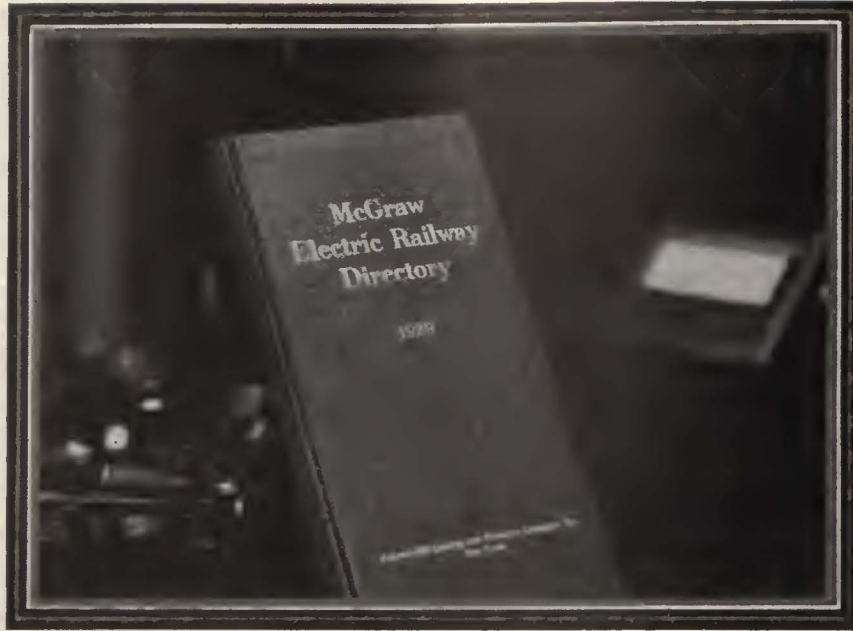
Subsidiary of United States Steel Corporation

General Offices:

208 South La Salle St., Chicago, Illinois



ALL THAT GOOD WHEELS SHOULD BE



Order This Edition—Now!

McGraw Electric Railway Directory

THE 1929 Edition of the industry's standard reference authority—an up-to-date, reliable guide to the active electric railway companies in the United States, as well as in Canada, Mexico and the West Indies.

Many changes in company management, personnel, and technical practices of the industry have taken place during the past year. The McGraw Electric Railway Directory will keep you abreast of these changes, and provide you with the data you continually need on this highly specialized field.

This volume is especially designed for railway operators and officials as an accurate guide to the industry, and as a personnel directory. For manufacturers in search of intimate knowledge of the field from a sales point of view, this new edition will prove an invaluable aid.

The Electric Railway Directory covers the entire Electric Railway Industry, including all electric railways, interurban and street railways, subway and elevated roads, electric railways with complementary bus service, subsidiary bus lines and the important electrified steam roads.

Listed in this comprehensive survey of the industry are all the active operating companies; the holding companies; their managing and operating personnel; communities served; rolling stock; track mileage; shop locations; motor bus data—and other pertinent reference information which includes:—

Names and addresses of officials and principal department heads, including Purchasing Agents, Superintendents, Plant Engineers, Master Mechanics, Electrical and Mechanical Engineers Division and Resident Managers, Bus Managers, etc.
Names of principal communities reached by each company.
Names of subsidiary bus companies.
Names and addresses and officers of affiliated holding or controlling companies and of properties controlled by each.
Location of repair shops.
Location of power plants, and their total capacity.
Mileage of the road, owned, leased and track-are rights.
Miles in paved streets.
Gage of track.
Number and kind of cars used.
Number of buses operated.
Miles of bus routes.
Number of garages and capacity.
Rates of fare.
Transmission and trolley voltages.
Number and capacity of sub-stations.
Officers and Executive Committees of Electric Railway Associations.
Commissioners and principal assistants of National and State Railway and Public Utility Commissions.
Alphabetical list of Electric Railway Officials, giving company connections.

The 1929 Directory is an invaluable source for information on the Electric Railway Industry that you constantly need. Order one or more copies now for your administrative, sales, engineering and credit departments. Also copies for your branch offices and representatives.

Bound in Full Imitation Leather—Handy Pocket Size

Price, \$10.00 per Copy

Limited Edition

McGraw Electric Railway Directory,
475 Tenth Avenue, New York, N. Y.

Please send us copies of the new 1929 Electric Railway Directory—and invoice at \$10.00 per copy.

Name

Company

Address

City State

Why the man who changes the tires likes Goodyear type "K" rims

These eleven pictures show the remarkable ease with which the operation is performed



Opening Rim 1—Insert tool in notch near split. Push downward and toward center of rim.



Opening Rim 2—Insert tool in second notch and push handle downward toward center of rim.



Closing Rim 1—Match valve notches in rim parts. Grasp and spread as shown. Hook end of split section on ring.



Closing Rim 2—Press split section into place and finish closing with kick or light blow downward and outward from center of rim.



Applying Tire 1—Rest rim section on a 2-inch block as shown. Apply tire, valve pointing upward.



Applying Tire 2—Match up position of valve notches in each section of rim.



Applying Tire 3—Stand on ring section, near valve, to hook rim halves together.



Applying Tire 4—Continue walking around rim.



Applying Tire 5—Close rim by dropping on block or with gentle blow from a 2- to 4-pound hammer.



Tire on Rim—Ready for inflating and mounting on wheel.



Removing Tire—Deflate and proceed as shown by Figs. 1 and 2.

For complete information, and full co-operation of its staff of engineers, write Goodyear, Akron, Ohio, or Los Angeles, California



Copyright 1929, by The Goodyear Tire & Rubber Co., Inc.

Type "K" Truck & Bus Rim Equipment

Smooth starting . . . rapid pickups . . . quiet operation . . . power savings . . . riding comfort . . . when car journals are equipped with . . .

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

The operating economies and better riding qualities made possible by the application of Hyatts are well known to many city and interurban car companies through actual service.

Hundreds of Hyatt equipped cars in various parts of the country today are evidence of Hyatt acceptance and faithful performance.

To those who may not be acquainted with Hyatt contributions to increased public good will and patronage, we welcome the opportunity of presenting facts and figures on anti-friction bearing journals.

The changeover to existing equipment, or their adoption to new cars, is made easy through Hyatt conformance to A. E. R. A. standards.

From whatever angle you look at it, the Hyattway is the Saving Way . . . the Right Way.

HYATT ROLLER BEARING COMPANY
Newark Detroit Chicago Pittsburgh Oakland



Hyatt Roller Bearing Journal Boxes fit A. E. R. A. pedestals, size for size. Existing equipment can be modernized by their adoption just as easily as they are applied to new equipment.



Carnegie Wrought Steel Wheels for electric railway service are multiple-life wheels. Which means that when the ordinary wheel is worn out and ready for the scrap heap, the multiple-life wheel is still good for many years of service. The cost of reconditioning the contour is trifling compared with the cost of a new wheel. A special process of rolling and forging under enormous pressure insures a homogeneous structure, free from irregularities that might cause failure.

In city service, Carnegie Wheels have an additional advantage in that cars may be speeded up with safety over crossings, with less possibility of damage to special track work.

Operators who figure on a cost-per-mile basis will find Carnegie Wrought Steel Wheels the outstanding value in the wheel market today.

Booklet on request.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

CARNEGIE BUILDING ∞ PITTSBURGH, PA.

SHELL

THE transportation or industrial engineer who uses Shell lubricants has a world of expert opinion with him. Many of the most profitably operated properties in the country are 100 per cent Shell lubricated.

The widespread and growing use of Shell oils* and greases is due to the Shell policy of *exactly* suiting the lubricant to a specific need. Shell engineers do not have to recommend stock oils—which, at best, only *approximate* particular requirements.

Talking over your lubrication needs with a Shell technician when he calls, places you under no obligation . . . and more than likely will result in measurable operating and maintenance economies for you.

SHELL PETROLEUM CORPORATION
SHELL BUILDING / / / ST. LOUIS

*Shell Motor Oil is made in correct grades for every bus, truck and passenger car engine. The one oil with all 4 essentials of complete and proper lubrication.

1. Ideal Body at All Operating Temperatures
2. Low Carbon Content
3. Non-Fouling Carbon
4. Low Pour Point



SHELL

© S. P. C., 1929



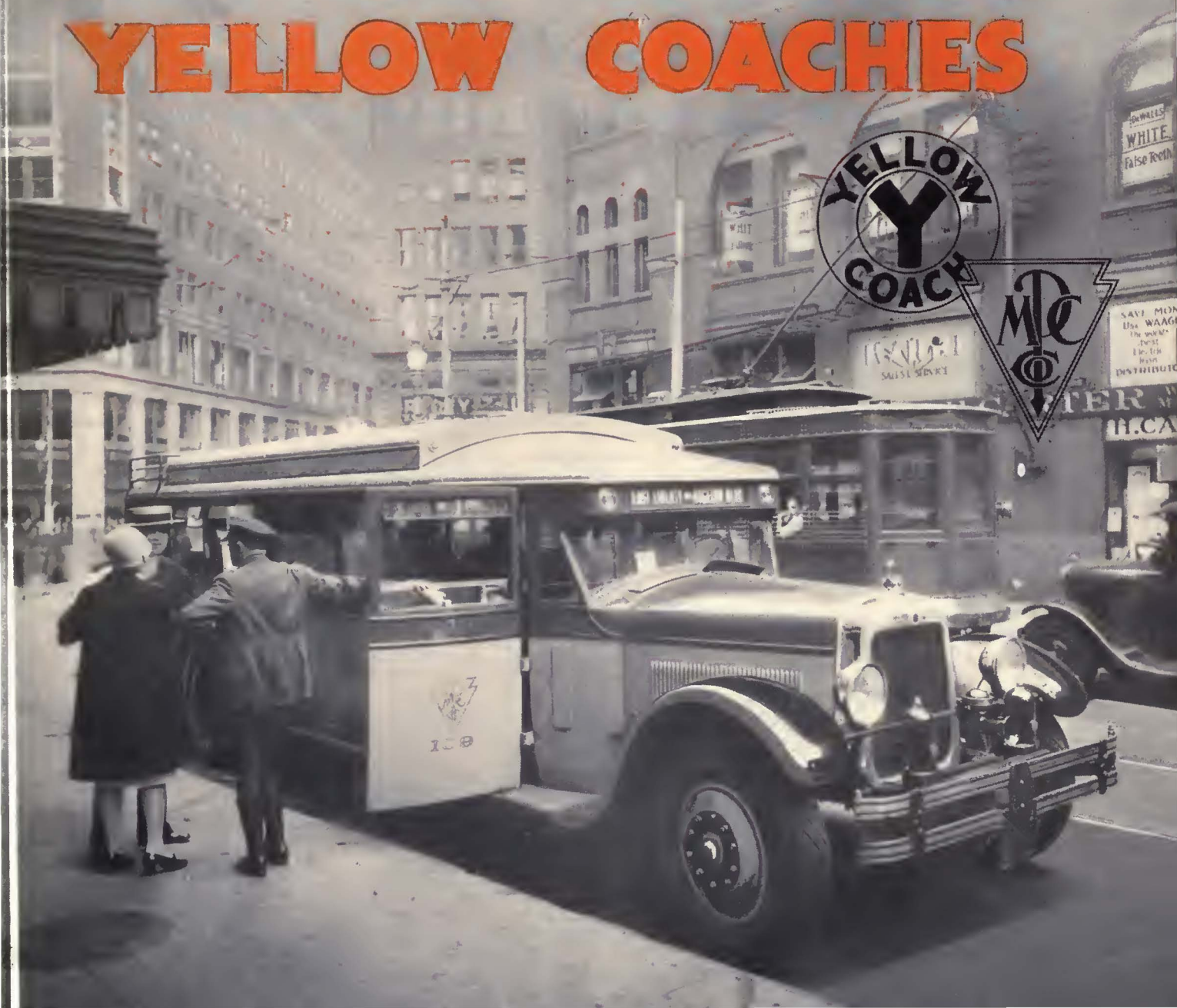
OILS FOR EVERY TRANSPORTATION AND INDUSTRIAL SERVICE

PITTSBURGH



Where severe operating conditions prevail....there you find

YELLOW COACHES





80% of the Coach in Pittsburgh

THE real story of successful *De Luxe* motor coach operation in Pittsburgh began in December, 1926, when the Pittsburgh Motor Coach Company placed its first trial order for 6 Yellow Coaches.

Operating conditions in Pittsburgh are exceptionally severe. Traffic is heavy. The grades are steep and long and winding. Here, then, are grueling conditions to test the stamina of any equipment.

Today 80% of the coach equipment used in Pittsburgh is Yellow Coaches. As in the case of so many companies who are using Yellow Coaches, the Yellow fleet of 52 coaches has been built through a steady series of repeat orders—each order based on the satis-



Equipment Used is Yellow Coaches

factory performance of the coaches preceding it. There has been no guess work in Pittsburgh.

Since the first order for Yellow equipment was placed in December, 1926, *eleven successive repeat orders* have been given for Yellow Coaches—52 Yellows in all, 10 of which have just been delivered.

The range of the Yellow Coach line has made possible a selection of vehicle capacities best suited to meet the different and difficult operating conditions in Pittsburgh. Thus Type "Y" 29-passenger Parlor Coaches are being used on heavy, well-developed routes, while Type "W" equipment is being successfully used to pioneer and popularize new routes where increased business is desired at minimum expense. Type "W" equipment is also successfully proving its ability to maintain summer riding on one of the older routes without any loss over the

normally heavier-riding winter months—the number of passengers carried on this route in June of this year being exactly the same as for January.

Since November (1928) the New Type "W's" have operated approximately 225,000 to July 1st, *without a single pull-in from any cause*. The first three coaches operated 30,000 miles each before even the carbon was removed—50,000 miles each with practically no overhauling—35,000 to 40,000 miles each before the brakes were relined—in Pittsburgh! Twelve of this type are now in service.

Such experience explains why the Pittsburgh Motor Coach Company is receptive to new advancements made in the Yellow Coach line. Both Type "Y" and Type "W's" are playing a definite part in a well-organized and well-balanced transportation system—and playing it well—typical of Yellow performance everywhere.

The Type "W" is proving an ideal vehicle for developing new routes where increased business is desired at a minimum expense. The first Type "W" was ordered for trial last November. . . . Two more were delivered in January. . . . Six in April. . . . Three in July.

The growth of the Yellow Coach fleet in Pittsburgh has been consistent; the performance of the coaches winning constant re-orders.





MORE Mileage MORE Passengers

Pittsburgh is
Forging Ahead
with

YELLOWS

Yellow Coaches will pile up approximately 2,340,000 miles this year for the Pittsburgh Motor Coach Company—almost double the mileage of 1928.

Since 1926 Yellow Coaches have been successfully meeting the difficult conditions imposed by a de luxe service which had been established to win the patronage of a public accustomed to private automobile transportation; the demand for a fast express service with comfort, safety and reliability of schedule. And in addition to meeting the demands for a superior transportation service, they have also been meeting the severe operating conditions peculiar to Pittsburgh; long, steep winding grades and heavy traffic.

The fact that 80% of the motor equipment operated by the Pittsburgh Motor Coach Company is Yellow equipment indicates clearly the successful part that Yellow Coaches play in winning riders for *America's largest exclusive de luxe bus operation.*

General Motors Truck Co.

Pontiac, Michigan

As Harmonious as its Name

As a bus skims over the highway or ambles through traffic, its warning signal must appeal for the right of way in tones that are positive but pleasing. It must be heard—it must not be harsh

The PNEUPHONIC HORN gives warning of approach, unmistakable, yet not irritating nor startling. Its tone is loud, clear, distinctive, and harmonious.

WESTINGHOUSE AIR BRAKE CO.
Automotive Brake Division—Pittsburgh, Pa.


The Westinghouse Pneuphonic Horn is available in various types and sizes to produce different tonal qualities, and in combinations for producing a pleasing chime effect when desired. Write for descriptive literature and prices.



Mileage tells the whole story!

Bethlehem Wrought Steel Wheels have the stamina to stand up under the hard pounding to which they are subjected by modern traffic conditions. Heavy, double-end electric cars have proved them under thousands of miles of severe service.

Five distinct forging and rolling operations give Bethlehem Wheels multiple wearing qualities. The forging gives the steel toughness, while the rolling improves the grain structure and tends to prevent crystallization in the flange and tread. This construction insures high resistance to heat and wear, and consequently increased mileage.



Bethlehem Wrought Steel Wheels, when recontoured, continue to give excellent service and mileage. Small flats caused by skidding and sudden stops will pound out of themselves, and the wheels resume their original shape, thus keeping cars in continuous service.

The only true basis for the selection of car wheels is mileage. If you purchase wheels on this basis, the exceptional mileage and long life of Bethlehem Wrought Steel Wheels make them well worth your consideration.

BETHLEHEM WROUGHT STEEL WHEELS

BETHLEHEM STEEL COMPANY : *General Offices: Bethlehem, Pa.*

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

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

This Standard Specification

is growing more popular

THROUGHOUT THE BUS INDUSTRY



“Goodrich HEAVY DUTY Silvertowns”

IN DEVELOPING new uses of *Goodrich Rubber for the Bus Industry*, Goodrich is making a definite contribution to a rapidly expanding industry.

Thousands of busses are equipped with Goodrich bus tires. Millions of miles of uninterrupted service are rolling up on Goodrich Rubber every month.

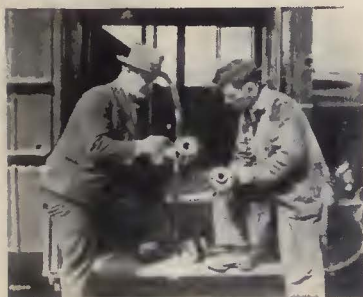
For wherever and whenever luxurious busses are known for *uninterrupted service* . . . Goodrich Tires and Goodrich rubber for the bus industry are recognized as *contributing factors!*

“Silvertowns on the front, duals on the rear” on your new bus specifications is a simple way to initiate a new kind of *speed* in bus operation, of uninterrupted *tire service* and of riding *comfort* for bus patrons . . . and to *prove* greater efficiency and economy in operation to stockholders!

This standard specification is growing more popular every day.

* * *

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Calif. In Canada: Canadian Goodrich Company, Kitchener, Ontario.



Shop foremen know the value of rubber. These rubber coupling balls not only permit proper seating, but for resiliency and insulation they are years ahead of fabric.



Rubber seam bands do what metal-to-metal contact can't do—keep the rain out and eliminate the rattle! Goodrich makes them, of course.

Seven Superior Specifications

Built Into Every Goodrich Silvertown Heavy Duty Balloon

- 1 Heavily insulated stretch-matched cords.
- 2 Additional *adhesion*—from greater insulation between outside plies.
- 3 Heavy twin beads for better rim seating.
- 4 Extra gum *fillers* between plies for longer tire life.
- 5 Heat-resisting, interlocking cord breakers.
- 6 Tread designed correctly for heavy duty service.
- 7 The whole tire toughened by the famous Goodrich “water cure.”

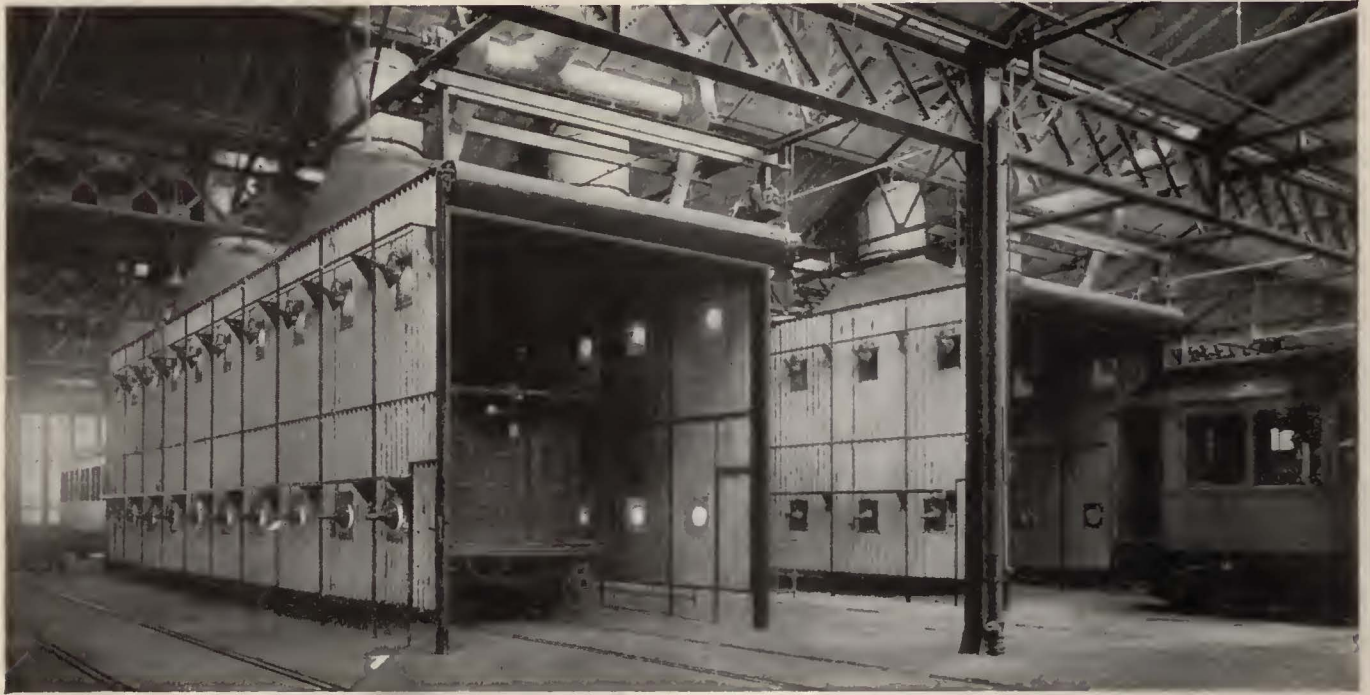


“Before we put Goodrich rubber fender flap on our busses it was almost impossible for us to keep fenders straight,” say the operators of over six hundred busses.

Goodrich **HEAVY DUTY** Silvertowns

SPECIFY GOODRICH ON YOUR NEXT BUS •

Chicago Rapid Transit *Cuts Painting Costs 75%*



Mahon Spray Booth installation at the Niles Center Shops of the Chicago Rapid Transit Company.

THE installation of Spray Painting equipment in the Niles Center Shops of the Chicago Rapid Transit Company has resulted in this remarkable economy. Spray Booths, specially designed by Mahon engineers for this particular installation, are largely responsible for the rapid production and ideal working conditions which promote maximum efficiency. Mahon engineers, pioneers in the scientific development of Spray Booths for every purpose, are today backed

by a widely diversified experience covering hundreds of installations under every conceivable condition. To street railways and large bus operating companies we offer the services of this highly specialized staff of Spray Booth experts. Their knowledge of spray painting production methods and shop layout is of inestimable value to you. Consultation with Mahon engineers will not place you under any obligation. Write today.

THE R. C. MAHON COMPANY

DETROIT, MICHIGAN

*Manufacturers of Spray Booths and Exhaust Stacks,
Industrial Drying Ovens and Blow Pipe Systems.*

MAHON

SPRAY BOOTHS & EXHAUST STACKS

• DESIGNED FOR FIRE SAFETY •

Long Clutches and Radiators *are used on all* Studebaker Buses



LONG

LONG MANUFACTURING CO.
DETROIT MICHIGAN

LONG PRODUCTS
AUTOMOTIVE
CLUTCHES
AND
RADIATORS

In WISCONSIN, too, their maintenance *this improved*

THE Northern States Power Company, operating throughout the western part of northern Wisconsin, has made extensive and profitable use of Carey Elastite System of Track Insulation.

The photographs show how this advanced system was used at Eau Claire, in the Badger State, in connection with a standard 85-pound A.S.C.E. T-Rail and a roadway of concrete . . .



Showing the application of Carey Elastite System of Track Insulation on the Northern States Power Company's lines through Eau Claire, Wisconsin.

THE PHILIP CAREY

they lowered cost by using traction development



The completed installation—Carey Elastite System of Track Insulation, used in connection with a standard 85-pound A.S.C.E. T-Rail and a roadway of concrete.

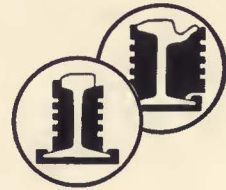
Carey Elastite System of Track Insulation

is a resilient, durable, asphalt-and-fibre cushion. The asphalt has an extra-high melting point; yet, because it is blended according to a special Carey formula, it cannot become brittle even at sub-zero temperatures. It bonds firmly to the rail and to the pavement. It absorbs rail vibration and reduces excessive track noise. Invariably its use insures faster schedules, higher standards of service and lower maintenance cost.

If you are planning any development or track reconstruction work, it will be to your advantage to know Carey Elastite System of Track Insulation. Our representative will gladly call and supply you with the facts.

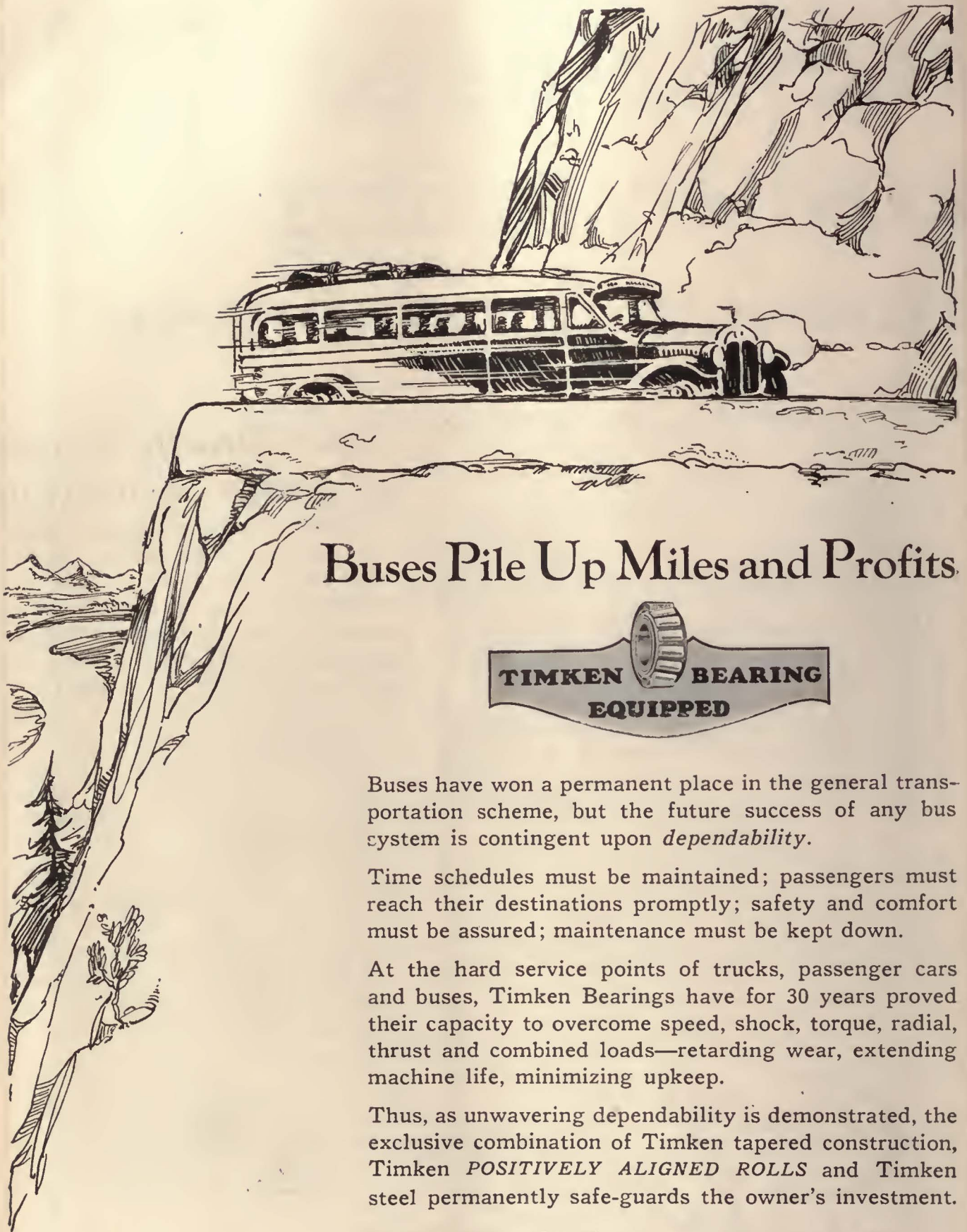
**Carey
Elastite**

TRADE MARK REGD. U.S. PATENT OFFICE



**SYSTEM OF
TRACK INSULATION**

COMPANY, Lockland, CINCINNATI, OHIO



Buses Pile Up Miles and Profits



Buses have won a permanent place in the general transportation scheme, but the future success of any bus system is contingent upon *dependability*.

Time schedules must be maintained; passengers must reach their destinations promptly; safety and comfort must be assured; maintenance must be kept down.

At the hard service points of trucks, passenger cars and buses, Timken Bearings have for 30 years proved their capacity to overcome speed, shock, torque, radial, thrust and combined loads—retarding wear, extending machine life, minimizing upkeep.

Thus, as unwavering dependability is demonstrated, the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken steel permanently safe-guards the owner's investment.

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N , O H I O

TIMKEN *Tapered Roller* BEARINGS

There will be

TALK

on the Boardwalk
in October!

AT Atlantic City in October—when electric railway men gather in groups on the Boardwalk—there will be TALK.

... Groups listening to comments on the most modernized steel tie ever offered to the Electric Railway Industry.

... Groups expressing approval of the **NEW** precision type rolled steel rail clip that is sawed and drilled (not sheared and punched).

... Groups that will tell from experience of the advantages of complete machine methods for the treatment of concrete, and will lay verbal claim to the best track installations of the 1929 construction season.

There will be opportunities at the Convention Exhibit of the International Steel Tie Company to observe and check the value of perfect contact and bond between rail, ties and concrete that will win the approval of track men.

There will be those who will tell you of the low initial cost for laying their track with this type of construction.

Plan to hear this talk. See the modernized steel tie and installation methods. The developments in steel tie construction during the past year are astonishing.

15 POINTS

Make This A Superior Fare Register

All Detroit Motor Bus Co. Buses are being equipped with Hyman Registers after careful test. Everywhere these Registers are shown, they are meeting with favor. Write for further information.

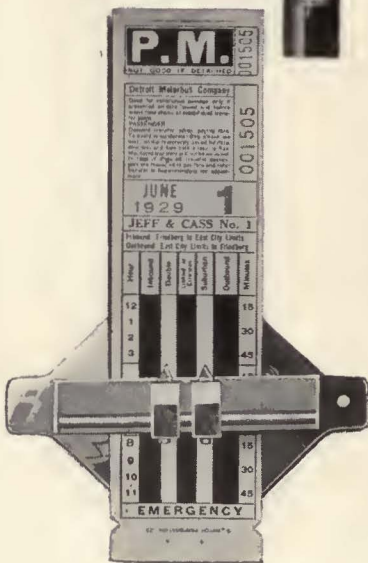


Hyman Transfer
Cutter

*Tear off sheet, and you
have a transfer*

By means of pointers which slide across the face of the sheet, time, direction, route and all needed information is recorded as sheet is torn off.

Simple — easy — eliminates transfer abuses.



- 1** The passenger deposits his own fare in either the nickel, dime or quarter slot.
- 2** Automatic registration of the fare instantly.
- 3** Increased efficiency.
- 4** Inspection, of the coin deposited, by the operator.
- 5** Automatic release of coins from the inspection plate.
- 6** Maximum speed in making change, removable in individual denominations of nickels, dimes and quarters.
- 7** A maximum of schedule speed.
- 8** Sold outright at extremely low price.
- 9** Prevention of accidents because of the ease in the collection of fares.
- 10** One-man operation of buses or street cars.
- 11** Automatic operation continuously.
- 12** Elimination of electrical operation, or complicated mechanisms, thus greatly reducing the possibilities of service failures necessitating fare collection by the operator without registration.
- 13** Attraction to the Hyman Fare Register by the Public without any explanations by operator.
- 14** No maintenance Cost to the Transportation Companies.
- 15** The Hyman Fare Register is a small, compact, light-weight, rapid, accurate, simple and low-cost machine.

See our display at Atlantic City
Booth No. E 585

Hyman Register Corp.

234 State St.
DETROIT, MICHIGAN

Greater *dielectric and mechanical* Strength!

with added flexibility
... in these improved

Empire Varnished Tapes



EMPIRE Seamless Bias Linotape satisfies the most rigid specifications for cable splices, bus bars, high tension repair work, armature coils, etc.

We now offer Oil Packed Empire Seamless Bias Linotape with special characteristics for high tension cable insulation.

Recent tests have proven conclusively that this product is definitely superior. It has a uniform higher dielectric strength, a lower power factor and dielectric constant. Send for a sample can.

Empire Varnished Insulations comprise:

- Seamless Bias Tape in long lengths
- Sewn Bias Tape
- Lengthwise Cut Tape
- Varnished cloth in 36" widths, straight or bias.

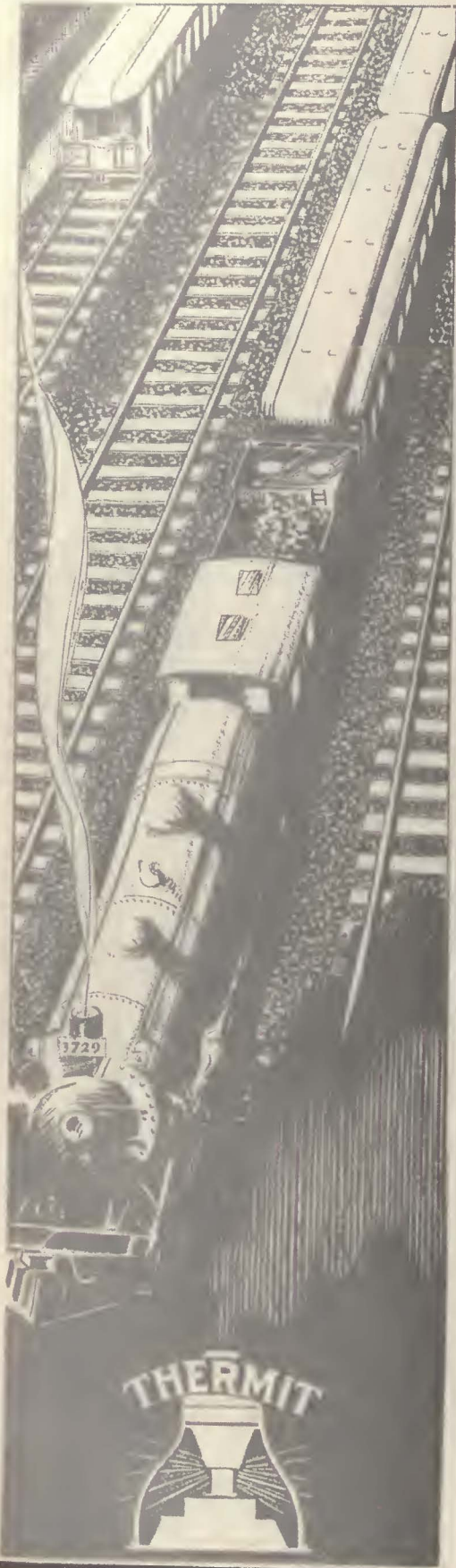
MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Works: Schenectady, N. Y. London, England
Cleveland Pittsburgh Cincinnati Birmingham Seattle
San Francisco Los Angeles Toronto Montreal

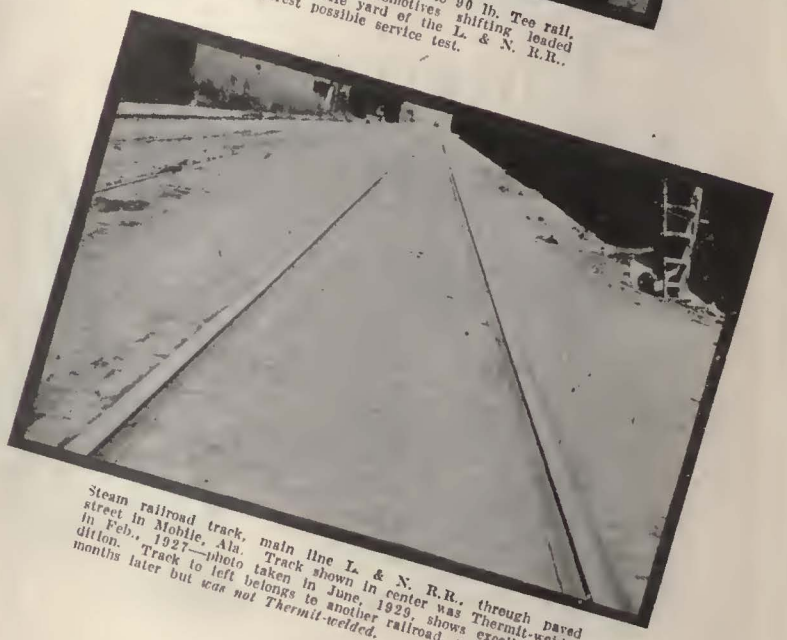


Electrical INSULATION





Five joints, some of them compromise, 100 lb. to 90 lb. Tco rail. —Thermit-welded close to frogs. Locomotives shifting loaded freight cars constantly in the Mobile yard of the L. & N. R.R. give Thermit welds the severest possible service test.



Steam railroad track, main line L. & N. R.R., through paved street in Mobile, Ala. Track shown in center was Thermit-welded in Feb., 1927—photo taken in June, 1929, shows excellent condition. Track to left belongs to another railroad, was built a few months later but was not Thermit-welded.

THERMIT WELDS on Steam Railroad Tracks

No better proof could be found of the ability of Thermit welding to stand up under heavy traffic, than its growing use on steam railroad lines. Where railroad trains run through paved streets, Thermit welding has been found to be a satisfactory solution of the rail joint problem. A typical example—the Louisville & Nashville R.R. Co's line through Mobile, is shown above. Over this track passes the Crescent Limited, New York to New Orleans, and thousands of tons of freight daily.

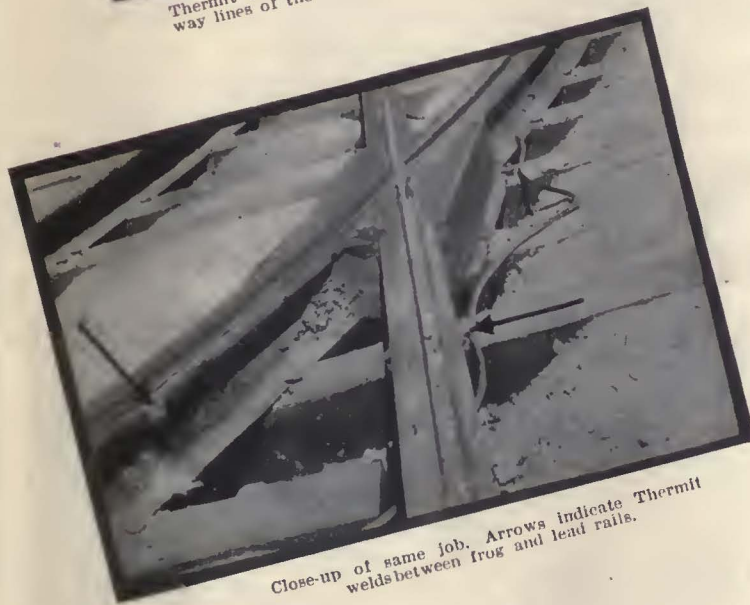
The world famous Twentieth Century Limited runs through the city of Syracuse, N. Y. over Thermit-welded joints.

Steam railroads also are finding Thermit solves their troubles with compromise joints in yards and terminals.

METAL & THERMIT
PITTSBURGH CHICAGO BOSTON 120 BROADWAY



Thermit welds at special work joints on the street railway lines of the Mobile Light & Railroad Company.



Close-up of same job. Arrows indicate Thermit welds between frog and lead rails.

THERMIT WELDS on Electric Railway Tracks

Thermit welding of electric railway track is by no means confined to companies in the largest cities. Many systems operating fifty to one hundred miles of track, are using more and more Thermit, as the advantages of initial installations become apparent. The Mobile Light & Railroad Company is a typical example.

Other users of Thermit are to be found in every part of the United States and Canada.

The process of Thermit welding is so developed that it presents no mechanical or labor difficulties even to the smaller roads. Any reasonably intelligent trackman can be trained to make perfect Thermit Welds. The necessary apparatus can be purchased on easy terms, or rented at very moderate cost.



CORPORATION

NEW YORK, N.Y.

SOUTH SAN FRANCISCO TORONTO

DOLLAR FOR DOLLAR . . THE WORLD'S MOST ECONOMICAL TRUCK AND BUS TIRES

Some tires excel in one respect—some in another—but these new U. S. Heavy Service Tires have everything. They are built to dollar-for-dollar standards that defy comparison. Put them to a heavy grind in fast and continuous service under all sorts of traffic and operating conditions, and they will reveal startling mileage figures—unparalleled economies. More and more truck and bus fleet operators are standardizing on U. S. Heavy Service Tires for this very reason. Test them yourself. You can get a U. S. dealer on the phone—and he will cooperate with you to the limit



U. S. ROYAL **HEAVY SERVICE TIRES**



UNITED STATES RUBBER

COMPANY

THE WORLD'S LARGEST PRODUCER

OF RUBBER



29 Street-railway companies bettered their fare systems with Globe Transfers in past 24 months

Realizing the expense and complications involved if the Globe-designed transfers failed to accomplish their purpose, each of these companies made careful investigation before adoption.

It is gratifying to note that in each case these new transfers accomplish these results:

- Greatly reduce round-tripping.
- Completely eliminate time-limit abuse.
- Are faster and easier to issue.
- Are positive in identification.

Such a changeover need not put you to great trouble. Give us the facts, and a chance to design a system for you, in cooperation with your representatives. Consult our nearest branch office for any fare-service you need.

In Booth E545 at the A. E. R. A. Convention you will see these 29 transfers and two new, efficient transfer holders, as well as the latest in tickets, receipts, hat checks, etc.

Globe

TICKET COMPANY

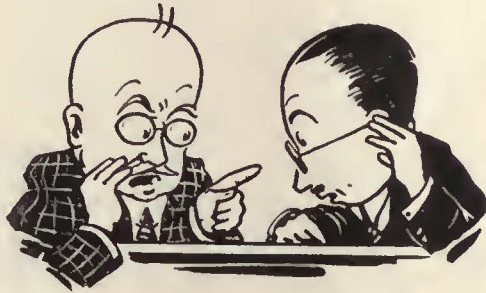
Sales Offices:
Syracuse
Baltimore
Cincinnati
Cleveland
Pittsburgh
Springfield, Mass.

112 North Twelfth Street
PHILADELPHIA

Factories:
Philadelphia
Los Angeles
Boston
New York
Jacksonville

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Squelching another whispering campaign—



“Look out for that company, it’s slipping,” said the whisperers. Its product, an assembled unit sold to manufacturers to build into their machines, was of high quality but had been sold only through salesmen and direct mail.

Sales *were* falling off. The market, conscious of the gossip, was suspicious of the financial strength of the seller. This increasing sales resistance was undermining the morale of the sales staff.

With this serious situation facing it, the company called in an advertising agent who recommended an emergency advertising campaign in a McGraw-Hill publication covering the particular market. The program, the first publication advertising ever used by this company, consisted of color spreads in every issue.

That was only a year ago. Today, as evidence of the company’s comeback, sales are not only mounting but the advertiser’s chief competitor has offered to sell out to the new advertiser. *From bottom place to top position in recognition in one year.*

MORAL: Selling is not a choice between salesmen, publication advertising and direct mail but a matter of co-ordinating all three and using each on a basis of the job to be done.

M c G R A W - H I L L
P U B L I C A T I O N S

New York

Chicago

Cleveland

Detroit

Philadelphia

St. Louis

Greenville

San Francisco

Boston

London

"Canned Experience"

Make use of the other man's experience

That old saying
about experience being the best teacher is absolutely sound. But most of us recite it without thinking that experience may be of various sorts—the experience of other men as well as our own, "canned experience," if you please, ready for use. Why not take advantage of the experience of other men as far as we can and save not only years of time but many expensive lessons?

Do you know that a large share of the world's best research work in the fields of science, technology and business is contained in **McGraw-Hill BOOKS?**

A single fact, a single table, a single idea may be worth many times the price of the book to you.

Buy your Books on the Budget Plan

Choose any

of these McGraw-Hill Books that you would like to see—one, or two, or half a dozen—as many as you wish.

Read them for ten days free—keep those you want—send back those you don't want.

If desired you may pay for the books on our monthly budget plan, provided your order amounts to \$12.00 or more. The minimum monthly payment is \$3.00 and the monthly installments must be large enough so that the entire account will be paid in full within six months.

There is no additional charge for books purchased on the budget plan. The prices are the same as for cash.

Choose the books you want to see — and just mail the coupon

Richey—

Electric Railway Handbook
Second Edition, 708 pages, flexible, pocket size, 528 illustrations, \$4.00

A thoroughly revised reference book of practical data, formulas and tables for the use of operators, engineers and students. It gives the essential reference data on all phases of electric railway construction and operation. It presents: (1) Data on subjects which come up in everyday electric railway practice. (2) Material of service to the non-technical manager or operator. (3) Reference material on electric railway practice for those who are specializing in other or allied lines.

Harding—

Electric Railway Engineering
Third Edition, 480 pages, 6x9, 248 illustrations, \$5.00

A thorough revision of this standard work on the theory and practice of electric railway engineering. The book covers the principles of train operation, power generation and distribution, equipment and types of systems.

Kurtz—

Lineman's Handbook
550 pages, pocket size, flexible, illustrated, \$1.00
The first book written expressly for linemen, foremen, and other employees of line departments. The book meets the growing need for a pocket volume of construction and maintenance data, procedure, and methods. It presents hundreds of links, shortcuts, expedients and time- and work-saving methods, as well as scores of useful diagrams, tables, and formulas for the lineman.

Standard Handbook for Electrical Engineers

Fifth Edition, 2,100 pages, 4 1/2 x 7, flexible, illustrated, \$6.00

A widely-known encyclopedia of electrical engineering. The book covers every branch of modern electrical engineering. It is complete and reliable, and so carefully and fully indexed that its information is readily accessible.

Croft—

American Electricians' Handbook

823 pages, pocket size, 900 illustrations, flexible, \$1.00

The book is a reliable, useful handbook for wiremen, contractors, linemen, plant superintendents and construction engineers. It aims to give the practical man the facts on apparatus, materials and installation which he needs in his daily work. It is practical from cover to cover.

Blake and Jackson—

Electric Railway Transportation
Second Edition, 437 pages, 6x9, 121 illustrations, \$5.00

A second edition of this widely known book on the transportation side of the electric railway business — getting the cars over the tracks — increasing the traffic — collecting the fares — and selling service in the face of modern conditions. Particular consideration is given to the place of the bus in modern transportation.

King—
Railway

Signaling
369 pages, 6x9, 340 illustrations, \$4.00

A completely adequate book on all phases of modern railway signaling. The book describes fully the construction, installation, operation and maintenance of signaling equipment, and presents a thorough discussion of principles.

Nash—

Economics of Public Utilities

413 pages, 6x9, \$1.00
This book presents the essential facts and the most mature views upon the underlying financial and economic phases of public utility companies with particular emphasis on electric railways, electric light and power companies and gas companies.

It discusses every angle of the public utility as a business and treats thoroughly such subjects as capitalization, investment features, franchises, regulation, valuation, depreciation, taxes, rates, service, accounting methods, public relations, etc.



Mail this coupon to see these McGraw-Hill books

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

Send me the books checked for 10 days' free examination:

.... Richey's Electric Railway Handbook, \$4.00. Croft's American Electricians Handbook, \$4.00.
.... Harding's Electric Railway Engineering, \$5.00. Blake and Jackson's Electric Railway Transportation, \$5.00.
.... Kurtz' Linemen's Handbook, \$4.00. King's Railway Signaling, \$4.00.
.... Standard Handbook for Electrical Engineers, \$6.00. Nash's Economics of Public Utilities, \$4.00.

I agree to return such books as I do not wish to keep, postpaid, or to remit for them within 10 days of receipt.

Name

Home Address

City

Posttion

Name of Company..... F-E-R-J.

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

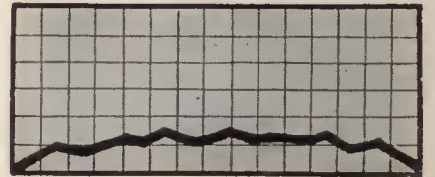


What is wrong with this star salesman?

With the BBK Crane Company he was a phenomenal success.



He went with the XYZ Crane Corporation and was a dismal failure.



The difference is not in the salesman nor in the product but in the nature of the Industrial Advertising backing him. Every industrial

salesman cannot be a star, but the best that is in him can be developed if the advertising policy and plan are based on achieving Recognition.

How to build this recognition in ten simple steps is graphically explained in the book, "Industrial Marketing at Work." A copy will be delivered by the nearest McGraw-Hill office to any executive responsible for sales or advertising to industry.

McGRAW-HILL PUBLICATIONS

New York
Philadelphia

Chicago
Greenville

Cleveland
San Francisco

Detroit
Boston

St. Louis
London

ALL types of City and Interurban cars of latest design and Modern construction are built by—

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Mfg. Co.

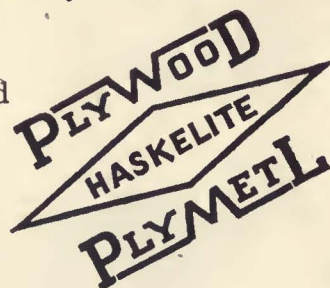
111 W. Monroe St.

Chicago, Ill.

Haskelite adds beauty to new Lynchburg cars

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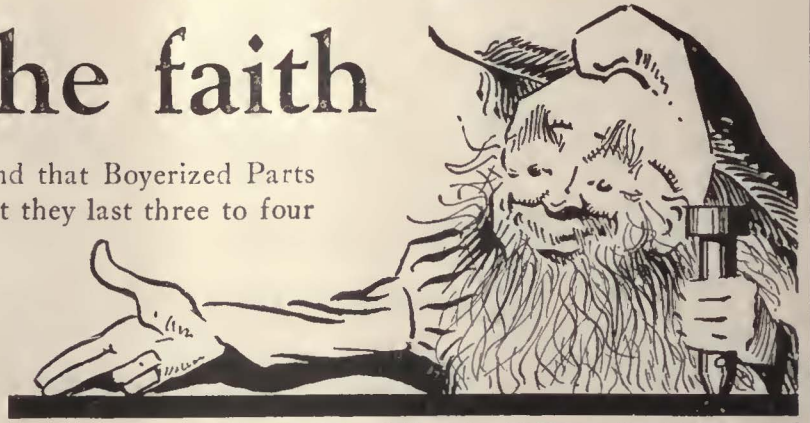
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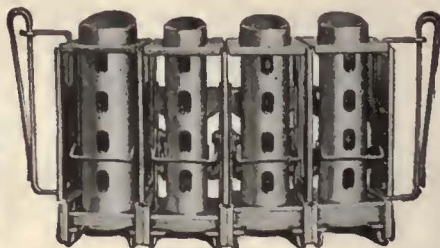
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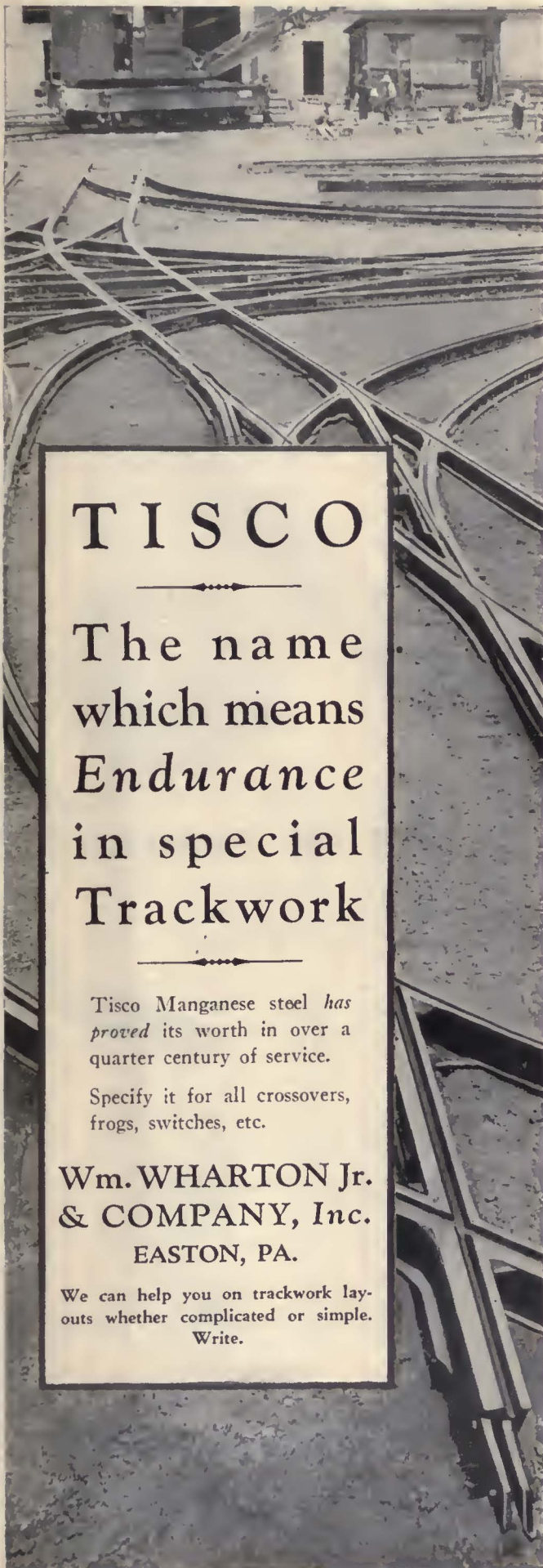
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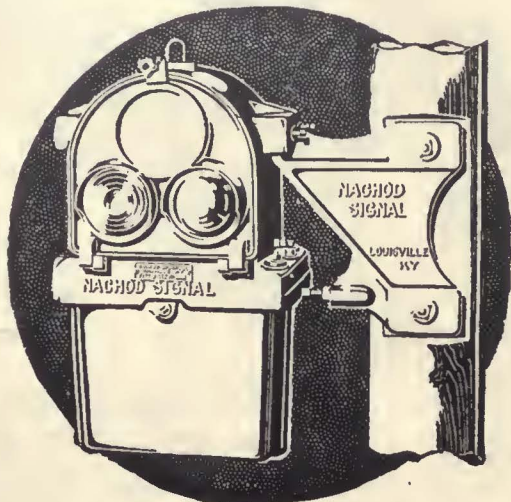
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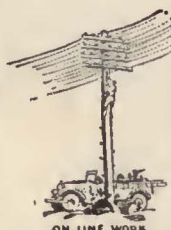
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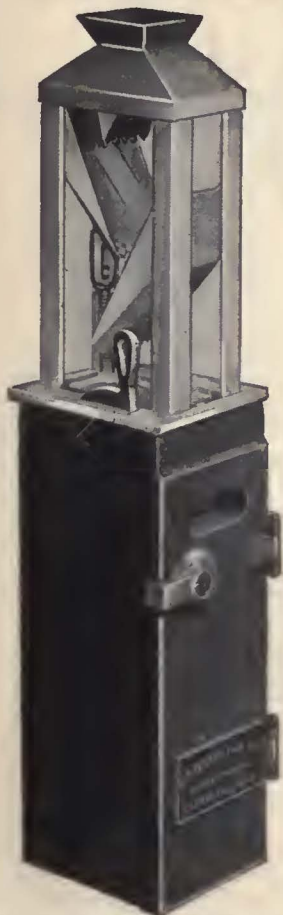
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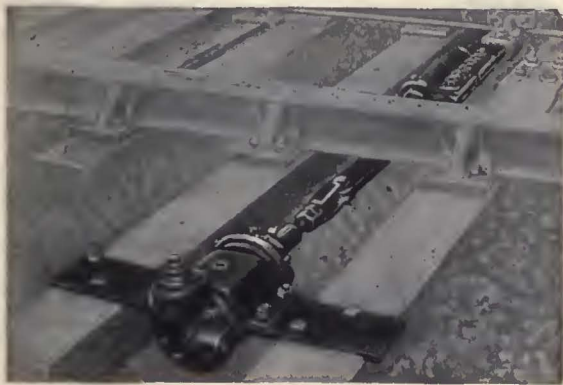


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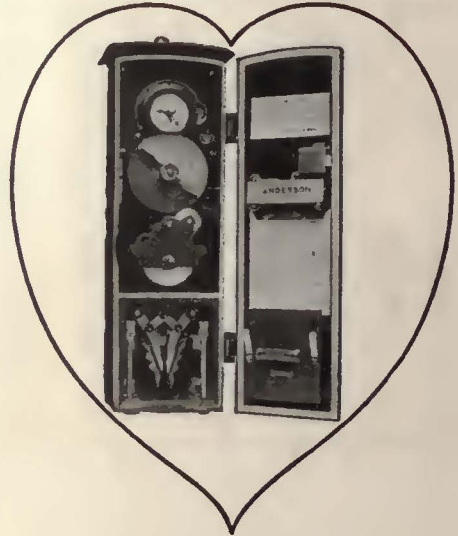
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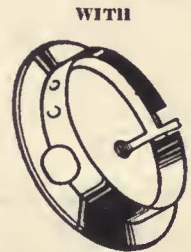
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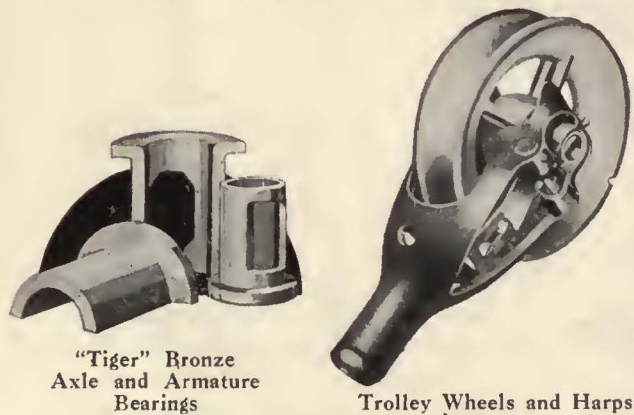
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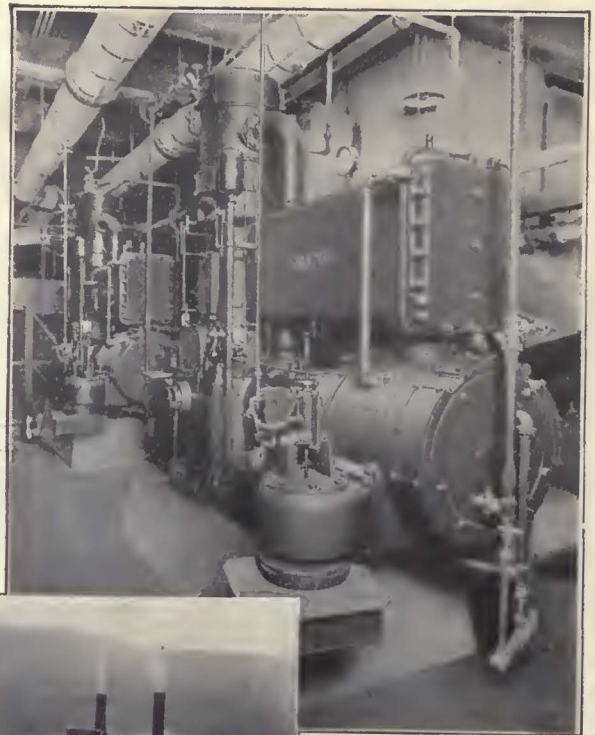
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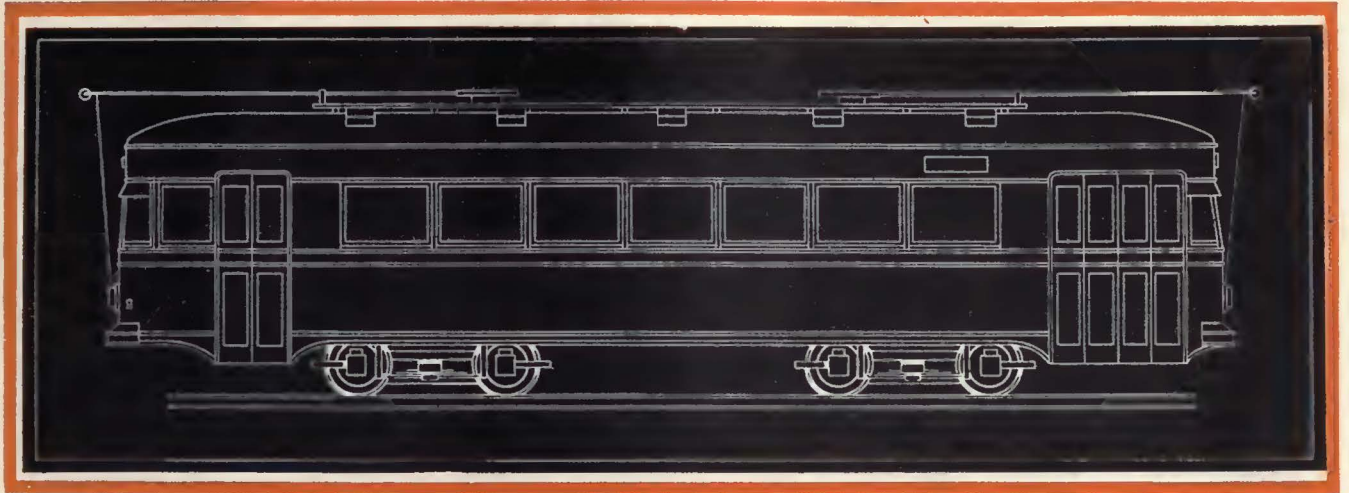
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LYNCHBURG *modernizes 100%* With Brill MASTER UNIT Cars



The Lynchburg Traction & Light Company, Lynchburg, Va. have ordered twenty double-end Brill MASTER UNIT Cars for city service. When this new equipment is placed in operation, their entire service will be rendered with the latest Brill Cars, the MASTER UNIT type, which have won instant approval wherever they have been introduced. Operators and the riding public alike have enthusiastically endorsed their appearance and comfortable riding qualities. And no wonder, for this new development was brought about by the cooperation of Brill engineers with electric motor and car equipment manufacturers and railway operators.

All MASTER UNIT Cars have the same general characteristics of design such as curved sides below the belt rail, sloping two-part windshield type vestibule and well type steps.



The Lynchburg cars will be mounted on Brill 177-E Trucks and equipped with four 35 H.P. motors. Seating equipment will consist of deep-spring, leather upholstered Brill Seats of the 201-D type.

Experience teaches us that modernization is a sound investment, a means of increasing revenue and reducing maintenance costs. Lynchburg has faith in such a procedure.

Be sure to see the Lynchburg Car on Track "B" at the American Electric Railway Association Convention, Atlantic City.

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