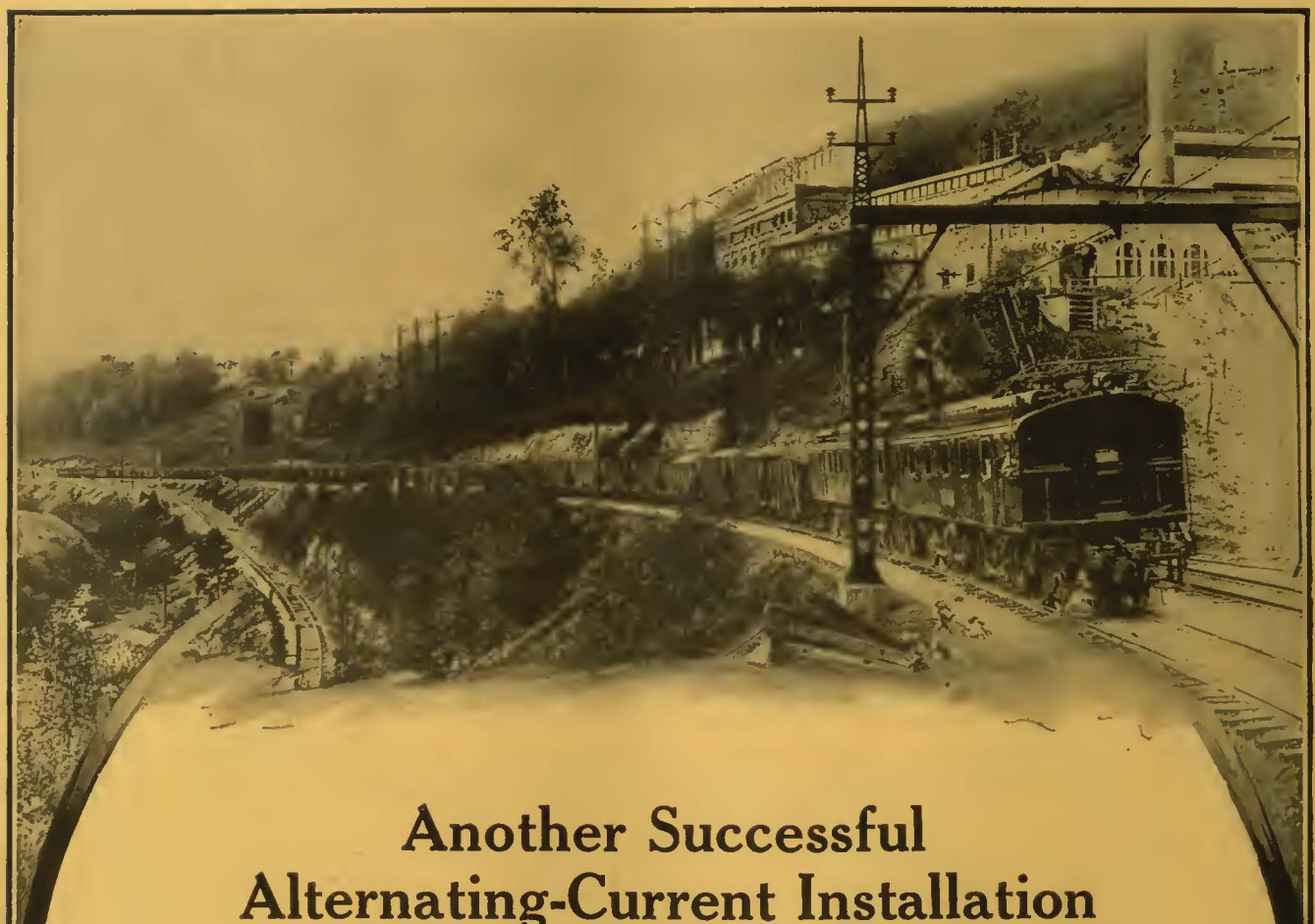
cGraw-Hill Company, Inc. May 12, 1923 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL



Another Successful Alternating-Current Installation

Winding over and through the mountains of West Virginia, hauling approximately two million tons a month, the electric locomotives of the Norfolk & Western have more than met expectations.

As a proof of the successful operation of this alternating-current electrification, the Norfolk & Western Railway are extending their electrified zone a distance of thirty route miles.

This extension will insure a more rapid and efficient handling of the 3250-ton trains through this coal-mining region which includes the 2% Elkhorn grade over which these trains operate at a speed of 14 miles per hour.

Were steam locomotives used to handle the present tonnages the number required would be at least three times the number of electrics now employed.

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA

THE BALDWIN LOCOMOTIVE WORKS · WESTINGHOUSE ELEC. & MFG. CO.
PHILADELPHIA, PA. · EAST PITTSBURGH, PA.

Vol. 61, *No.* 19 New York, May 12, 1923 *Pages* 789-830

ELECTRIC RAILWAY JOURNAL

CONTENTS

McGraw-Hill Co., Inc., Tenth Ave. at 36th St., New York

JAMES H. McGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MEHREN, Vice-President
MASON BRITTON, Vice-President
O. D. STREET, Vice-President
JAMES H. McGRAW, JR., Sec. and Treas.

WASHINGTON: Colorado Building
CHICAGO: Old Colony Building
PHILADELPHIA: Real Estate Trust Building
CLEVELAND: Leader-News Building
ST. LOUIS: Star Building
SAN FRANCISCO: Rialto Building
LONDON: 6 Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

Cable Address: "Machinist, N. Y."

Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingeniería Internacional
Bus Transportation
Electrical Railway Journal
Electrical Merchandising
Journal of Electricity and Western Industry
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

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

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

Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U. S. A.

Circulation of this issue, 5,950


Silence-
Silent running Westinghouse Micarta Gears are a necessary adjunct to the best shop practice.
Micarta Gears can be obtained from the following gear manufacturers:
Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Westinghouse

Long Life Squeezed into O-B Extruded Ears

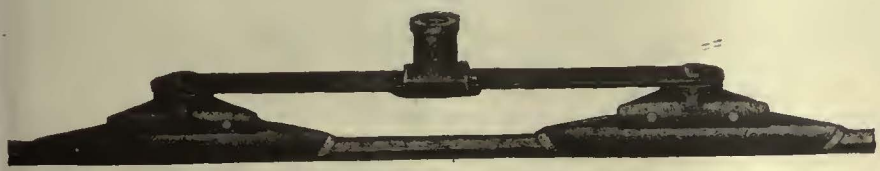
Section of extruded ear and boss installed with grooved wire. Note trolley wheel clearance. There are extruded ears for round, grooved or figure 8 wire.

Long life is literally squeezed into O-B Extruded Trolley Ears. Wearing qualities are actually forced into the metal—as extruded brass is exceedingly dense and tough.

Red hot brass, not in the molten state, is forced at tremendous pressure through a die of the desired section of the finished piece. The result is a very uniform metal to exact dimensions.

Extruded ears fit the trolley wire accurately and offer a smooth underrun for the trolley wheel. The accuracy of the clinching of the trolley wire and the exceptional toughness of the metal mean long life under the constant pounding by the trolley wheel. Because the extruded metal is so dense, it does not curl.

Extruded ears, once in place, outlast the trolley wire—and make the wire wear longer, too.



Flexible extruded ear with boss attached to tempered steel spring. Adapted for use with rigid suspension.

Standard extruded ear installed with hanger. Made with 5/8 or 3/4-in. boss for 2-0, 3-0 or 4-0 round, grooved or figure 8 wire.

O-B Extruded Trolley Ears consist of the extruded metal runner piece, to which is clinched and riveted a sherardized malleable iron boss for attachment to standard hangers. They are also provided with special hangers for catenary construction.

The Ohio B Brass Co.
Mansfield, Ohio, U.S.A.

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Trained Eyes and Steel Ties

IN the course of experience an Engineer develops unconsciously a faculty of measuring the strength of material with his eye—of checking without calculation by his visual perception the correctness of any construction—always when faced with this test Steel Twin Ties get the nod of approval.

THEY'RE big enough for the work they have to do—140 pounds of steel—156 square inches of bearing per track foot and this at no greater cost than wood ties in ballast—in many localities at a large first cost savings over wood ties in concrete.

See them in your 1923 construction.

We have for immediate delivery some stock joint plates either flat or flanged

THE INTERNATIONAL STEEL TIE CO.

Cleveland

Steel Twin Tie Track

Not How Little—
But How Much You Actually Receive

AT a meeting of the Railway Storekeepers' Association a Railroad man said to a lumberman, "When I was a young fellow working in a lumber yard and ordered a 2 by 4, I got a 2 by 4—two inches thick and 4 inches wide—but now you are asking us to take 2 by 4s that are 1-11/16 inches thick by 3-1/16 inches wide. How much smaller do you want us to take them?" The lumberman answered, "Just as small as you will take them." And he told the truth.

The condition in the Tie field is similar. If you do not adopt courageous tie inspection methods you will not get full value for your tie dollar. And when we say courageous tie inspection we merely mean to enforce the A. R. E. A. specifications and grade ties exactly according to the arithmetical dimensions and to have the courage to cull a tie that shows signs of decay, for a decayed tie cannot be made strong by preservation.

These are the methods used by the International Tie Organization. Every International Tie is a standard specification Tie, inspected carefully, graded and permanently marked.

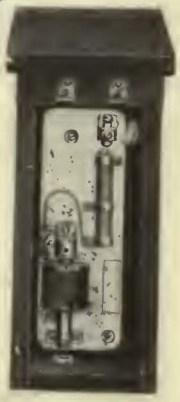
You benefit by our thorough inspection.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

An Arrester in time Saves the line — *ORDER NOW!*



Garton-Daniels
D. C. Pole Arrester
Door Removed

Garton-Daniels Arresters

KEYSTONE PRODUCTS

Keystone Expulsion Arresters
Garton-Daniels Arresters
Keystone Truss Pins
Locke Insulators
Keystone Triangle Arms
Never-Creep Anchors
Segur Winding Tools

Time is on your side now. It won't be in a short while, however. Unprotected lines might survive the *first* storm but there's little likelihood of them standing up against storm after storm all through the summer. And the damage then will cost double and treble the cost of protection with the justly famous line of Garton-Daniels Arrestors.

Before you order, however, you will want to look over Bulletin 189 on Keystone and Garton-Daniels Lightning Protective Apparatus. It will cost you nothing but a post card.

Sold by Jobbers the world over

ELECTRIC SERVICE SUPPLIES CO.

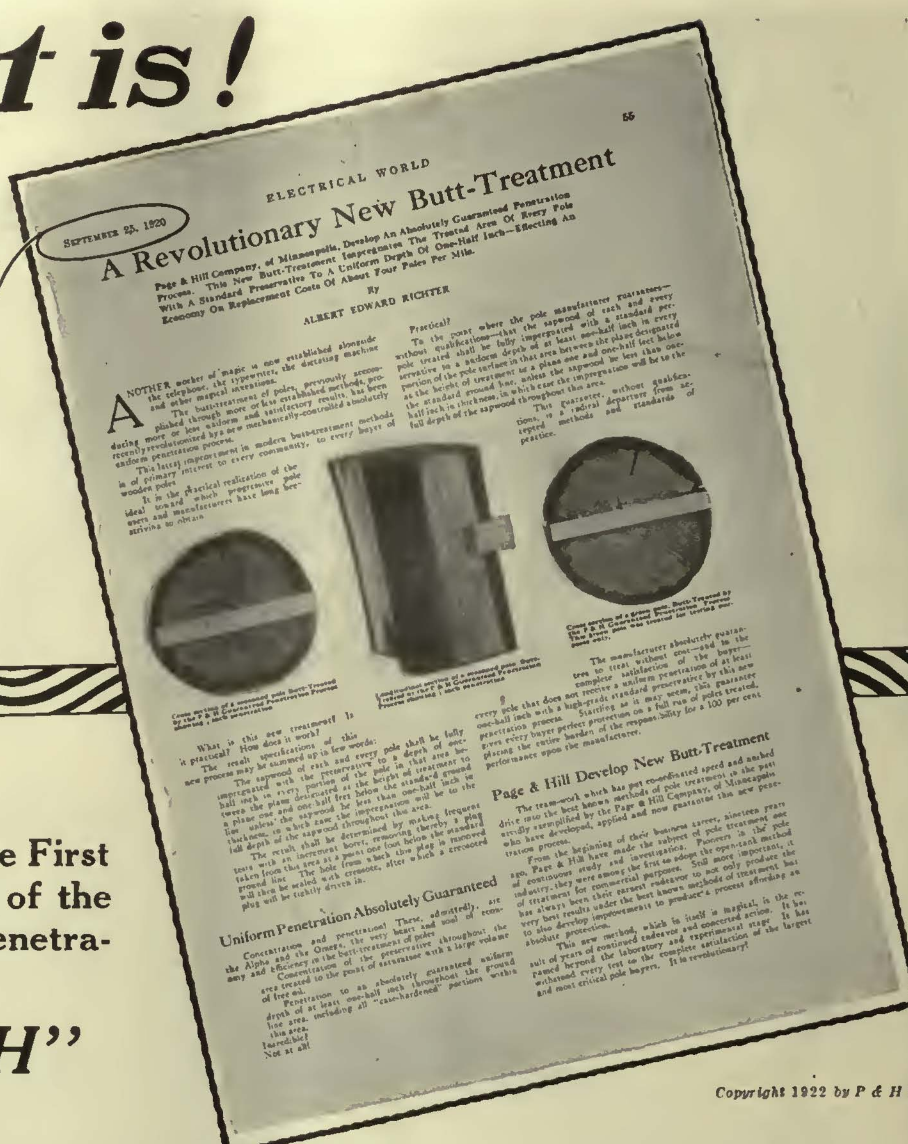
PHILADELPHIA 17th and Cambria Sts. | PITTSBURGH 829 Oliver Building | SCRANTON 310 N. Washington Ave. | NEW YORK 50 Church St. | CHICAGO Monadnock Bldg.

CANADIAN AGENTS: Lyman Tube & Supply Co., Montreal, Toronto, Winnipeg

Here it is!

Note the date of this article announcing the P & H Guaranteed Penetration process of butt-treating cedar poles - perfected by Page & Hill Co.

SEPTEMBER 25, 1920



the First Public Announcement of the Only Guaranteed Penetration Process,

—the "P & H"

Copyright 1922 by P & H Co.

PAGE & HILL CO. was the first to brand their poles - the first to develop a process of butt-treatment that insured a one half inch penetration of the preservative thoughout the ground-line area of the pole - the first to issue a *written guarantee* specifying a definite depth of butt-treatment.

The "P & H" is the *original* Guaranteed Penetration Process *- and is still the best.* We guarantee, *in writing,* a half inch uniform penetration of the preservative throughout the ground-line area.

We produce and sell treated and untreated Northern White and Western Red Cedar Poles - we can give you any form of butt-treatment. We make prompt shipments because of the strategic location of our yards throughout the North Central and Western States.

Write for illustrated booklet of facts on the butt-treatment of cedar poles.

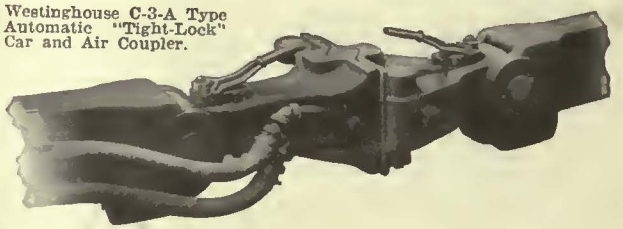
PAGE AND HILL CO.
MINNEAPOLIS, MINN.

Grand Rapids, Mich., Powers Bldg

New York, N. Y., 50 Church St.
Chicago, Ill., 19 So. LaSalle St.
Kansas City, Mo., 717 Bryant Bldg.
Omaha, Neb., 513-14 Electric Bldg.
Houston, Texas, 1111 Carter Bldg.
Dallas, Texas, 311 Sumpter Bldg.
Buffalo, N. Y., 950 Ellicott Sq. Bldg.
Louisville, Ky., 1416 Starks Bldg.

Illustrated: A pair of Westinghouse C-3-A Type Automatic "Tight-Lock" Car and Air Couplers, still giving satisfactory service after nine years on cars of Cincinnati Traction Company.

Westinghouse C-3-A Type Automatic "Tight-Lock" Car and Air Coupler.



9 years in Service

WHAT a large number of traction companies have learned by experience about Westinghouse Automatic "Tight-Lock" Couplers, will be of value to you.

They have learned that efficiency, dependability and low cost of upkeep, over a period of many years, are traditional of all couplers bearing the stamp of Westinghouse.

We have an Automatic Coupler for every class of service—one type light enough that it is used on Safety Cars, a type for medium-weight cars and still another type for the heaviest subway, elevated and interurban trains.

Couplers to give car and air, or car, air and electric connections. All strictly "Tightlock."

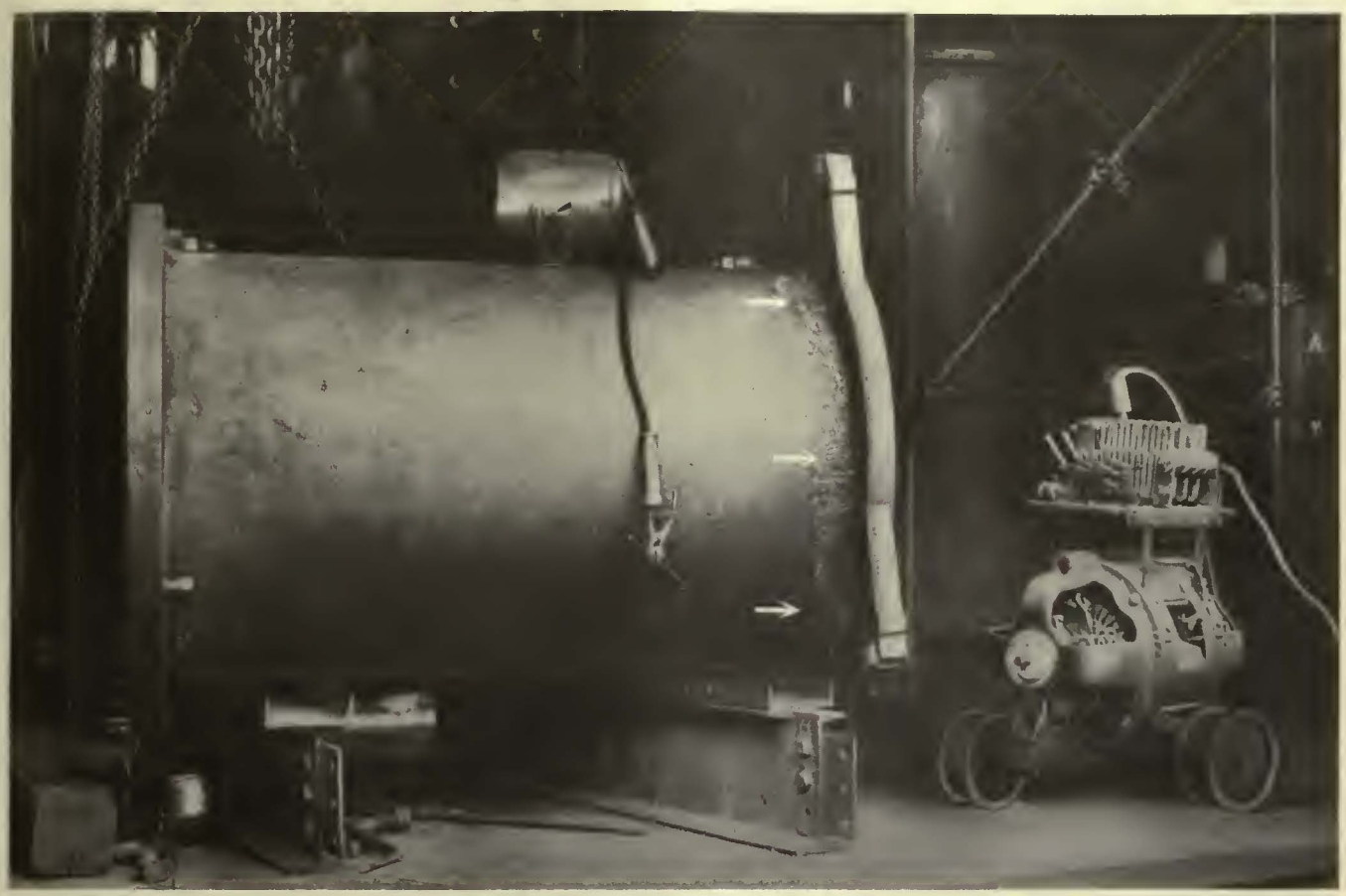
Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

OFFICES:

Boston, Mass.
Chicago, Ill.
Columbus, O.
Denver, Colo.
Houston, Tex.
Los Angeles
Mexico City
St. Paul, Minn.
St. Louis, Mo.
New York
Pittsburgh
Washington
Seattle
San Francisco

WESTINGHOUSE TRACTION BRAKES



Electric ARC Welded!

Lackawanna & Wyoming Valley R.R. Saves over $1100 and 3 Months Delay

A year ago a large crack developed in this high pressure gas engine cylinder. As this was a special cylinder, it could not be replaced within three months and would cost about $1200.00. Instead of getting a new cylinder the crack was welded with the small RWB Dynamotor (type BB). In a few days the cylinder was again in use and not only a direct saving of over $1100.00 was realized but a serious shutdown of three months was avoided. The cylinder has been in constant operation ever since it was welded. (Arrow points indicate welded area.)

This is a typical example of what electric welding can do for every electric railway property. Besides shop equipment repairs, it is essential in keeping the maintenance cost of rolling stock at a low figure. It offers opportunities to reclaim in a short time broken and worn parts which may mean days of delay before replacements can be obtained. In addition, track repairs and good bonding can be secured. For all these various classes of work the portable RWB Dynamotor (type BB) is employed by many railways. Hundreds of these machines are in use and savings amount to thousands of dollars yearly. With this machine the carbon arc can be used in addition to the ordinary metallic arc. This frequently doubles the speed with which certain classes of work can be done. Either positive or negative electrode is available, which allows the best welding method in this respect for each job. Power consumption is also low, which is an important factor to be considered. Sturdiness, portability and low upkeep costs are among other features of the Dynamotor which add to its value from an equipment standpoint.

Just how much can be saved by electric welding depends entirely on how thoroughly it is used. With the type BB Dynamotor ample means are available to make these savings by electric welding unusually large, for the machine is so well equipped for both track and shop work.

Rail Welding & Bonding Company

Cleveland, Ohio

Preferred—

because it restores a true surface to corrugated rail.

The Reciprocating Track Grinder

best suits the Connecticut Company

"What type of grinder, other than a reciprocating grinder, is best adapted for removing corrugations in rail?" was the question recently sent out by the American Electric Railway Association.

Out of many answers placing the Reciprocating Track Grinder ahead of all others, here's one from M. M. Johnston, Division Engineer of the Connecticut Company: "We have always used the Reciprocating Grinder for this purpose. A rotary grinder, similar to the Atlas or Universal, will do the work more rapidly when the corrugations are deep, but the results are not so satisfactory due to the difficulty in obtaining a true surface throughout any great length of rail."

The Reciprocating Grinder not only maintains a true even surface, but the grinding blocks actually restore the original shape of the rail head, instead of grinding it flat.

"Atlas" Rail Grinder

"ATLAS" and "UNIVERSAL"

best for other kinds of rail grinding

High-speed rotary grinders, especially adapted to following up welding operations, grinding off surplus metal, truing gage lines and making repairs to special work.

RAILWAY TRACK-WORK COMPANY

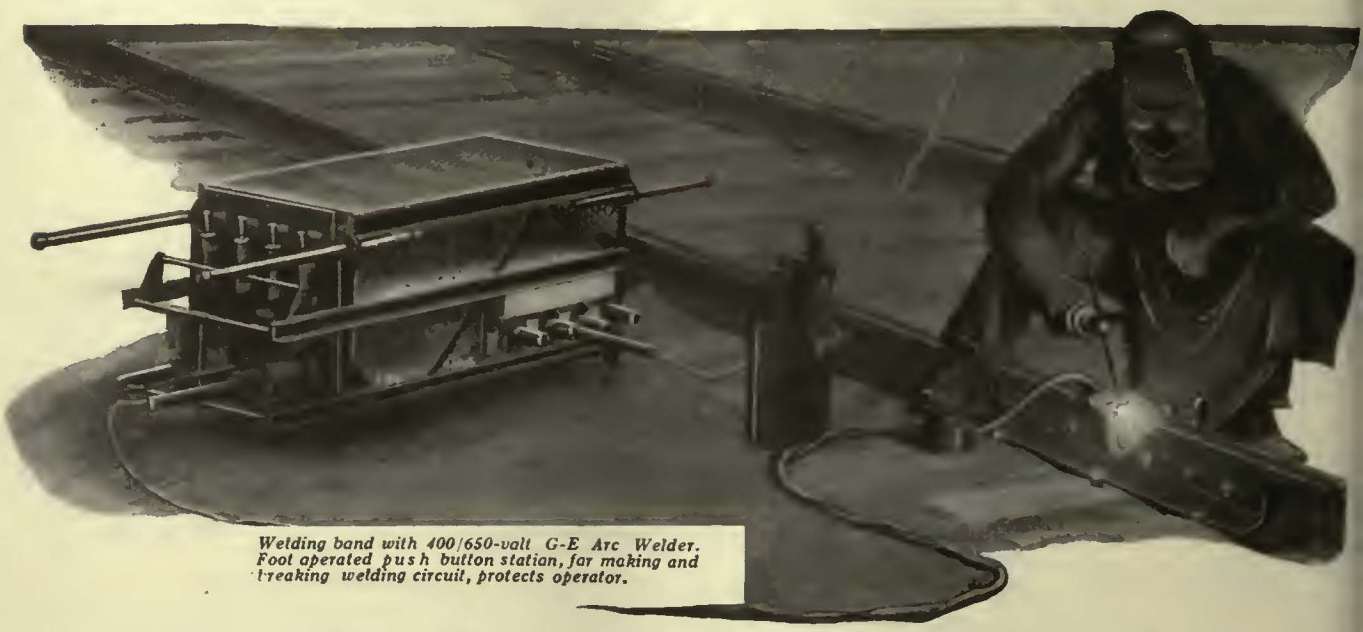
3132-48 E. Thompson St., Philadelphia, Pa.

30 Church St., New York

AGENTS:

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

Good Bonding is fundamental to improved service at less cost. Invest in it.



Welding bond with 400/650-volt G-E Arc Welder. Foot operated push button station, for making and breaking welding circuit, protects operator.

Form SF-1, made single and double conductor, for attaching to rail head. Readily applied without tearing up pavement.

Form SF-4 bond with steel terminals to fit the angle between the web and base of the rail.

Form SF-6 for application around the joint plate. Designed to be attached to top of rail flange.

Use G-E Welded Bonds

Think of an unbonded joint as an open circuit—that's what it is, practically. The high resistance causes a voltage drop that you pay for in impaired service and increased cost of repairs to motors operating on abnormally high current. And there is an energy loss that's bound to show up in your power or coal bill.

To do without good bonding is to practice false economy. You might as well try to run machinery without lubrication.

Rails as long as the system and without a joint would be ideal. Impossible, of course. But with welded bonds the track, as an electrical circuit, *is without a joint.* Furthermore, welded bonds are more easily and cheaply applied.

Ask our nearest Sales Office about G-E rail bonds and G-E equipment to weld them.

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

40-236

New York, Saturday, May 12, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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

Volume 61
Number 19

Toronto Reports a Surplus of $109,468 for Sixteen Months

A GREAT deal of interest will attach to the report, digested elsewhere in this issue, of the operation of the Toronto lines by the city for the sixteen months ended Dec. 31, 1922. The surplus shown is $109,468. On the basis of fixed assets of $34,586,698, the return on the investment approaches the infinitesimal. Judging from the report, which, however, gives very meager information and makes it impossible really to know what has been charged up to the railway or transferred to other city accounts in arriving at this net, the city has done one thing. It has apparently made the enterprise self-supporting. This is what it set out to do. The management there never fell for the fetish of the 5-cent fare. The average fare is 6.165 cents. Moreover, in discussing the fare question, H. H. Couzens, the manager of the Toronto Transportation Commission, explains that with a flat fare every extension to the system increases the cost of doing business without a corresponding increase in revenue.

The report is not intended to be a railway operating statement, but it is interesting in that the manager for the commission has made it quite plain that the operation of the system is in no way free from the hazards that attach to private management. Thus he calls particular attention to construction work carried out at the greatly increased prices for material and labor prevailing in the present market, charges that Toronto must meet in the future by increased car fares.

Plan Ahead to Cope with Growing Vehicular Traffic

LAST week an item appeared in this paper showing an increase of 17 per cent in motor vehicle registration for 1922 over the preceding year.

Dr. Wilfred I. King of the National Bureau of Economic Research, and author of the book "Income in the United States," is quoted as saying that he can see no immediate saturation point in this field. Dr. Wesley C. Mitchell of Columbia University, author of "Business Cycles," agrees in this and argues that with decreases in price and reduced cost of upkeep, we can double the number of cars in use. These and other authorities indicate that with the present population we can support some 20,000,000 passenger automobiles in the United States. In the case of trucks, the limit will be found on the basis of comparative costs as against other forms of transportation, but there is no indication of any reduction in the rate of expansion for some time.

Interurbans are very much interested in this growth in motor vehicle use from the standpoint of competition. The street railways have some interest in this direction, but they will probably be more concerned from the standpoint of the increased street congestion, which means slower schedules and more accidents. It all points to the need to plan ahead to give the best possible service with attractive cars and fast schedules, and to work toward traffic control measures that will keep the car routes open and free of such obstructions as come from promiscuous parking, cruising, left-hand turns, permitting heavy trucking and other vehicular movement to be concentrated on car line streets, etc.

The Public Can Do Much to Reduce Accident Hazard

WITH the growth of street traffic comes the accident, like Banquo's ghost, to haunt the railway man. Every forty minutes a motor vehicle kills some one on America's highways. In 1922 the number of persons killed in this way approached that of the list killed in action in the late war. William P. Eno, the international traffic authority, believes the records are far too small, as he says many of those who die ultimately from traffic accidents get home, out of town, or to a hospital, and all records of the cause of the death are often lost. He thinks it not unlikely that the number of deaths from highway traffic is 36,000 a year.

Some persons believe that this waste of life can be prevented by legislation. Undoubtedly much can be accomplished by good regulations, well enforced, but no laws can eliminate the reckless driver or the careless pedestrian. Education of the individual, which can be accomplished best through organized effort in a community, is the best way to reduce the hazard.

What part does the street railway play in this? For some time past the companies have conducted and organized safety campaigns among the employees, and the result has been that little more can be accomplished along this line in further reduction of accidents. Most of the street railway accidents nowadays are caused by persons having no connection with the company, and are entirely beyond its control. While the street railway accidents are but a small part of the total, the best way to reduce them is to appeal to the public at large. Prevention of the accident eliminates the liability for which the railway is the particular target.

The accident situation is not discouraging, however, as good results have been obtained from the safety agitation already done, if viewed in the number of accidents per hundred thousand car miles, or per hundred vehicles. But the greatly increasing vehicular movement practically compels the electric railway, in defense of its earnings, to carry propaganda for safety beyond its own employees to the community at large.

This week is published the first of a series of articles by C. W. Price, an authority on safety work, who has organized several successful campaigns, among them one in Washington, D. C. In this series he takes up the methods employed and shows how accidents actually have been reduced. in some cases the fatalities being 30 per cent less in 1922 than in the previous year, even though the total traffic increased. The articles will

discuss safety campaigns as planned and carried out by street car companies so that they should be especially helpful to railway executives in planning their future safety activities.

Home Rule Legislation Fails in New York

GOVERNOR SMITH'S program of utility legislation has failed. Desperate efforts were made by the Governor at the last moment to save something from the wreckage for the home-rule advocates, but the differences between the two factions in the New York Legislature proved irreconcilable. Mayor Hylan played the game of all or nothing, and in this case he got nothing. The result has been more idle vaporing from Hizzoner and a demand upon the Governor by the Board of Estimate of New York City for a special session of the Legislature to consider transit legislation.

The Governor, however, has said that he can see "no reason at present for such a session." Not content with that, the Board of Estimate has instructed the Corporation Counsel to prepare legal charges asking the Governor to remove members of the Transit Commission. The Mayor has scored the "four Republican obstructionists" in the Legislature and they in turn have lambasted the Mayor, who is accused by them of making "false appeals in order to keep alive a political issue which he and his associates have found profitable."

According to the Governor, himself a Democrat, the Democratic view of the legislation he advocated meant a comprehensive solution of the transit problem as a whole, while the Republican program at best promised something in 1928. This statement was, of course, intended for popular consumption, but the program of the Democrats in New York should be analyzed in the light of the facts in the case. First of all, they wanted a return to home rule, with a new commission for New York City responsible only to the Mayor and the Board of Estimate, the decisions of this commission not to be subject to review by the courts. In addition, they wanted, briefly, the right to own and operate new subways and eventually to own and operate all subways; the right to regulate the present privately operated subways, and the right to establish municipally owned and operated bus lines anywhere in the city without securing a certificate of convenience and necessity. The Republicans insisted that the state should be permitted to continue to regulate security issues; that the city should secure the necessary rights from a state commission before being permitted to place buses in operation in competition with existing means of transportation, and that after operation of any transit facilities for a reasonable length of time at a 5-cent fare the fare be increased, if necessary, to make the operation of such lines self-supporting. The Republicans were unalterably opposed to any deficits from operation being met from general taxation.

These are just a few of the irreconcilable differences between the two factions. They show, however, the extent of the assault that it was proposed to make upon the present existing order of things in an effort to satisfy the vanity of an administration that has construed its election to office to mean that it should be permitted to proceed without let or hindrance with a program of municipalization staggering in the possibilities of evil that might come out of it.

As matters now stand the present Transit Commission in New York is left with its powers intact to carry on to completion, if it can, the program for unification of the existing transportation lines and the construction of new rapid transit routes, while the Mayor is left to think things over and perfect the paper plans for the construction of the separate system of lines which the city administration has recently indicated it proposes to carry to completion under its existing powers. There remains, of course, the possibility that the Mayor and the commission may get together on the matter of future subway building, and some of the New York City papers have gone to laborious lengths to point out that the differences between the city administration and the commission are not irreconcilable.

Chamber of Commerce Makes Progress in Solving Transportation Problems

THE main subject announced for the annual meeting of the Chamber of Commerce of the United States in New York this week, namely, "Transportation in All Its Phases in the United States," is somewhat misleading because city transportation was not considered. The papers and discussions on transportation were on how the trunk line railroads could be rehabilitated so that they could better serve the public and how the operation of the motor truck and waterway could best be co-ordinated with the railroad in the country's transportation system. While electric railways, as freight carriers, were mentioned only indirectly, the meeting had many points of direct interest to them because many of their financing and labor problems are similar to those of the steam railroads; they also are faced with automotive competition, and they are vitally interested in regulation and in the coal question. Electric railway problems are also to be taken up as part of a study of the general transportation situation by a committee whose appointment was decided upon by the Chamber some time ago. Five sub-committees of this main committee made progress reports at the meeting and will consider, among other things, freight rates, cost of operation and taxation of motor and railway carriers, wear on highways by motor trucks, possibilities of co-ordination of the motor bus and electric railways, and other allied topics.

The most interesting feature of the discussion on transportation at the meeting was that in the addresses and debates two principles stood out as being generally accepted, not only by the membership in general but by the advocates of motor transport and water transport as well. The first of these is that the main transportation of the country will still have to be carried on rails and that government ownership of these rail carriers is undesirable. In consequence, such a policy must be adopted toward them as to encourage their development and expansion under private initiative. The second conclusion reached is that in the interests of both public and carriers there should be better co-ordination between the different modes of transit, so that each shall undertake only that part of the work for which it is better fitted than the others, and that this comparison should include a consideration of the cost of operation, of which a part is any subsidy which it may receive by having part of its right-of-way furnished free at government expense.

Altogether the meeting was a step forward in the correct solution of transportation problems, as well as in the other questions considered, and much may be expected from the reports of the five committees now working under the direction of the Chamber studying various phases of the transportation problem.

Inspection Bay No. 2 In Carhouse Just Constructed at Toronto

Toronto's New Car Storage Facilities

Rehabilitation Program Includes Expansion and Improvement of Division Inspection and Storage—One Layout Has Just Been Completed—A Feature Is the Provision for Fire Protection—Reinforced Concrete Selected on Competitive Annual Cost Basis

THE rehabilitation program of the Toronto Street Railway system, under the direction of the Toronto Transportation Commission, includes the erection of several new carhouses. One of these, with division headquarters and employees' rooms, has recently been completed at the corner of Eglington Avenue and Yonge Street, and plans have been prepared for a similar building to be known as the Danforth carhouse.

The Eglington carhouse, or inspection shop as it might more properly be called, occupies part of a plot of 10.32 acres which was purchased by the commission. The arrangement of the carhouse and yards, however, is such that a portion of this plot of about 3.05 acres is available for resale for stores and residences. The space occupied by the main carhouse is 41,695 sq.ft. and that by the office building is 5,450 sq.ft. The rest of the space used for railway purposes is given up principally to storage tracks, as in Toronto open storage is used for most of the cars.

The storage capacity of the carhouse proper is thirty-four cars, based on a 50-ft. length. The yards at present will hold 120 cars, but this can be increased by additional tracks to hold fifty-three more cars when desired, thus providing a total capacity of 207 cars at this place. The entrances to the yards and to the carhouse are paved with granite blocks and the remainder of the yard is ballasted with cinders.

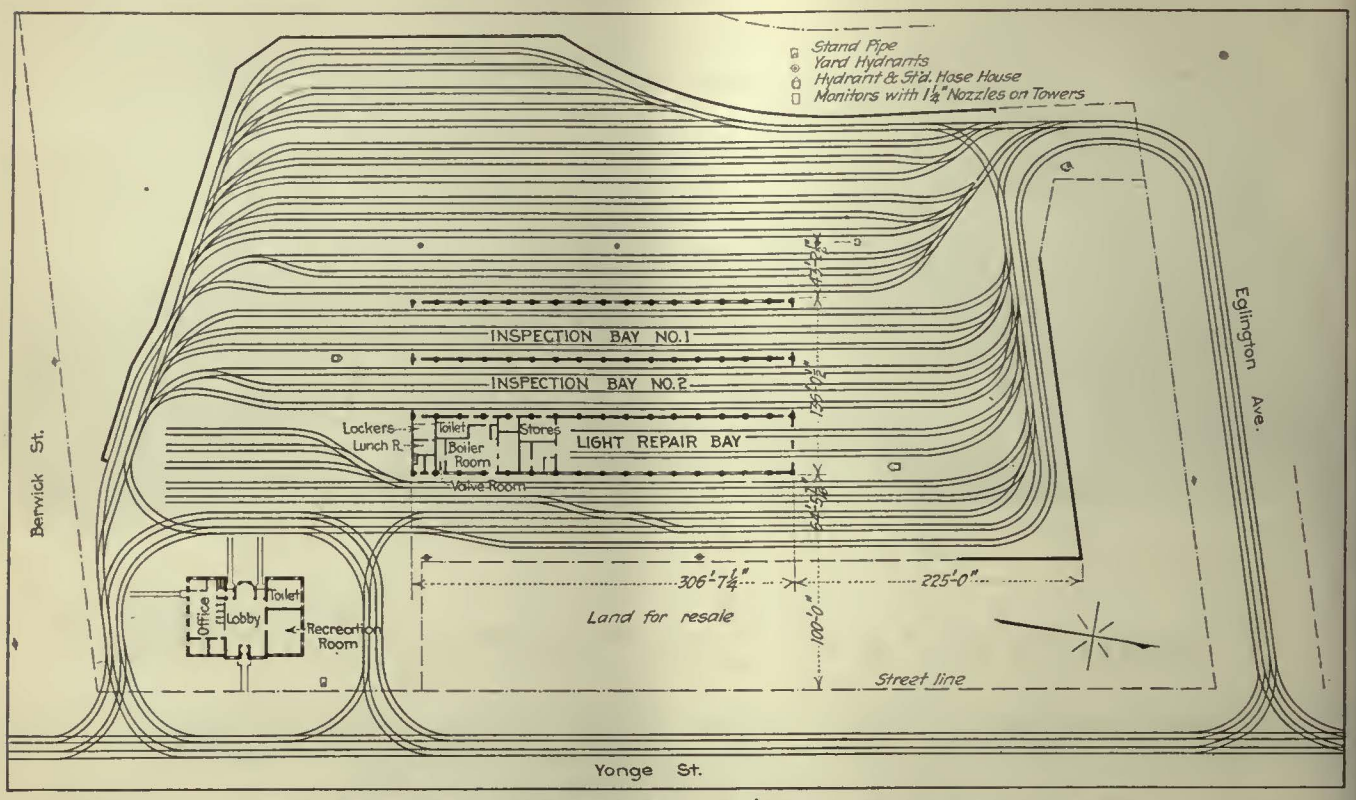
The main entrance to the yard is from Eglington Avenue and the general movement of the cars is south to the Yonge Street exit. Toronto service is given largely by single-end cars, with trailers in rush hours, and the yard is adapted to that kind of operation. Two electric shunters are used to move the trailers around.

The Division Headquarters Building Has a Pleasing Exterior

Carhouse and Storage Yards

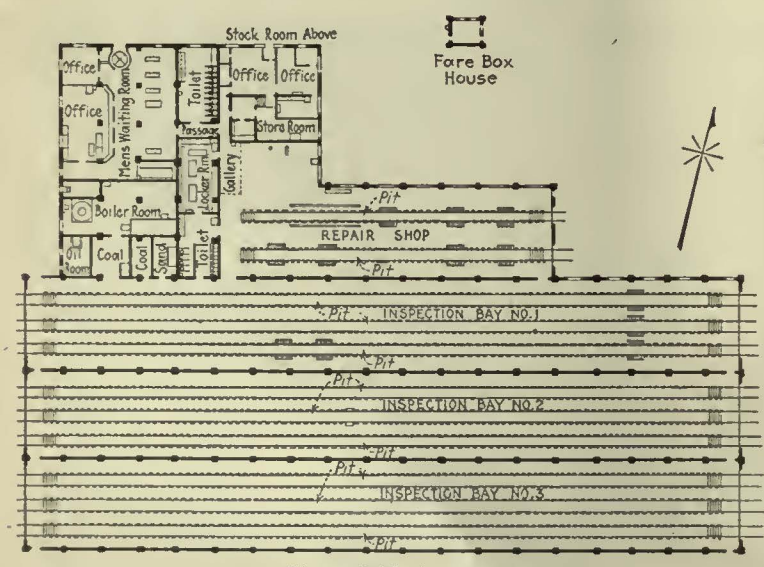
The carhouse proper is a reinforced-concrete structure with brick and tile walls, steel sash and electrically operated rolling steel doors. It has no wood in its construction and is equipped throughout with automatic sprinklers and an auxiliary fire hose system. It is divided into three bays by fire walls, each bay being 307 ft. long by 44 ft. wide. The two westerly bays are used for the inspection of cars. Each has three tracks and is closed by doors at either end. The remaining bay, with two tracks, accommodates the workshop, storerooms, boiler house, lavatories and locker room. Under every track is a concrete inspection pit running the full length of the building.

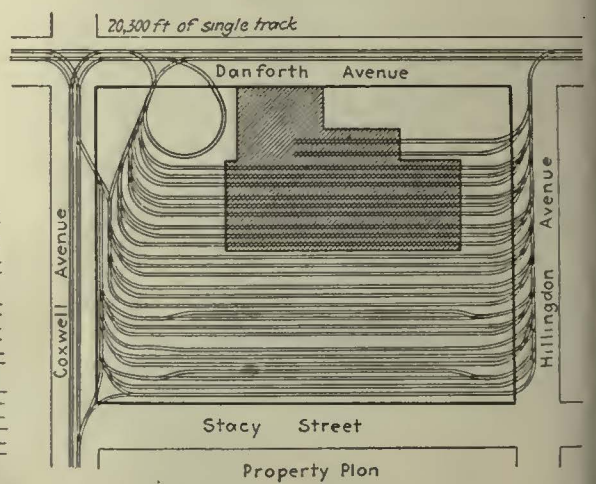
In addition to the sprinkler system and auxiliary fire-hose system in the carhouse, a number of monitor nozzles are located on the roofs, while others are on poles. These nozzles are capable of playing water over the site used for storing the cars. There also are yard hydrants and standpipes, the locations of which are shown on the accompanying plan. This special fire protection not only insures very low insurance rates, and so justifies itself on this ground, but it provides as far as possible against se-



Plan of Eglington Carhouse and Storage Yards Shows Minimum Use of Street Frontage

The Main Room in Division Headquarters Is Well Lighted and Cheerful





Plans of Danforth Carhouse and Yards Under Construction

rious disorganization of the service if a fire destroyed rolling stock which the company could not replace for months.

Within the carhouse the spraying system of car washing is employed. It is similar to that used by the Detroit Municipal Railway and described on page 705 of the ELECTRIC RAILWAY JOURNAL for Oct. 28, 1922. On both of these railways cars are washed as they pass through the carhouse.

The building is heated by hot air, driven by fans through concrete and tile ducts to outlets in the pit floors.

OFFICE BUILDING

The office building, located at the southeast corner of the site, is a brick structure with steel frame, 92 ft. long by 60 ft. wide, and provides accommodation for the men and staff of the division which operates from this depot. In the center of the building is a well-lighted lobby with large windows at both ends. It contains schedule racks, order boards, tables where the men can make out their reports, with ticket and cashiers' windows at the left. The general interior view of the waiting room shows this side of the lobby, with the railings, which are of aluminum piping. Opening to the right are the trainmen's recreation room and lavatories.

COST OF CONSTRUCTION

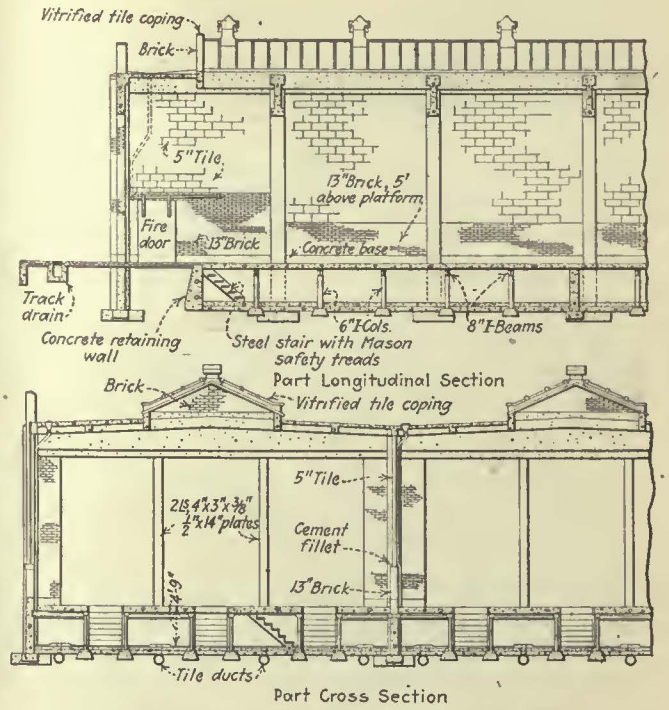
The total cost of the carhouse and office building, including furnishings and equipment, but exclusive of land, was about $275,000. Before adopting this construction the Transportation Commission made an analysis of different types, with the results shown in the accompanying table. Reinforced concrete, the type adopted, was most expensive in first cost, but the reduction in insurance premiums on buildings and contents and the lowered maintenance of buildings brought the total annual operating costs of the three types of construction to almost the same. Hence the great advantage to the system of having a practically fireproof construction at the same time was secured without extra cost.

COSTS OF DIFFERENT TYPES OF CONSTRUCTION FOR CARHOUSE TO ACCOMMODATE THIRTY-FOUR CARS

(Including sprinklers and track in buildings)

Type of Construction	Reinforced Concrete (Columns and Roof)	Steel Trusses, Steel Columns, Gypsum Roof	Steel Trusses, Steel Columns, Wood Roof
Capital cost	$215,000	$213,000	$207,000
Annual charges:			
Interest and sinking fund at 9 per cent	19,350	19,170	18,630
Insurance premiums on buildings and contents, and maintenance	2,828	3,077	3,542
Total	$22,178	$22,247	$22,172
Costs per car:			
Capital	$1,194	$1,183	$1,150
Annual operating	123.21	123.59	123.17
Costs per cu.ft.			
Building, shell only (cents)	19.1	18.9	18.4
Building, equipped (cents)	19.7	19.5	19.0

In addition to the Eglington carhouse, which has been completed, the Toronto Transportation Commission is building a somewhat similar structure with accompanying storage yard occupying an entire block at the corner of Danforth Avenue and Coxwell Avenue. With the yards the capacity is 263 cars, there being twenty-six storage tracks, of which nine pass through the three inclosed inspection bays. Two additional tracks enter the repair shop. A plan is given in the lower diagram on page 792.



Use of Reinforced Concrete Secures Fire Protection

Broadcasting Utility Information in the Middle West

THE Iowa Committee on Public Utility Information has adopted a novel method of interesting the public in the work of assisting in solving problems which the public must face if adequate utility service is to be furnished. The director of the committee, Joe Carmichael, gave a fourteen-minute talk on the evening of April 30 from Radiophone Station WOC, Palmer School of Chiropractic, Davenport, Iowa.

"WOC" is one of the strongest broadcasting stations in the country, and telegrams, phone calls and letters indicated that the talk was heard in distant parts of the country. Thousands of people listened in in the immediate vicinity of Davenport.

The speaker discussed briefly some of the difficulties confronting the electric light, gas and electric railway industries. He pointed out that the public was confronting the utilities with the biggest economic task that any industry ever faced. In order to provide service which the public was demanding, the utilities had to double their investment in the next six or seven years. That investment now exceeds thirteen billions of dollars. It has been accumulating for half a century, yet it now must be duplicated in a few years.

The utilities, he said, did not know where the money was coming from, but they knew where it was not coming from. It was not coming from dissatisfied, disgruntled customers. It was not coming from anywhere, if there was any appreciable number of disgruntled, dissatisfied customers, for no one was going to invest money in an industry whose public relations were bad.

Exchanging Ideas on Publicity Work

The Publicity Men of Several Mid-West States Are Exchanging Views and Presenting Discussions on Various Aspects of Their Work Through the Medium of a Bulletin—Some of the Matter Presented Therein Is Abstracted Here

By E. B. Sanders
Publicity Manager Kansas City Railways

PUBLICITY is either good or bad, beneficial or injurious; it molds public opinion either favorably or adversely; it can "make or break you."

With the right kind of publicity an ordinary actor becomes a star overnight; print a few words of commendation on the successful manner in which some lawyer has handled a case and clients will flock to him for counsel; boost a street railway and you have won public sentiment to the side of the company.

As a general rule newspaper editors are more inclined to boost than to criticise. Any individual who is constantly striving to do the right thing usually receives the support of the newspaper; and the same principle applies to any industry. The electric railway industry needs plenty of publicity—the right kind of publicity. But we can't get it unless we go after it in the right way.

In the first place there must be something done to create good publicity. It's the lack of effort that usually results in the wrong kind of publicity.

The fact that service is the one and only commodity the electric railways have to offer necessarily implies that our efforts to secure publicity must be concentrated on that one sales article.

Keep Up the Supply of News

Fortunately, however, service covers a lot of territory. It may be divided into many classes—and each class is deserving of the proper publicity. The idea is to keep showering the newspapers with news. If we don't furnish the material, how can we expect to be fairly treated?

King "Tut" had to wait a long time to break into print, and then didn't profit by it. The street railway man can't wait that long. He has to advertise while there is still time to reap a reward, for three thousand years from now when some "Americanologist" unearths one of our twentieth century cars, places it in a museum, and the people pass by and remark, "What an odd looking chariot," it won't make much difference to us what the newspapers say about us or our "chariots."

But today—that's a different story.

In the publicity game today we are either King Tuts or King Solomons. The latter was a good advertiser—he got his while the getting was good. That's what the street railway men in the Middle West are trying to do.

Last summer the more than fifty companies in five Middle Western states (Missouri, Kansas, Iowa, Nebraska and Oklahoma) "pooled" their publicity and advertising ideas. In other words, these companies agreed to exchange advertising copy of all kinds as well as suggestions and ideas along that line. As a medium of such exchange a *Bulletin* was started and sent to every company in this territory. Published every other month, this *Bulletin* contains articles on subjects of interest to the electric railway publicity men, advertising copy used by the various companies, ideas and suggestions on how to secure publicity, what and how to advertise, and other valuable information Everything appearing in the *Bulletin* is prepared by the men who handle the publicity for their companies. This "pooling" of ideas and suggestions has proved invaluable to the men in this territory.

Before the first issue of the *Bulletin* appeared, the following questionnaire was sent out to every company in these five states:

1. Do you use any of the following advertising channels? (a) Newspaper space. (b) Window signs. (c) Company publications. (d) Dash cards. (e) Cards inside cars. (f) Handbills. (g) Other mediums.
2. Do you receive much newspaper space in the way of news items?
3. Are your newspapers friendly to your company?
4. How many daily newspapers in your city?
5. Do you call the newspapers whenever you have any news that would be of interest to the public?
6. Have your receipts increased or decreased within the past year?
7. To what do you attribute such increase or decrease?
8. Have you any jitney competition? If so, approximately how many jitneys?
9. How many employees have you?
10. Would you be willing to write a short article for our bulletin on some phase of advertising or publicity work?
11. Will you please offer us some suggestions on ways and means of making the bulletin a popular and beneficial publication (these suggestions to be published in the bulletin)?

Practically every company filled out this questionnaire immediately, and the answers were published in the first *Bulletin* so that every company would know what the others were doing.

This investigation brought out the fact that very few companies were doing advertising of any kind; a few were receiving some free publicity—mostly news concerning accidents for which the company was not responsible, or pertaining to breakdowns in service.

Every company was 100 per cent strong for the *Bulletin*. All agreed to co-operate in every way to make this innovation a success. *And they have done so!* To day every *Bulletin* reader will tell you that he has been benefited by the ideas of others as expressed in each issue. More companies are advertising now than previously—and with splendid results.

Since the inauguration of the *Bulletin* several companies have begun publishing weekly pamphlets for distribution on their cars. This was one of the first suggestions made by one of the *Bulletin* readers. Other suggestions offered in the way of advertising mediums were as follows: Newspaper space; company publications; inside cards; dash cards; window signs; handbills; large signs on construction work detailing cost and number and quantity of materials used; moving picture films; and addresses by officials at club and civic organization meetings.

It might be said that today every company in this territory is using effectively one or more of these advertising mediums. One company official suggested that arrangements be made with radio broadcasting stations in this territory to broadcast occasional short speeches on the electric railway situation. And this was so good that plans are now under way to do this.

Speaking of publicity and public relations, an Oklahoma official said in *Bulletin* No. 3:

Public relations are in a large measure, whether good or bad, established by the employees of the utilities. Therefore, it would appear of the utmost importance to sell the service to employees first. Adequate, reliable service and conscientious employees who are good salesmen are the two important factors which establish and maintain public relations.

Advertising Pays Well

In *Bulletin* No. 4 appeared a number of splendid articles on "The Value of Good Newspaper Publicity." Here is an abstract of one by an official in Oklahoma:

Whatever the merits of such advertisings are, it must be borne in mind that the results can only be estimated, and to undertake to state a value in dollars and cents would indeed be difficult.

Advertising managers and others who are closely associated with advertising work, due to their extensive study of the values of the various methods of advertising, almost unanimously agree that newspaper advertising has a psychological value, which is difficult if not utterly impossible even to estimate. In this connection, my experience with newspaper advertising, from a public utility point of view, convinced me that the values of such advertising come from two directions, stimulating traffic and molding public sentiment. Whether either or both are worth what they cost is a matter of speculation. Personally, I believe they are. I am firmly convinced that public opinion, however unfavorable, can be changed to more favorable and probably made satisfactory by constant agitation in the proper way, through the columns of the newspapers, and this is indeed too important to be overlooked. Yet the most brilliant manager would demur if asked to place a dollar and cents value on it.

Advertising is like adjusting an important claim; one cannot say whether the investment was good or bad. It is largely a matter of opinion, and what appears to have been profitable could easily have been expensive without our having positive knowledge to the contrary.

Each utility has its own difficulties to overcome, many of which are characteristic to that community only. With a small property, such as ours, located in a sparingly populated district, the people soon familiarize themselves with the schedule, rates, etc., rendering the advertising of such useless, or practically so. Therefore, in such communities, and the same is true to some extent with larger properties, newspaper advertising must be designed to build up and maintain good public relations.

The newspapers, without a doubt, could be, if they are not, the most powerful agency in making public opinion either favorable or unfavorable to a local utility. Therefore, it would appear of considerable importance that our relations with the newspapers should be very favorable.

Utilities advertising is quite different from the ordinary advertising, in that they have but one article to sell, "Service." Everybody knows what a street car ride is, as well as what it means to have gas, telephone or electric service, and unless there is something special in the matter of rates or change of schedules, it requires an artist to write an advertisement that will attract attention enough to be generally read. Of course, at certain seasons of the year amusement parks offer a good field for newspaper advertisement, and where there is jitney or bus competition, much can be done through newspaper advertising to influence traffic in favor of the railway.

In conclusion, I want to say that personally I attach much importance to newspaper advertising. I believe that most utilities could expect to find it profitable to spend from ½ to 1 per cent of their gross receipts for carefully designed newspaper advertising.

Favorable Publicity Brings Patronage

A street railway official out in Kansas contributed this article on the subject:

A street car system cannot put an itemized valuation on good newspaper publicity. It is like the "going value" of any business, intangible, nevertheless an asset worth hundreds of dollars in real cash. Good newspaper publicity, which always means favorable publicity, brings this company car fares daily, many of them. How much of a day's revenue can be credited to friendly publicity can never be reckoned nor even approximated. Yet it is indisputable that favorable publicity brings patronage; unfavorable publicity would drive it away.

We know of scores of specific instances. Here is one of the outstanding examples:

A certain business man in our town lives near the end of a line, the principal source of revenue to our system. This man drives to and from work every day. His direct route would be on this car line to the business section. He always turns off at the paved cross street nearest his home, drives a block and turns on an avenue paralleling this line, to run downtown. In short, he turns two blocks out of his way daily.

Why? Let him explain, as he explained to a patron of our lines whom he happened to pick up one day:

"I always turn off of Santa Fé at that corner—maybe you've noticed it." he said. "Two blocks out of my way. Just because I don't like to pass up acquaintances waiting for a street car, and at the same time I don't like to take those nickels away from the street car company. I know the company needs them. Oh, if some one has missed his car and will have to wait or walk, or if it's bad weather, I always pick up as many as my old bus will hold. But the company can't get along without its fares, and those fellows can get along without a ride downtown in my hack; I just don't like to pick up passengers when the street car is right behind me. But if I pass up my friends, they begin to wonder what kind of a swell head I'm getting. That's why I always run downtown on this side street."

That man is a real friend of our company. He does not owe or own a cent in it. Nor did I, personally, know who he was until the street car patron told me about the incident. Then why his friendship for the company? Good newspaper publicity explains it, and nothing else does, in my opinion.

Regarding the value of good newspaper publicity as proved, the next question is how to get it. With both newspapers friendly, that is not difficult here. We do not impose on them by asking them to "say something nice" about us. Nothing would turn them against us sooner, and justly so, than constant begging for boosts. We get our favorable publicity by creating news.

We make news by making improvements in service whenever possible and by trying out ideas for the public's convenience. To be printed, it must reach the reporters. We consider it a part of our business to keep acquainted with the reporters. To get news about the company's plans or activities published, we need only to tell the reporters. They are anxious to get it. But it must be real news, not propaganda or "bunk," as they term it. For instance, we recently received considerable publicity on trying out a bus line as a substitute for one of our main lines; also for some track improvements we made. Meanwhile we had a line break down one night. Many faults could have been dug up about that. Instead the newspaper told about our efforts to restore service.

Another important reason for the friendly attitude of the press can be best expressed by the reporter who once gave me one of my most valuable publicity hints. He spoke inelegantly but eloquently. He said:

"I don't mind handing you guys a little boost once in a while, because you never try to cover up on accidents and such stuff; you give us all the dope you got on 'em. In other cities where I worked the street car companies were always hushing up stuff like that, and they'd lie and do anything to keep us reporters off anything they didn't want in the newspapers. Their motormen and conductors never told us anything because they knew they'd be fired or catch hell if they did. The bosses always made it as hard for us as they could to learn the facts about smashups and running over kids and such. You bet your life we never went out of our way trying to write anything good about them."

The value of good newspaper publicity to this company, and to any small-city line, is as much, almost, as the value of the franchise and investment. In a bigger city, where a large portion of the public must depend on traction service because the distances are greater, good newspaper publicity is not necessary to existence. However, good or bad publicity represents the difference between getting or losing the fares of the fellows who would rather walk or ride in a jitney than

pay a fare to that "grafting corporation." The total of those fares in a year can easily make the difference between a dividend and a loss.

KIND OF COPY IS IMPORTANT

Here is what another Kansas official says:

About two years ago we changed the plan of our newspaper advertising here in this city and made a cut of approximately one-third in the space carried, adopting for the advertisements a conversational form between two supposed car patrons, using a cut showing a business man and a laboring man on a car. In each ad at least one thought was conveyed, such as the company's yearly payroll, the amount of taxes paid annually, the number of families supported by the company, the amount of material and supplies purchased annually, and other such items, these subjects being interspersed with advertisements pointing to the high grade of service being rendered. Fine results were obtained within four months after the starting of this campaign, and the attitude of the public was changed from condemnation to boosting for us.

It has also been my experience that newspapers are very ready to publish what are commonly termed "human interest stories" in regard to politeness and efficiency of car operators, and incidents of a somewhat unusual nature occurring in the operation of cars. They are always very ready to publish news stories regarding new installation of equipment, track special work, etc. I believe that all publicity of this nature it is possible to secure is of great advantage in maintaining a friendly feeling between the street railroad and its patrons.

The superintendent of an interurban company, illustrating a point in his article, told the following story:

A Jew was in business and his turnover so slow that he was rapidly losing money. Business was indeed rotten. One day as he stood in the door looking for prospective customers, a minister of the gospel came by and noticed the disheartened look on the Jew's face. He stopped to give him a word of encouragement and asked him about his business. The Jew told all of his troubles and the minister said to him: "Well, Isaac, the trouble with you is that you do not pray enough to your God. Pray to Him reverently and fervently, and have faith in prayer, and it will be answered." The Jew promised the minister that he would do this.

Some days later the minister was passing the store again and noticing the disheartened look still on the storekeeper's face, stopped and asked if business had improved. "No," the Jew replied, "it is no better, and I have been praying to God and praying and praying, and my prayers have not been answered." "How have you been praying, and what have you been asking for?" kindly asked the minister. "Well," replied the Jew, "every day I have gone into my closet and prayed to God for the eight thousand dollars profit I have told Him that I need right away, and have repeated this prayer several times a day, but still it has not been answered." "That isn't the way to pray," suggested the minister. "You have been asking too much." To which the Jew replied, "Well, how did I know that was too much? Why didn't He make me an offer?"

In explaining his point, this superintendent said:

We, too, have been working for business and praying for an increase in earnings; but like the second-hand dealer, we have not been telling the people properly what we offer. We, too, have seemed to be waiting for an offer.

There were a number of other interesting articles in *Bulletin* No. 4 on "The Value of Good Newspaper Publicity."

This plan of "pooling" ideas has indeed proved profitable for the publicity men in these five Middle West states. Certainly there are no King Tuts "out where the West begins." King Solomon had nothing on them.

The Pennsylvania Water & Power Company has installed and tested a carrier-current or "wired-wireless" telephone outfit on its lines. It has been so successful that similar facilities are contemplated by the company between the generating station and the Lancaster (Pa.) substation.

Large Power Station Project in Detroit

THE vote on April 2 in Detroit in favor of the $12,000,000 bond issue for a municipal power plant is another step in the erection of this station to supply the needs for energy of the municipal undertakings. It will be recalled that an initial appropriation of $1,000,000 was made last June. This the Public Lighting Commission has been using for developing the site, for substructures and for engineering. The present appropriation of $12,000,000 is required to complete the work, $7,000,000 being for the power plant and $5,000,000 for the transmission system. Until the present debt limit of 2 per cent for public utilities in the city charter is increased, however, bonds cannot be sold for its erection.

The proposed new city station would be built at the foot of Morrell Street with a capacity of 120,000 kw. and would be equipped to burn powdered fuel. Its first equipment would consist of four 20,000-kw. turbines and it is estimated that it could furnish energy under the present load factor for 1.12 cents per kilowatt-hour, including interest and amortization charges on a twenty-two-year sinking fund basis.

At present, the city has a small municipal lighting station, and the railway department inherited two old power stations from the Detroit United Railway.

During recent years, while the Detroit United Railway was operating the city system in Detroit, it generated about one-third of its power and purchased about two-thirds from the Detroit Edison Company under a ten-year contract. This contract, which was entered into in July, 1913, provided that at the end of ten years either party could serve notice on the other that it was not ready to renew the contract, but in that case the contract would not terminate abruptly. Instead, the terms in regard to rates, power to be supplied, etc., would continue for a year. At the end of that time one-third of the load would be taken over by the purchaser; at the end of the second year two-thirds of the load would be taken over, and only at the end of the third year would all of the load be discontinued by the Edison company.

In the meantime, the Department of Street Railways has made an interim contract with the Detroit Edison Company for energy at substation d.c. bus bars. The rates under the contract for energy are on a sliding scale and include a coal clause, but it is estimated that the charges will be approximately as follows:

July 1, 1922, to July 1, 1923	1.006 cents per kw.-hr.
July 1, 1923, to July 1, 1924	1.243 cents per kw.-hr.
July 1, 1924, to July 1, 1925	1.482 cents per kw.-hr.
July 1, 1925, to July 1, 1926	1.750 cents per kw.-hr.

Under two supplementary contracts the Detroit Edison Company will also install in its substations 8,500 kw. of motor-generator sets which will be taken over by the city at the end of the contract. To care for its requirements in a section near the River Rouge, where the Edison company's substation isn't large enough to permit of additional equipment, the Department of Street Railways is installing a 2,000-kw. substation. The electrical equipment for this substation, which will consist of two motor-generator sets, has already been purchased from the Indiana Service Corporation. The Edison company's substation capacity will be increased by about 2,500 kw. by September and by about 6,000 kw. more when the new motor-generator sets already mentioned have been installed by the Edison Company.

Revamping the Filing and Record System of an Engineering Department

This Work Was Done in Order to Enable the Clerical Division of the Montreal Tramways Engineering Department to Handle a Largely Augmented Volume of Work with Speed and Accuracy

By R. B. Genest
Chief Clerk Engineering Department, Montreal Tramways

Head Timekeeper's Office Is Arranged to Facilitate Record Making

IN THE May 5, 1923, issue of the ELECTRIC RAILWAY JOURNAL the author explained how the cost accounting system of the Montreal Tramways was revised. There were several other improvements made in the filing and record system at the same time. In fact, these formed an integral part of the general rehabilitation of the accounting system.

THE ENGINEERING DEPARTMENT FILING SYSTEM WAS TACKLED FIRST

It was found, first of all, that our filing system was daily losing its effectiveness due to the worn condition of the file folders and the lack of space for the continually increasing number of files. The file system inaugurated fifteen years ago was, in other words, gradually falling down. Preliminary to a revision of the filing system, a representative of the engineering department attended a filing school, where he learned of the modern successful methods of handling correspondence. As a result, an economical system of filing which is adaptable to engineering work was devised.

The study which was made of methods of filing showed that the correspondence of an electric railway engineering department is difficult to classify. No hard and fast rules can be laid down which would be generally applicable. It is, however, not possible in general to index by the names of letter writers. In our case a simple index was devised containing the following headings:

A
3 ..... Accidents
6 ..... Agreements (extra copies)
35 ..... Automobiles

B
52 .....Bath-St. Denis Yard
73 ..... Bills
84 .....Blue Prints and Plans (Correspondence)
87 .....Boilers, General
88 .....Bolts, Track
90 .....Bonding
90 ..... Bonding cars
104 .....Bridges
119 .....Bureau of Standards, Washington

C
126 ..... Cable
131 .....C.P.R.-Longue Points Spur
137 .....Car Barns-Cote, Hochelaga, St. Denis, St. Henry, Terminal .....
137-A .....Car Hoists
137-B .....Car Stop Fasteners
137-C .....Car Stops
137-D .....Car Operating (Timekeepers)
141 .....Cattleguards
142 .....Cement
151 .....Cinders
152 .....Claims
161 .....Coal
170 .....Concrete Mixers
170-A .....Conduits
173 .....Construction Cars
185 .....Crane Cars
189 .....Crossings (railroad-diamond)
189-A .....Crossings (open)
189-B .....Crossings (underground)

D
213 .....Depots Cote, Hochelaga, St. Denis, St. Henry
213-A .....Derailments
215 .....Devilstrip (width of)
228-A .....Drainage
230 .....Drills, Track
232 .....Dumps

E
247 .....Electrolysis
247-A ...Electrical Commission of Montreal
247-B..Electric Railway Journal
247-C .....Electrification South Bank Branch CPR
247-D .....Elevators
251 .....Employees
252 ....Engineering Department Orders
259 .....Excavations
259-A .....Expenditure, Maintenance and Renewals; Expenditure, Maintenance and Renewals; Expenditure, Maintenance and Renewals; Expenditure, Maintenance and Renewals

F

262 .....Farm Tile Pipe
262-A .....Farm Ditches
266....Fences and Cattleguards
271 .....First Aid
271 .....Fires
282 .....Forms
282-A .....Form Letters
287.Franchises and Ordinances, Miscellaneous
289 .....Freight Shed
296 ....Filing System

G

301.....Garage, Cote Street
303.....Gages, Track
305....Genest, R. B. (Personal)
324...Grades, Grade Separation
326 .....Granite Blocks

H

340.....Hack Saw Blades
364 .....Hayes Derails
366 .....Head Office
414..Hydro-Electric Commission

I

418 .....Intersection
418-A .....Interlocking Plants
418-B .....Insurances
418-C .....Instructions

J

424 .....Jacks
433 .....Joints
433 .....Joints (Removable Paving Blocks for)

K

459.....Kinnear Doors, General

L

483 .....Lanterns
501.....Lighting, General
509 .....Locks
513 .....Loop, Nolan Street
518 .....Lumber

M

539...Machinery, Miscellaneous
545 .....Manholes
546 .....Manufacturing Orders
547 .....Maps
556 .....Material
564 .....Memoranda
569.....Meteorological Service
574 .....Mileages
583 .....Miscellaneous
587.....Montreal Tramways Commission

N

629.....Nova Scotia Tram & Power Co.

O

642 .....Organization
644....Ottawa Electric Railway

P

656 .....Paving
663 ....Permits
669 .....Photographs
670 .....Picks
677 ...Poles, Light Standards
679 .. ..Postal Rates
681 .....Power Plants, Cote, Hochelaga, St. Denis, St. Henry, Pte-aux-Trembles, St. Laurent, William Street, Youville
681..Power Distribution System
688 .....Programme
688-A .....Property, M. T. Co.
688-B....Proposed Construction
690 .....Publications

Q

692.....Q. P. U. Commission

R

693 .....Rails
693-A ....Rail Saws
693-B.....Rail Grinders and Drillers
693-C.....Railway Commission, Board of
698 .....Recorder's Court
698-A .....Receipts
706 .....Revenue Passengers
711 .....Rifle Range, Pointe-aux-Trembles
712 .....Right-of-Way
722 .....Roofing
732.....Royal Trust Building

S

744 .....Sand
744-A .....Sand Boxes
744-B .....Salt Bags
744-C .....Sand Drying Plant
748 .....Scales, Track
773.....Secret Service Reports
776 .....Semaphores
778 .....Sewers
779 .....Shanties
783 .....Shelters
786 .....Shims
786-A .....Shovels
788 .....Sidings
792 .....Signs
803 .....Snow Removal
803...Snow Melters (Electric)
808 .....Special Work
811 .....Spikes, Track
817.....Stations and Platforms
817-A .....Statistics, Transportation of other street railways
817-B .....Stationery
818 .....Steam Roller
828 .....Stock Inventory, Hochelaga Const. Stores
828-A .....Stock Inventory, St. Denis Yard
829 .....Stone
831 .....Stop Blocks
838 .....Subways
841 .....Switches
841-A..Sweepers and Sprinklers

T

847 .....Taxes
847-A .....Tarpaulins
848 .....Telegrams
848...Telephone and Telephone Numbers
858...Ticket Offices and Waiting Rooms
858-A .....Ties
858-B .....Tie Rods
858-C .....Tie Plates
862 ....Tool Inventory
862-A.....Tools and Machinery Department
864 .....Track Maintenance
864 .....Track Costs
864-A....Track Extensions and Renewals
864-B .....Track Removals
865 .....Traffic
870 .....Turbines

V

881 ..... Valuation (contract)
881-A.....Valuation (Terminal Line)
884.....Vernon B. (Personal)
885 .....Victory Bonds

W

903 .....Water Meters
903-A .....Water Mains
913 .....Welding
920 .....Wheels, Car
950.....Working Force, Reports
951.....Work Orders, Current

Y

955 .....“Y's”
958 .....Youville Shop

The letters of a file are placed in a smooth, stiff expansion folder, bearing a non-breakable clip and an extended metal nameplate or label holder. The numbers of the main file headings run from 1 to 1,000. These numbers, combined with direct name guides, and a generous use of alphabetical sub-divisions and file headings will care for 20,000 files.

The sub-division of files without the use of auxiliary numbers is further facilitated by the use of colored labels. All file headings, guides and name plates are staggered in the file cabinet boxes, so that when a drawer is opened the names of all files are visible in alphabetical sequence under the main file number.

The outside box plates show the file number, main headings and alphabetical sequence.

When a file is removed, an “out” folder is inserted. This contains sufficient information to permit the file to be traced promptly to the borrower.

Several copies of the file index were distributed among the staff, so that the file numbers soon became known and the work of the file clerk was considerably facilitated.

This plan of filing through the use of the guide numbers minimizes the possibility of replacing a file in a wrong location. These guide numbers prevent a file from going very far astray, even if, as is true in some cases, there are several hundred files covered by one file number. It may be of interest to note that the revision of the filing system involved the rereading and reclassifying of 15,000 files, averaging 250 letters per file.

Revision of Forms

The filing system having been put in order, the next move was the overhauling of all forms used by the en-

At Left—Checker's Portable Shanty. At Right—Checker at Work in His Portable Shanty

Office Facilities for the Checkers, Inspectors and Timekeepers

gineering department. A committee was appointed from the staff to carry out this work. There were found to be about seventy-five forms in use, many of which had become obsolete, while others did not call for sufficient information.

The whole system of forms was put on a logical basis. The forms were numbered consistently and standard letter-size sheets were used for them where possible. Careful consideration was given to interlocking forms; that is, those which have to be checked against each other, or preliminary reports which lead up to summarized statements. In the revision of these, generous use was made of reference and serial numbers with a view to correlation with the filing system.

Finally, provision was made for storing the forms in the head timekeeper's office, in closed cupboards divided into compartments. Stock cards are used to check quantities on hand, consumption and dates of orders and deliveries.

Accommodations for Field Staff and Records

As the investigations continued it was found that the office accommodations for timekeepers, inspectors, clerks and material checkers, both in the field and in the main office, did not enable these employees to produce the best results on account of the limited facilities at their disposal.

The first thing done was to overhaul all of the shanties used in the field. These were enlarged and rebuilt in collapsible form to permit of rapid dismantling and erection in moving from one location to another. The sections of the shanties were numbered and fitted with hooks and bolts. The exteriors were painted dark green and the interiors battleship gray. Provision was also made for electric lighting and heating of the shanties by means of temporary connections to the overhead wires, through the co-operation of the superintendent of power plants.

Each shanty is furnished with a table, stools, locked drawer, large stationery box and first-aid cabinet. Each timekeeper is given a list of stationery required and from time to time he is supplied with a reasonable quantity of each item.

At headquarters an office of ample size was fitted up for the use of the traveling checker, excavation permit clerk, excavation inspectors, paving inspector, material checkers and timekeepers. Arrangements were also made for handling the executive work in connection with the operation of the permit agreement covering excavations through right-of-way, covered in an article by the writer in the issue of this paper for April 29, 1922.

The general instructions to checkers and timekeepers were next brought under review. A revision of these was made in connection with the changes already described. As these instructions show clearly the way in which the work of these men is done they are reproduced below:

General Instructions to Timekeepers and Clerical Staff Revised

General

Checkers shall report to and receive instructions from the chief clerk in the chief engineer's office. They shall also do all clerical work requested of them by the foreman on the job and render him all assistance possible.

Checkers shall also render all assistance possible to the timekeepers from the accounting department or the engineers from the chief engineer's office.

At the beginning of a work order there will be placed a small shanty to be used as an office by the checkers and general foreman only, with a counter and a drawer which can be locked, where the checker can keep all his records.

During the absence of the checker, the checker's shanty must be locked. The general foreman must not allow any one access to shanty in the checker's absence.

Where it is not possible to have the use of a free telephone the checkers will be allowed to use pay telephones and charge the cost of same to a petty cash account to be sent in to the chief clerk.

Unless absolutely necessary, the checker shall not leave the work while it is in progress as he will be held personally responsible for the receiving and sending of all material.

All daily reports are to be forwarded to the chief clerk's office not later than 10 a.m. of the following day.

All semi-monthly reports to be sent to reach the traveling checker's office not later than the 3d or 18th of the month.

DUTIES OF CHECKERS

1. Timekeeping.
2. Field ledger.
3. Requisition and credit slips.
4. Receiving and sending of material.
5. Rehabilitation sheet.
6. Interruptions to traffic.
7. Requests for cars.
8. Discharge slips.
9. Moving public utilities corporation poles, etc.
10. Tickets for men.
11. Assist engineer to measure work.
12. Keep list of tools for foreman.
13. Distribution of labor.
14. Distribution of material.

1. TIMEKEEPING

At about 7 a.m., 11 a.m., 2 p.m. and 6 p.m., the checkers shall travel over the job and take the time of the men, making distribution over the items noted in Sec. 13.

At each of the above times he will take the time of the workmen by asking for and making note of workman's check.

Any man arriving late or leaving early must first find the timekeeper and report or he will not be paid for his work. Any man working only part of a day will be paid to the nearest half hour.

The checker will also make out the daily time sheets with the distribution mentioned above and send sheets to the chief clerk the following morning. All time sheets are to be made out in rotation of numbers, and no time sheet shall be destroyed, but if made out incorrectly, a sheet shall be marked "Canceled" and sent to chief clerk.

At completion of work all time sheet blanks left shall be sent to chief clerk. Every time sheet issued to a checker is to be accounted for.

2. FIELD LEDGER

Material. The checker shall keep a ledger in a loose-leaf book provided with a separate sheet for each kind of material, showing material received and returned daily.

These ledger sheets will give the requisition number or credit note number and way bill number with date and car number, and quantity and kind of material.

On the fifteenth, and at the end of each month, the checker shall make out a list of all material received and returned during the half month and forward to the chief clerk.

Labor. Checker shall also keep ledger sheets for labor in his loose-leaf pocket book, and after the time sheets are made out, shall enter daily on a ledger sheet the distribution of the time over each of the thirteen distributions.

The total amount charged against each item shall also be sent twice a month to the chief clerk as outlined for material.

These ledger sheets must be kept up to date daily.

At the end of the work the complete field ledger shall be sent to the chief clerk.

W. O. Number Pending. While a W. O. number is pending, returns should be made out in the usual way and forwarded to the office under the heading, "W. O. No. Pending."

3. REQUISITION AND CREDIT SLIPS

When directed by the foreman, the checker shall request material by making out the requisitions in triplicate giving full particulars of the materials required and the W. O. number; these requisitions in duplicate to be sent to the stores department the day previous to time when the material will be required, when possible.

One requisition book shall be used exclusively for material used on the work, and one book for miscellaneous items such as tickets, cars, etc. No requisition is to be destroyed, should it be made out incorrectly, but shall be marked "Canceled" and left in the book. At the close of the work the requisition books are to be sent to the traveling checker and every requisition in the books must be accounted for.

Any corrections or copies of requisitions shall be made by crossing out the errors and writing in the corrections. Figures or notations are not to be erased.

No materials will be delivered by the stores until they first have received a requisition except in the case of stone, sand and cement, which shall be handled as follows:

The checker will make out a requisition for the above three items required and across the face mark "No Charge" and forward it to the stores by 4 p.m. of the day previous to the time the material will be required. The same day the material is received the checker will make out a requisition for the actual amount received, giving car number and way bill number, and forward requisition to the stores, with his requirements for the following day.

All materials returned to stores or to another job shall be covered by four copies of a credit note, giving a full account of the material work order number, etc. Three copies of the credit note or transfer slip are to be given to the motorman and a fourth copy to be signed by the motorman and retained by the checker, who will enter car number thereon.

The same instructions relative to correcting and forwarding of requisitions to the chief clerk at end of work shall also apply to credit notes.

4. RECEIVING AND SENDING MATERIAL

All material sent to the work shall be personally received by the checker, who will sign the duplicate way bill covering shipments. The original copy of this way bill must be kept by him. On the checker's copy of the way bill is to be marked the requisition ordering this material, and at the end of the work all these way bills are to be turned in to the chief clerk. All material received must have duplicate way bills, and if these are not sent in at once, chief clerk should be notified.

All material sent from the work shall be personally sent by the checker, who will make out the proper credit notes as outlined in Sec. 3.

5. REHABILITATION SHEETS: FORM NUMBER

These sheets are to be made out daily giving all information as to progress of work and weather report only; giving locations from chainage marked by the engineer.

6. INTERRUPTIONS TO TRAFFIC AND ACCIDENTS

The checker shall make report daily of all interruptions to traffic, giving cause, time, car and address number, and if caused by other than Montreal Tramways, the name of the person or company with all information obtainable.

The checker shall make report daily of any accidents to people or vehicles other than Montreal Tramways employees, giving time, cause, name and address, as well as names and addresses of two or more witnesses.

In case of accident to employees of the Montreal Tramways, blanks provided shall be filled out.

All of the above reports are to be sent daily to chief clerk.

7. REQUEST FOR CARS

The checker shall make requisition for all construction cars necessary, to be forwarded to store keeper at St. Denis yard not later than 3:15 p.m. of the day previous to that on which they will be required.

8. DISCHARGE SLIPS

In case of the discharge of an employee it shall be the duty of each checker to fill out a form, which shall be signed by foreman and given to man discharged.

Discharged employees shall be sent to timekeeper at the Cote St. construction office between 5:30 and 6:00 p.m. of the same day for their pay.

In case an employee leaves the employ of the company he shall not be given the above form, but must wait until the following day for money due him.

9. PUBLIC UTILITIES CORPORATION POLES

Should it be necessary during the progress of the work to move any property belonging to anyone other than the Montreal Tramways, the checker shall at once notify the chief clerk in writing, giving complete information.

In case of emergency, the checker should telephone the chief clerk, afterwards confirming the message in writing, but in no case shall the checker or other employee deal with the property owner direct.

All work performed in conection with above shall be divided for labor and material, also a division made to indicate work done by anyone other than the Montreal Tramways.

10. TICKETS FOR MEN

It shall be the duty of the checker to supply workmen with two car tickets per day, making distribution when he takes the time at the end of the day.

Requisitions for tickets are to be forwarded to the chief clerk the day previous to that when tickets will be required.

11. MEASURING WORK

The checker will give any assistance asked for by an engineer coming to the job to measure work, etc.

12. TOOLS AND CEMENT BAGS

The checker will keep the lists of tools and empty cement bags for the foreman, but the foreman will count tools each night and will also furnish the checker with all information relative to tools received and sent away.

The checker will also be furnished with a list of empty cement bags by the foreman, which must correspond with the number of full bags received. A form to show the number of empty

bags is to be made out by the checker and sent to the chief clerk on the 15th and at the end of the month as well as a final report on completeion of work.

13. DISTRIBUTION OF LABOR

Labor charges in connection with straight track are to be kept separate from those of special trackwork.

(*a*) *Removal of Paving:* Includes cost of removing paving blocks, and piling, cleaning, loading, shipping and unloading old blocks.

Includes cost of removing paving base to bottom of ties and block paving.

Includes, for all other types of permanent paving, removal of paving surface and paving base to bottom of ties.

For pavings which are not permanent, such as macadam, this includes excavation down to bottom of tie.

(*b*) *Grading:* Includes cost of concrete, stone, macadam or earth excavation to grade and cost of excavation for tile drains.

(*c*) *Removal of Excavated Material:* Includes cost of removal of excavated material, cleaning up street and loading material on cars. If material is to be wasted, unloading is to be charged to this item; if removed for use as ballast or backfill on any other job, unloading is to be charged to the proper item for other job and number of work order to which it is sent is to be shown on daily report.

(*d*) *Temporary Track:* Includes cost of loading and unloading material for temporary track.

Includes cost of laying track and backfilling, also cost of removing, reloading and return of material to yard.

(*e*) *Track Foundation:* Concrete slab includes cost of unloading material, mixing and laying concrete; stone or cinder foundation includes cost of unloading and spreading of material whether stone, cinder or macadam.

(*f*) *Straight Track or Special Trackwork Removal:* Includes cost of removing rail, ties and all track material and loading, shipping and unloading and sorting of same at yard by a representative of construction department. Should the crane car have been used in doing this, a note to that effect should be made under this item on the final report.

(*g*) *Straight Track or Special Trackwork Laying:* Includes cost of loading, shipping and unloading of rail and track material, rail bending, laying rail on special trackwork, placing ties and tie rods, gaging, spiking and bolting and all labor in connection with track laying.

(*h*) *Track Drains:* Includes cost of laying 6-in. farm tile drain, and excavation for and installation of standard track drain basins and their connections to sewer.

(*i*) *Tamping, Lining and Surfacing:* Includes cost of unloading and handling of tamping material, whether done by machine or by hand, lining tracks or special trackwork and surfacing.

(*j*) *Paving Base and Wearing Surface:* "J. B." paving base includes cost of unloading of material, mixing and laying of concrete.

"J. S." wearing surface includes cost of unloading material, recutting blocks on job, laying sand cushion, rail plaster, laying blocks, mixing grouting material and grouting where block paving is laid.

Includes labor of laying asphalt top and binder when such paving is used.

Includes labor of laying special concrete top course when concrete paving is laid.

A separate record of quantities of material used in "J. S." wearing surface must be maintained in ledger, that is to say, material used for grouting, rail plastering and sand cushion. If possible, please notify head office when sand cushion is being laid.

(*k*) *Backfilling:* Includes cost of unloading material, filling track, use of steam roller.

(*l*) *Overhead Charges:* Include wages of head foreman, checkers, water boys, messengers and watchman.

(*m*) *Miscellaneous Charges:* Include cost of laying crossings, cutting and changing curbs and sidewalks, removal of hydrants, poles, etc., and rearrangement of public underground utilities.

15. FINAL REPORT AND SKETCH

The checker is to note in a pocket note-book or on a sketch, as the work progresses, and have ready for transfer to the final report immediately on completion of the work, the following:

1. Location of concrete slab.
2. Location of stone, cinder or macadam ballast, where used.
3. Location of new or old paving blocks of each brow, each track and devilstrip separately.
4. Location of track drains.
5. Location of switch drains, state whether connected to sewer or not.
6. Kind of rail, and kind of joints used.
7. Kind of rail removed.
8. Location of making up guards of open track curves.
9. Location and length of temporary track, noting side of street in which same is laid and date of removal.
10. Location of all switch points, center of diamond crossings, beginnings and ends of curves where possible.

Anything out of the ordinary is to be noted where M. T. standard type of construction is specified and anything contrary to specifications where special construction is called for.

Should a checker experience any difficulty in making his sketches, he can have them made for him at the engineering office by request to the chief clerk.

On completion of a job all unused track material is to be returned to St. Denis construction yard and a proper credit note made out.

If tools are to be returned to the tools department, the cost of removal will be charged against the work order just completed. If they are removed to another job, the cost will be charged to the work order to which they are removed.

Boston "L" Employees Complete Course in Practical Electricity

WITH a dinner at the Harvard Club of Boston on April 30, and the award of 140 certificates to employees completing the course in practical electricity under the Division of University Extension, Massachusetts Department of Education, the Boston (Mass.) Elevated Railway signalized the successful termination of a new project to furnish instruction to interested members of its personnel.

Last September Edward Dana, general manager of the company, offered a course in practical electricity under the state division in co-operation with the board of trustees of the company, and about 330 employees enrolled. Weekly lectures and home study comprised the program. Among the subjects included were the flow of electricity, electrical units and laws, types and connections of electrical instruments, electric circuits of the simpler types, measurement of power, motors, generators, etc. The course required one night a week for about twenty weeks, and the interest was so marked that a day class was established and maintained for the benefit of those whose hours of duty precluded night attendance. A $5 fee for text books and other accessories was required on admission and was refunded on completion of the course.

Instruction was in charge of Charles O. Bourne, chief electrician, Boston Navy Yard, assisted by Robert E. Lee of the Boston Navy Yard and George E. Wilmarth of the Wentworth Institute, Boston. The course ended on April 13, and of the 140 graduates, thirty-seven men were from the maintenance department, thirty-seven from the transportation department, twenty-nine from the department of rolling stock and shops, eight from the power department, and three from the department of wires and conduits.

At the dinner, Mr. Dana was toastmaster. Congratulatory addresses were made by James F. Jackson, chairman board of trustees, Boston Elevated Railway; President Samuel W. Stratton of the Massachusetts Institute of Technology; James A. Moyer, director of the Massachusetts Division of University Extension, in the absence of Payson Smith, Commissioner of Education, Massachusetts, and Charles O. Bourne.

In appreciation of their work, the three instructors were presented with gold pencils by their classes and each also received a sum in gold from the students. Each graduate received a certificate, a photograph of a class in session and a copy of Elbert Hubbard's "Message to Garcia."

City Transit Conditions Compared

Supervising Inspectors of the New York City Transit Commission Visit Fourteen Cities and Report on Observations Made

AN INTERESTING summary on transit conditions in fourteen cities has recently been submitted to George L. Lucas, acting chief executive officer New York Transit Commission, by Walter E. Edgerton and William O. Smith, supervising inspectors of the commission. The observations are based on a trip of twenty-nine days between Nov. 8 and Dec. 7, 1922, and the cities visited were Boston, Syracuse, Cleveland, Detroit, Chicago, Milwaukee, Minneapolis, St. Paul, Omaha, Kansas City, St. Louis, Cincinnati, Pittsburgh, Cumberland, Baltimore and Philadelphia. An abstract of the conclusions, with two of the tables presented in the report, follows:

RAPID TRANSIT SERVICE

In rapid transit service in the cities noted, the principal point which impressed these observers was the large number of trains operated in the loop district during the maximum rush hours by the Chicago Elevated Lines. During the morning rush hour, they say, the company operates 193 trains per hour in double track operation, making all station stops. Some of the methods used to maintain this high standard of operation are double platform lengths so that two trains can stop at the same station at the same time, the use of platform men at stations to accelerate train movement, and the operation of trains over track line intersections in groups. The length of station stops has also been reduced by increasing the number of trains so that a train is not held up because passengers have trouble in boarding and alighting, due to the crowded condition. It is thought that some of these methods can be applied in New York. The report also calls attention to the fact that in none of the three cities with rapid transit systems visited are guard railings used for protective purposes on the edge of station platforms. Both the Boston and Chicago systems, however, use them to some extent to segregate streams of passengers going in different directions.

The observations on surface car operation are much more extended than on rapid-transit service. Messrs. Edgerton and Smith say, in their report, that they were much impressed with the progressive attitude found in many cities in trying out new and improved methods for equipment and operation. This was particularly true in connection with car design and especially with the one-man type of car. They found the principal criticism of the original Birney car by operating men was the lack of entrance and exit facilities. This design provided for a narrow entrance so that the motorman could control the traffic as it boarded the car, but at heavy transfer points this made the stop altogether too long. The operation of the Adams double-truck one-man car in Chicago was observed, and the report makes this complimentary comment:

> It is the best one-man car yet devised, and we believe that it has a much broader field of usefulness than any other one-man car. It is our belief that this car with its double truck, light weight body, seating capacity of forty-five and a weight of 633 lb. per passenger, with the roomy effect which it presents, is far superior to all other one-man cars. The car was observed under the various operating conditions and appeared to meet every requirement. This includes speed, running time, quick loading and unloading facilities and its capacity for handling large loads conveniently with a minimum amount of discomfort to passengers. This car would have a place in any of the systems in our city, and would be a wonderful improvement over all of our present one-man car operations.

They consider the Birney car "to have a place somewhere in nearly every system, especially for handling very light traffic or to improve conditions on a very light line, but a unit that is able to care for only thirty passengers at one time is necessarily limited as to its use." They consider the car with a turnstile on the rear platform a decided improvement over the Birney car, in that it has more entrance and exit facilities and the rear entrance permits a much better distribution of the load, though this car increases the running time by about 10 per cent over two-man operation.

They also point out that many of the cities claim that a car of the Peter Witt type, perhaps with minor modifications, is best adapted to handle their traffic, but that local conditions are often controlling in the choice of car. For instance, they say, the extremely cold weather during the winter season in Minneapolis and St. Paul makes it necessary for cars used there to be kept closed as much as possible, so that a car with a side entrance is out of the question. Two tables accompany the report, one listing the rolling stock in the several cities and the other giving traffic statistics. Both are reproduced.

TRAIN OPERATION

The inspectors were particularly impressed with the development of the use of trailers to a large extent in many cities, but particularly in Cleveland, and with the speed and simplicity with which trains of motors and

TABLE I—EQUIPMENT OF SURFACE CARS IN FOURTEEN CITIES

		One-Man Cars						
	Surface Cars Owned	Motors	Trailers	Birney	Others	Articulated	Single End	Center Entrance
Chicago	3,193	3,101	92	11	....	....	0	0
Philadelphia	2,801	2,691	110	....	219	0	75	1,160
Boston	1,649	1,429	220	....	75	115	.....	396
St. Louis	1,549	1,370	179	10	8	Open Cars Only	1,342	282
Cleveland	1,509	1,055	454	....	3	0	1,055	Tr. 428 M. 433
Baltimore	1,500	1,400	100	50 Mod.B 30	20	Yes	0	Tr. 100
Detroit	1,495	1,276	219	250	....	....	All	.....
Pittsburgh	1,210	966	244	....	Few	0	50%	40%
Minneapolis and St. Paul	1,035	1,035	....	0	0	Sev.	All	None
Kansas City	744	722	22	94	30	....	All except 20	None
Milwaukee	685	575	110	....	100	**72	.....	.....
Cincinnati	675	615	60	....	*75	0	Nearly all	Tr. 60
Syracuse	180	180	....	....	100	0	Nearly all	Some

* Not used as such.
** Company has thirty-six three-truck, two-car trains; is building twenty-five more, and intends to build twenty-five more next year.

TABLE II—TRAFFIC RATIOS ON THIRTEEN RAILWAY SYSTEMS

				Car-Miles per		
Companies	Rev. Pass. per Car-Mile	Rev. Pass. per Pass. Car	Pass. Rev. per Rev. Pass., Cents	Car-Hour	Mile of Single Track	Passenger Car
Boston	6.8	194,943	9.56	11.3	93,547	28,789
Cleveland	8.2	219,189	....	6.0	107,895	26,877
Chicago, Surface	6.3	274,512	7.69	8.7	111,605	43,323
Chicago, "El"	3.6	120,580	9.29	....	256,689	33,637
Minneapolis and St. Paul	7.3	268,864	6.00	10.0	65,970	36,731
Kansas City	5.1	210,755	7.55	9.2	80,465	41,290
St. Louis	6.4	242,444	6.91	9.3	96,141	38,027
Cincinnati	5.6	200,240	8.14	8.5	72,095	35,885
Baltimore	6.6	237,905	6.82	8.4	81,774	36,233
Philadelphia	7.9	282,234	6.54	9.3	119,385	35,966
Third Avenue Ry., N. Y.	10.9	293,970	4.89	7.7	81,908	27,807
Brooklyn City R. R.	9.3	295,165	4.98	8.0	114,403	31,603
New York & Harlem Ry.	10.9	308,023	4.98	7.4	147,307	28,350

trailers are made up in that city. They say that motor cars without trailers are used during the middle of the day, but at the approach of the rush hours trailers are attached to many of the motor cars as the latter pass the depot, the cars being coupled in the street, and the time taken is no longer than that of an average car stop. They also point out that in cities with steep grades, as Kansas City, St. Louis and Cincinnati, the use of trailers is limited to certain lines on account of the grades.

BUS COMPETITION

In no city did they find a thoroughly organized bus system in competition with the street car lines at the same rate of fare. The Detroit Motor Bus Company seems to be doing well with three lines and contemplates extending its system, but the fare is 10 cents, whereas the street car fare is only 5 cents. The Chicago Motor Bus Company also charges 10 cents fare. Baltimore is practically the only city where the street car system has gone into the operation of motor buses as an adjunct to surface car operation, and here the buses are only just beginning to show a profit. They liked the de luxe bus service as operated in Milwaukee and think it would be feasible for some runs in New York. The fare in Milwaukee on these buses is more than 3 cents a mile with a minimum charge of 25 cents, and in New York such service might be the means of relieving the streets of many of the privately owned automobiles which contain but one or two people.

One of the principal objects of the trip was to study rush hour conditions in the cities visited. On this point the report concludes as follows:

> An inspection and analysis of service and traffic in fourteen cities showed us that the rush hour conditions are practically the same all over. Through some contributory cause the loading may be a little above or below the average, but taking the entire system in each of the cities and comparing them to the New York systems during the rush hours you will find very little difference in the density of the loading. The rush hour peak is generally shorter in other cities and there is no such traffic density anywhere else in the country as we find on the main East and West Side Interborough subway lines; but to a stranger, the conditions at the Park Street station on the Cambridge subway line in Boston, the Thirteenth Street station on the subway line in Philadelphia, and the Thirty-third Street station on the Lexington Avenue subway line in New York show very much the same conditions of service and overloading. The same thing would hold true at the intersection of Grand Avenue, Halstead Street and Milwaukee Avenue in Chicago, of Woodward, State and Gratiot Streets in Detroit, or of Flatbush Avenue, Livingston Street and Lafayette Avenue in Brooklyn, as to the traffic and service on street surface lines.
>
> In other words, due to the abnormal increase in traffic during the rush hours over the other hours of the day, the companies find it necessary to carry a great many passengers standing, and these conditions are no worse in New York, as far as the street surface cars are concerned, than in the other cities.

The Northern States Power Company has used radio communication successfully in quickly locating "trouble" on its lines. When the two St. Croix transmission lines tripped out at 1:55 p.m. on Jan. 30 both telephone lines to St. Croix were put out of commission. F. J. Gerlich, superintendent of the service department, lost no time getting to the radio set and upon tuning in immediately heard the wireless operator at St. Croix calling Minneapolis. By means of radio-telephone communication the trouble on the transmission lines was quickly cleared up, and both lines were back in service by 2:05 p.m. (within ten minutes). Wire telephone communication was not re-established until half an hour later.

Novel Traffic Tower an Aid to Railway

Electric Device on Tubular Steel Pole Controlled from Booth at Curb Makes Possible Installation at Center of Intersection

THE presence of electric railway tracks in the street often complicates the problem of traffic control by making it impossible for the directing authority to place himself in the exact center of an intersection. If the ordinary "Go—Stop" semaphore is used, it must be placed on one side of the street, and it is difficult for traffic on the opposite side of the street to see the semaphore over the tops of passing vehicles. This results in confusion and delay, from which the railway suffers quite as much as the vehicular traffic. In order to overcome the difficulty the Department of Public Safety of the city of Scranton, Pa., working in conjunction with

Specially Designed Traffic Tower in Scranton, Pa.

the Scranton Railway, has designed a traffic signal somewhat different from any that is used elsewhere.

The signals are given by colored electric lights facing in the four directions. The tower is so slender that it can be placed in the center of the roadway directly between the street car tracks and is sufficiently tall so that it cannot be obscured by passing vehicles. An operator comfortably housed in a booth at the curb operates the signal. The upright, supplied by the railway company, is an 8-in. tubular steel pole, 16 ft. in height, set in a pyramidal concrete base, as shown in the accompanying illustration. The box at the top to house the lenses and lights has a clearance of 14 ft. from the pavement. The clearance is an important point, because a lower box might be damaged by a motor truck passing too close. Eight lights are located in this box, a red and a green on each of the four sides. Four additional red lights are set around the base of the pole for use as a warning of the presence of the tower when the upper lights are not in operation.

All the lights are manipulated by the operator at the curb, whose position is raised sufficiently so that he can clearly see traffic approaching from any direction. By a single motion he changes one set of lights from green to red, stopping one movement, and simultaneously the lights controlling cross traffic from red to green, starting the other movement. When the lights change a

gong rings to warn pedestrians. An electric heater is provided in the booth for the comfort of the operator, and it is planned to replace the heater with an electric fan when the weather makes the latter more desirable.

The first of these towers was installed about Jan. 1, 1923, at Lackawanna and Wyoming Avenues. On weekdays the operator is on duty from 9 a.m. to 7 p.m., those being the hours of heavy vehicular traffic on Lackawanna Avenue. When he leaves the booth he switches on the red lights at the base, which remain throughout the night as a warning. The performance of the apparatus has been so satisfactory that it is now proposed to install similar traffic towers at nine other intersections in the congested district.

After careful study of the movement of street cars turning into and out of Lackawanna Avenue, it has been decided that better results will be obtained by having each tower independent of the others, rather than having them interlocked. The operators should co-operate with each other to expedite the movement of traffic, but it is thought that it would delay movement if the several signals were controlled at all points by the conditions at any one point.

Plush Seats for Safety Cars

New Cars of the Chicago, North Shore & Milwaukee Railroad Have Separate Exit and Entrance, 23-In. Aisle and 36-In. Seat Width—Comfort of Passengers Chief Consideration

A DISTINCT step in the direction of making transportation more salable has been taken in the design of twelve safety cars recently placed in service by the Chicago, North Shore & Milwaukee Railroad on its city line in Milwaukee, Wis. The idea of making the ride as attractive as possible has been the governing consideration. In doing this, it is notable that the interpretation, in terms of equipment, of this conception of selling a ride is almost entirely responsible for all deviations from the standard safety car.

Briefly, the car has been designed with increased length and width. The additional length has gone into longer platforms with double doors to permit simultaneous loading and unloading and hence faster schedules. The addition in width has permitted a wider aisle and wider seats. But in point of comfort and appearance, the seats are far better than the slat seats with which the earlier safety cars were equipped, and they are also considered by the company a decided improvement over the more generally used rattan seats. The seats used are of full spring construction, covered with a figured green plush, and manufactured by Hale & Kilburn.

Exterior of North Shore One-Man Car

Interior of North Shore Car Showing Plush Seats

The increased length and width of the cars necessitated larger sections for the side frames and platform supports. The weight is 19,700 lb. light, and the seating capacity thirty-two. The cars are provided with standard safety controls and air brakes. The inside of the car is finished in cherry. Electric heating is used with Railway Utility Company thermostatic control. The trucks follow closely the Cincinnati Car Company's standard design, but they have been strengthened to accommodate the increased body weight. The trucks have a standard 8-ft. wheelbase and are equipped with two GE-264 motors. Wheels are 26-in. rolled steel. The trucks are also equipped with Smith-Ward slack adjusters.

The principal dimensions of the North Shore car ars as follows:

Over-all length	29 ft. 6 in.
Platform length	5 ft. 6 in.
Over-all width	8 ft. 1¼ in.
Door opening (clear)	24 in.
Aisle width	23 in.
Seat width	36 in.
Seat spacing	28 in.

From the above it will be noted that the North Shore car is approximately 1½ ft. longer than the original standard car and that the platform has 1 ft. of extra length. The width has been increased by 3 in., while the aisle width has been increased from 21 to 23 in. and each seat has been given 1 in. additional width. The seat spacing is the same as that of the standard, namely 28½ in. The car has been designed for one-man operation only, and has proved very satisfactory in the Milwaukee service.

The farebox is located in a convenient place, easily accessible to the entering passenger and the operator in charge of the car. To facilitate operation transfers are issued only at a transfer point, where the passenger leaves the car. This has, to a great extent, lightened the work performed by the operator.

United States Consul B. S. Hayen, Leipzig, in a report to the Department of Commerce, reviews the German government's present effort to circumvent the coal shortage by electrification of the State Railways. By demonstrating the superiority in service and economic efficiency of electricity over steam it is hoped to offset the handicap to German railway transportation resulting from the occupation of the Ruhr coal fields and the deliveries previously made under the Versailles Treaty. Not only railways, but factories, will be compelled to use electric power. Lack of coal has forced the German State Railway Administration to withdraw a large number of trains.

Carrying Safety to the Public—I

Increasing Volume of Traffic Emphasizes Need for Consideration of Street Accidents—In Sixteen Years Automobile Deaths Have Increased Thirty-five Times — Remedies by Legislation Are of Questionable Value—Organized Safety Campaigns Have Reduced Fatalities Greatly

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

EDITORS' NOTE: The continuous growth of motor vehicle traffic makes the problem of accident prevention yearly more important for the electric railway. Fairly consistent work has been done in promoting safety in the railway's own organization, and with good results, but the larger work of making safety a community-wide activity remains to be done. Just how to go about this from the point of view of the railway executive, and what may be accomplished, will be told in a series of ten articles, of which this is the first. The author has had a great deal of experience in this work. For twelve years he was with the International Harvester Company, during which time he organized the twenty-three plants for safety. For four years he was assistant to the Compensation Commission of Wisconsin, working on the drafting of a complete new code of laws covering safety. In 1913 he assisted in organizing the National Safety Council, afterward serving as vice-president, field secretary and general manager. During the war he directed the work of organizing for safety in all the arsenals and navy yards. He has done pioneer work in organizing local councils and in promoting public safety and safety instruction in the public schools.

C. W. Price

THE editor of the ELECTRIC RAILWAY JOURNAL has asked me to answer this question: Can the public be reached with the safety idea? Or to put the question in another form: Can safety be organized in a community as successfully as it has been organized in the great industries, with a continuous campaign of education which finally will grip the interest of all of the people and cause them to stop being careless and begin being careful? My answer is that it can be done. However, if I would convince the practical electric railway executive I must not only prove that it has been done but I must tell how it was done.

In succeeding articles I shall, therefore, outline those features of an organized community effort which have proved determining factors in reaching the public in cities where substantial reductions have been made in accidents. During the past three years a definite plan of organization and a program of activities for community safety have been developed. These are as well defined as the program for a great industry, a program which if applied in any community with the same leadership will realize equally satisfactory results.

But in this first article I wish to present some facts regarding the present accident situation and the status of public opinion.

A recent analysis of the accident experience of a number of electric railways revealed the significant fact that from 65 per cent to 75 per cent of the accidents could not be prevented by any effort on the part of the employees, no matter how loyal they were to the safety idea; if prevented at all it must be by reaching the drivers and pedestrians on the streets.

It is not necessary to remind any railway man that the traffic situation is rapidly growing more complex and difficult to cope with. A recent analysis of accidents in representative cities of the United States showed that over two-thirds of the accidents on the streets were due to automobiles and trucks.

It is difficult for us to realize how new this problem is in our community life. Before 1906 or thereabout there was no automobile problem. In that year there were only a few thousand machines, and the government reported 374 deaths caused by automobiles, while in 1922 there were 12,357,376 automobiles thronging our streets and highways and, according to insurance statisticians, approximately 13,900 lives were sacrificed by this new and giant hazard. Seven people were killed by automobiles for every one killed by street cars.

A factor in this problem which has not been recognized sufficiently is this: Fifteen years ago the majority of the owners and drivers of automobiles were citizens of some means and responsibility. Today the millions of cheap cars manufactured and the enormous number of second-hand cars thrown on the market each year make possible the ownership of cars by a class of citizens, especially young men, who are of the more reckless type—men of little sense of responsibility. Add to this list the rapidly increasing number of drivers of taxicabs and trucks, many of whom are incompetent. Then picture these thousands of swiftly moving cabs and trucks and automobiles fighting their way through narrow streets, many of which were laid out for horse-drawn vehicles, and we have a suggestion of some of the factors which are daily adding to the complexity of the problems confronting the railway executive of today.

In many cities, during the past two years, the toll of deaths and injuries reported in the daily press has aroused public sentiment to a point where the people are demanding that something be done to control the evil.

As is usually the case in a sudden fit of alarm, all sorts of remedies are being suggested. Some insist that what is needed is more police, better traffic judges, heavy fines, and even the imposition of jail sentences.

These people forget the perfectly obvious fact that law enforcement is possible only as soon, and no sooner, as public opinion is developed to a point where, first, it will tolerate law enforcement, and, second, demand that the laws be enforced. The experience of every city in which successful work has been done in controlling the accident situation emphasizes the fact that there is only one final solution—an organized community-wide educational campaign, which will reach every man, woman and child and change his attitude and habits. To appreciate what such a campaign will mean we only need to recall the campaign for better sanitation and health which during the past twenty years has so greatly improved our habits of life. Consider the vital place which health instruction has come to occupy in our homes, our schools and the newspapers and magazines. Safety must come to occupy just such a place in our community life if we would solve the accident problem.

St. Louis, Milwaukee and Washington are good examples of what can be accomplished through organized effort, as is shown by the following records:

	Accidental Deaths		
St. Louis	1917	1922	Per Cent Reduction
Total deaths	510	334	34
Street railways	32	14	56
Steam railways	50	20	60
Industrial	110	15	86
School children	50	25	50
Automobiles (per 10,000 machines)	32	13	60
Milwaukee	1919	1921	Per Cent Reduction
Total deaths	320	243	24
Automobiles (per 10,000 machines)	26	12	54

In Washington, D. C., remarkable results have been achieved by the first two months of organized work. A "Safety Week" was conducted the last week of November, 1922, and a permanent organization was developed during January, 1923. The record for February and March, as compared with 1922, shows that the total deaths were reduced 32 per cent, the total traffic deaths reduced 43 per cent, and the total children's deaths reduced 65 per cent.

The experience of some dozen cities in which community safety has been organized has taught us that certain factors are indispensable to obtain success in the initial steps in developing a permanent organization and in the promotion of the continuous campaign. Since these articles are written primarily for the attention of railway executives, who in their respective communities may be called upon to take an active part in developing a safety organization, it may be well here to outline somewhat in detail these factors:

1. Where there is a Chamber of Commerce safety should be organized as a department of it. This plan provides for a permanent anchorage of the movement in an institution of standing and is in line with the growing tendency among business men to centralize civic activities and to avoid the multiplication of new organizations.

2. Because the success of a safety campaign depends on the wholehearted co-operation of a large number of individuals and organizations, it is exceedingly important that the president of the organization be a citizen of standing who will command the confidence and support of the whole community. Such a man is necessary to draw into the organization strong men and women who will act as chairmen and members of committees. In a number of cities the movement has ended in failure because of the lack of such leadership.

3. In the larger communities it is absolutely essential to the success of the work that a paid secretary or manager be employed to give his entire time to it. Because community safety is of such recent development, it is difficult to secure a man of experience for this position. Therefore, in many cases it is necessary to select some local man and train him. Given a fair education, the two indispensable qualifications in such a man are leadership and organizing ability.

4. There are two successful ways of financing a safety organization. The first is to finance it out of the budget of the Chamber of Commerce. The Milwaukee Safety Council is a good example of this plan. The second plan is to secure contributions from those business concerns which will be financially benefited, such as the public utilities, industries and concerns having commercial vehicles on the streets. Under the second plan, it has been found that where accidents are reduced as the result of a successful campaign and a corresponding reduction in insurance premiums is made, the concerns are willing to renew their contributions each year.

5. The following has been found to be a practical working plan for a safety organization:

President.
Vice-presidents, three or more.
Manager.
Treasurer.

The following committees:

Finance	Drivers' School
Publicity	Industries
Police	Women's
Schools	Traffic
Posters	Speakers

Statistics

The officers and chairmen of committees constitute the executive committee.

It is important in the initial stages of developing an organization to secure the support of all city officials who are in a position to give co-operation, such as the mayor, chief of police, superintendent of schools, traffic court judge, coroner and street commissioners. These officers should be given important positions on the committees.

6. In a subsequent article, the subject of publicity will be covered more fully, but at this time I wish to point out the necessity in the initial steps of giving wide publicity to the plan of organization and the program of activities. It is difficult for the average person to understand how a community-wide safety effort can be organized that will reach all of the people. In order to convince them, they must be shown in a simple and constructive way just how it is to be done. In addition to daily publicity in the newspapers, it is advisable to issue a small leaflet containing an outline of the organization with the names of the officers and a brief description of the various activities. It is also advisable to have speakers appear before the representative clubs of business men and present the scope and purpose of the campaign.

Resistance to Water Flow Through Valves

EXPERIMENTS made in the laboratories of the University of Wisconsin* have shown that in the flow of water through valves and pipes from ½ to 12 in. in diameter, globe valves offer from fifteen to forty times the resistance of gate valves, the ratio increasing with the size of the valve. The length of straight pipe of the valve size which will produce the same loss of head as the valve varies from ¾ to 4 ft. for fully opened gate valves and from 20 to 35 ft. for fully open globe valves. In the case of globe valves the smaller valves are equivalent to the greater length of pipe measured in pipe diameters.

The loss of head in clean, wrought iron pipe from ½ to 12 in. diameter is

$$H = \frac{0.0B19}{d^{1.16}} V^{1.9}$$

where H is the loss in head per 100 ft. of pipe; V is the velocity of flow in feet per second and d is the pipe diameter in feet.

*See Bulletin of the University of Wisconsin, Engineering Series, Vol. IX, No. 1, by C. I. Corp and R. O. Ruble, U. of W. Engineering Experiment Station, Madison, Wis.

Freight Business Built Up By Making Special Schedules

Petaluma & Santa Rosa Railroad Adopts the Slogan "Last to Leave, First to Arrive" and Campaign for Freight on the Basis of Service

THE Petaluma & Santa Rosa Railroad connects San Francisco with the fertile valleys of Sonoma County by steamer across San Francisco Bay and via Petaluma River to Petaluma, whence the company's rail system reaches out to farming communities that produce heavily in perishable commodities, such as poultry, eggs, berries, fruit, etc. Most of the territory served is traversed by excellent paved roads, and because the districts are all prosperous automobiles are plentiful.

Under these conditions the passenger travel is comparatively light and there is good opportunity for effective service in the rapid transportation of freight. Special attention has, therefore, been given to arranging schedules that would be most convenient to freight shippers; also to building spur tracks to warehouses wherever it was at all possible, regardless of the amount of tonnage offered at the time and with the idea that the track facilities would increase the tonnage. So far, company officials report, there has not been a single case where these spurs have not proved to be well worth while. The company's freight business has been increased almost 30 per cent in the past year, tonnages handled for the past six years being:

1917	133,173 tons	1920	140,082 tons
1918	120,077 tons	1921	159,950 tons
1919	114,256 tons	1922	204,024 tons

Of the 11,000 acres planted to apples, which are tributary to the system, only 4,000 acres are yet in full bearing and the yield should increase at the rate of 25 per cent annually. The present apple shipments over the railway total about 1,000 cars annually. About the same number of cars of eggs are also handled. Both commodities are shipped in refrigerator cars, the eggs being consigned chiefly to New York and the apples to all parts of the United States. The demand for the apples is particularly good due to their being about three weeks earlier than apples grown in other parts of the country.

Freight schedules are arranged to afford an overnight service each way between San Francisco and the points served by the railway. Southbound freight schedules are fitted to the needs of each commodity produced in the territory served, the objective always being the delivery to the markets as early as practicable after the commodity is harvested. This can be done so effectively that fruit or berry growers and poultrymen can place today's produce on the breakfast table in San Francisco tomorrow morning.

In the opposite direction freight can leave San Francisco late in the evening and reach the northern termini early in the morning. Thus retail dealers, by phoning the San Francisco wholesaler as late as 4 p.m., can receive goods desired by 7 a.m. on the following morning. This condition enables the retailer to do business on small capital investment and to carry only small stocks.

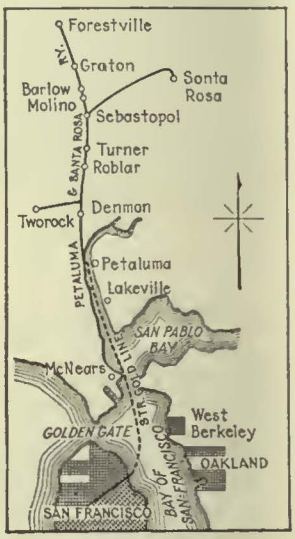
Apple Packing Plant on Electric Line

Commerce Chamber Taken Over the System

A Number of Apple, Berry and Other Fruit Shippers Depend on the Petaluma Line for Fast Service

Thus he does not need to risk losses on stock that does not move readily or which deteriorates rapidly, and his insurance, interest on investment and storage requirements are lower.

The company has not overlooked the opportunity to advertise the fact that this overnight service makes faster time than the U. S. mail. A consignment of freight delivered to the company's wharf in San Francisco at 4 p.m. will reach the consignee at 7 o'clock on the following morning, while the invoice mailed in San Francisco at the time the goods were shipped is not delivered until noon of the next day.



Rail and Boat Route of P. & S. R. Ry.

The passenger patronage on this system consists almost entirely of rural residents traveling between their ranches and trading points. In 1916 approximately 800,000 passengers were handled. In 1922, despite considerable growth of the territory, the number of passengers handled had decreased to 600,000 annually. This decrease has been due largely to the increased use of privately owned automobiles. Thus far there has been no commercial competition of auto stage or freight companies.

The slogan "Every employee a business solicitor" has been most effectively carried out by this company, as described in the ELECTRIC RAILWAY JOURNAL of June 10, 1916, page 1097. A feature of the company's public relations work is the practice of taking the members of the Chamber of Commerce of the principal towns served over the line so as to keep them familiar with improvements and other company activities. Every effort is made to tie the line as closely as possible to the community. The general manager belongs to all Chambers of Commerce and sees to it that the real value of the company's service to the community is properly kept before the people.

Time Saver on San Francisco Railway

Mirror at Entrance to Tunnel in San Francisco

THE mirror shown in the accompanying illustration has been placed just inside the west entrance to Twin Peaks tunnel, in San Francisco, to enable the motormen to see if the trolley wheel is on the trolley wire before starting through the tunnel.

The Readers' Forum

Way Engineer Emphasizes the Importance of Wood Preservation

PUBLIC SERVICE RAILWAY COMPANY

NEWARK, N. J., May 7, 1923.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for April 21 there appeared an editorial entitled "There is Economic Necessity Behind the Wood Preservation Movement." This, I feel, is worth enlarging upon at this time because of the extreme importance of the subject to our industry.

In the issue of the paper for March 18, 1922 (pages 460-462), I discussed an article on the accounting features of tie treatment, written by Earl Stimson, chief engineer of maintenance, Baltimore & Ohio Railroad. I incidentally took advantage of the opportunity thus offered to explain the timber situation in this country as disclosed by government statistics, available to everyone interested enough in the subject to send for copies. I also outlined some of the essential economic features of wood preservation, presenting facts which cannot be controverted. They showed the actual unfortunate timber situation in the United States at that time, and conditions are certainly no better today than they were when the figures quoted were compiled. The data are worthy of being taken out of the file and given careful thought and study.

Not more than 25 per cent of the original timber of our country now remains standing, and the annual growth is only about 35,000,000,000 ft., board measure, as against an annual consumption of from 100,000,000,000 to 110,000,000,000 ft., board measure, out of which only about 1,500,000,000 ft. is being treated for all purposes. How long are we going to ignore the "handwriting on the wall"?

The wood preservation committee of the American Electric Railway Engineering Association, which is functioning this year for the first time as a special committee, is endeavoring to bring the existing wood preserving specifications of the association up to date, and to present for adoption as many additional specifications as practicable, following along the lines of most generally accepted practice. In this way our member companies will have at their disposal up-to-date information as to what they can and should do. But in the final analysis the situation that confronts us is very well covered by the old proverb: "You can lead a horse to water, but you cannot make him drink." Unfortunately it is too late to "lock the stable door after the horse has been stolen." How long are we going to remain blind to the facts?

Part of the ultimate solution is, of course, in immediate and extensive reforestration. But in the meantime, until the results of this work are available for consumption at least a generation or more hence, wood preservation must be practiced on a much larger scale than at present, in order to reduce rather than increase the rate of timber depletion. There is a considerable range in the matter of choice of treatment to be used, the effectiveness of the different methods being very largely proportional to their respective costs, but regardless of the costs the expense is more than justified

by the results obtained and any treatment is better than none at all. Effective wood preservation is not limited to the use of coal-tar creosote oil, although this has always been recognized as the most effective. There is a satisfactory treatment for every use to which timber is put and for almost every kind of timber used for construction purposes. Every dollar spent in this way will be returned through the resulting increase in the useful life of the material treated and the accompanying reduction in the annual charge for depreciation.

HOWARD H. GEORGE,
Engineer of Maintenance of Way.

Three-Car Detroit Train Compared with Two-Car Milwaukee Train

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY
MILWAUKEE, WIS., May 5, 1923.

To the Editors:

The article on the latest idea in articulated cars in the April 28 issue was of particular interest, as this type of car has received a good deal of attention from us. The argument for a train of this type, on account of its advantages as to track space occupied for the number of passengers carried, is entirely patent, but when it comes to the advantage claimed in economy by reducing the platform labor expense through minimizing the number of car operators, we wonder if the proposers of the three-car articulated train have not overlooked something in the arrangement to produce the maximum economy in this respect.

This three-car train with four operators does not produce any saving over the three-car multiple-unit train or the motor car and two trailers, such as are operated in Boston and elsewhere. The articulation of two cars with the arrangement which we brought out for Milwaukee in 1920 permits the operation of a train seating 104 passengers with two men.* Comparing the figures given for Detroit's Woodward Avenue line, their proposed two three-car articulated trains would require eight men for 300 seated passengers, whereas three of our two-car articulated trains would require but six men for 306 seats.

We built our trains out of two old cars, and were therefore limited somewhat in the seating capacity which we could install; but on new construction it is conceivable that the seating capacity could be increased somewhat more on a two-car unit, and still keep within clearance lines.

The only other feature of the articulated three-car train, as proposed, which might limit the usefulness of such an outfit would be that its length (113 ft. over all) would make it somewhat unwieldy to handle in the shop, especially on transfer tables or under usual crane arrangements.

J. H. LUCAS,
Superintendent of Rolling Stock.

*Milwaukee's three-truck train was described in the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921, Vol. 57, page 131.

Association News & Discussions

Commerce Chamber Discusses Transportation

Large Attendance at Meeting in New York This Week—Principal Topics Considered Were Finance and Co-ordination of Various Means of Transportation, Especially Steam Railroad, Highway and Vessel

THE Chamber of Commerce of the United States, which met in Washington a year ago, chose New York as the place of its eleventh annual convention, which took place May 8 to May 11. There was a large attendance, and the American Electric Railway Association was represented by a committee of ten members with ten alternates. The official topics, according to the program, were "Transportation in All Its Phases in the United States" and "Europe and Europe's Affairs." Actually, the papers and discussion on transportation were practically limited to steam railroad affairs, transportation on the highways and maritime matters. It is understood, however, that the work of the five special committees on transportation which have been appointed by the chamber for a comprehensive study of all phases of the transportation situation will include the function of the electric railway in the transportation scheme. Some phases of this study were brought out at the meeting of the transportation and communication group on Wednesday afternoon, when progress reports were read of the subcommittees of this group.

At the meeting of national councillors of the chamber, held on May 7, for the nomination of directors, two electric railway men were nominated, namely, Philip H. Gadsden of Philadelphia to represent the second district, and Paul Shoup of San Francisco as head of the Department of Foreign Commerce. They were subsequently elected by the delegates at large. The choice for director of transportation and communication department was A. L. Humphrey, Westinghouse Air Brake Company.

GENERAL MEETING ON TUESDAY

The general plan of the convention was the holding of general meetings in the mornings of Tuesday, Wednesday and Thursday, group luncheon meetings in the afternoons of Tuesday and Wednesday, with a general business session on the afternoon of Thursday, and general meetings each evening with addresses by speakers of national importance or some other program of general interest. This report relates particularly to matters of electric railway interest which came up at the different meetings.

Some statistics of national import presented in the address of President Julius H. Barnes at the general meeting on Tuesday morning were that since 1900 the population of the country has increased 40 per cent, the volume of food production 38 per cent, the volume of mine production 128 per cent, the volume of factory production 95 per cent. The per capita annual earnings in the United States in 1850 were approximately $100, in 1890 approximately $200, and in 1920 approximately $600. The total national wealth is now $300,000,000,000. The freight car of 1875, which was 65 per cent dead load and 35 per cent earning cargo, has been developed so that now there are cars 20 per cent dead weight and 80 per cent earning load. Per railroad employee in 1922, the railroads of the country showed 243,000 ton-miles and 21,600

passenger-miles. Per $100 of capita investment the record was 1,750 ton-miles. During the last year the use of the motor truck has been developed, until last year the actual tonnage listed by it exceeded 50 per cent of the tonnage of all the railroads combined, indicating that the subject of transportation must be studied and developed in wider aspects than railroad development alone. This has led to the appointment by the chamber of five special committees to study various phases of the transportation situation, namely, railroad consolidations, governmental relations, relative rates, motor transport and waterways.

In an address on Tuesday evening Herbert Hoover, Secretary of Commerce, mentioned the greatly increased consumption of conveniences and comforts per capita of the population, which, he maintained, is normal progress. He also outlined some of the methods by which commerce and industry may keep the nation permanently prosperous. On the first point he said that we must get away from the notion that pre-war standards of living and volume of business would be normal now. We have been able to add to our standards of living by more general distribution of many articles and by increased efficiency of production and distribution.

He referred to the present industrial recovery and said that the government index shows wholesale prices today about 30 per cent below the crest of 1920, but 6 per cent above that of nine months ago. Increases in price, he said, are a necessary accompaniment of business recovery. We are undoubtedly in a plane of prosperity and should be able to discipline ourselves so as to hold onto it. One great need is the willingness of people to save their enlarged earnings, another is caution as regards over-expansion and credit.

Mr. Hoover said that now there is a tendency to an increase in the construction of buildings, railways and plant and equipment generally, as well as federal, state, and municipal construction. Tax-free securities lie at the base of a good deal of the last, but in the speaker's opinion all government work of this character except that which is essential should be deferred in times like these.

Group Meetings on Tuesday

At the meeting on Tuesday afternoon of the finance group, one of the papers was by Pierpont V. Davis, vice-president National City Company, on the subject of credit requirements of the railroads from the standpoint of the investor. Among other things Mr. Davis pointed out that there had been a great change in the investment market due to the income tax law and the large number of tax-free securities issued. Large investors were turning generally to these tax-free securities and selling their railroad and other taxable securities. He knew of one very large estate which had now only about a million dollars in taxable securities.

The average sale per customer of taxable securities by his concern is $3,500, whereas before the war it was ten or twenty times that. Another factor in the reduction of the demand for railroad securities was the competition for funds by foreign nations and the issue of securities by public utility companies to a much larger extent than twenty years ago. Referring to the railroad situation he spoke of the plans for valuation which had been urged by some with the idea that the railroads were greatly over-capitalized, whereas it is now found they are considerably under-capitalized.

The civic development group discussed immigration. John W. O'Leary, chairman of the immigration committee of the Chamber of Commerce, said the present 3 per cent law is wise as a temporary policy, but it is not a permanent solution of the problem. This must be worked out on a selective basis, which will give preference to the more desirable classes of immigrants. Much can be done to help out the labor shortage by shifting the unemployed from certain industries to others where they are needed. For example—the 250,000 coal miners said to be unnecessary can be placed in other lines of endeavor.

Congressman Albert Johnson, chairman of the House committee on immigration, thought that future legislation is likely to be tighter rather than looser. The present law allows a possible annual influx of 357,800 persons, and for the present year all but 45,000 have already arrived. The committee on immigration of the House wants to go back to 1890, as the status for basing the new law. This is so as to give more weight to the Northern races of Europe. In future legislation provision must also be made to take care of relatives of those who have already come to this country.

Allen T. Burns, of the Carnegie Corporation, showed that, contrary to general belief, the southeastern countries of Europe have sent immigrants who have become naturalized sooner than those from the older, northwestern countries. He said that the applicants for citizenship were largely from among the skilled workers.

At the meeting of the fabricated production group, Robert S. Binkerd said the annual average freight haulage per inhabitant in the United States was about 4,000 ton-miles, or ten times the average in Europe. This situation must lead to ultimate decentralization of production, he said. As showing the development of this idea during recent years, mention was made of the growth of satellite communities on the outskirts of large cities, and the movement of factories to smaller towns. In the discussion which followed it was suggested that the closed shop question had had some effect in causing manufacturing plants to seek new locations. This was admitted, but it appeared to be the sense of the meeting that a certain amount of decentralization was the ultimate solution of the freight transportation problem.

The discussion of the domestic transportation group centered in cost reduction by elimination of transportation wastes in distribution. A factor in this, said W. Lee Cotter, is proper warehousing with the aid of pool-car shipping. The pool car is a car fully loaded but containing consignments for different consignees, distribution being effected through the largest consignee or, preferably, through a public warehouse. Other speakers backed up Mr. Cotter in his statements. The general plan of store-door delivery by the railway was urged by W. J. L. Banham, who said that the plan has been widely used in Canada and elsewhere, and has been successful. The object is to relieve congestion at terminals and expedite delivery. Discussion in general favored Mr. Banham's proposition.

The group on transportation and communication confined its discussion on Tuesday afternoon to maritime matters.

General Session on Wednesday

The meetings of Wednesday began with a general session at the Metropolitan Opera House with President Barnes in the chair. The topic of the morning was "Developing a National System of Rail, Water and Highway Transportation." There was an address in favor of waterways by C. A. Newton, member of Congress from Missouri. This was followed by an address on "Co-ordination of Railroads, Waterways and Highways," by Charles H. Markham, president Illinois Central Railroad, who thought that the public was sometimes deceived as to the relative cost of furnishing the various forms of transportation because of the expenditures made out of public funds for the construction and maintenance of navigable waterways and hard surfaced highways. The taxpayers foot these bills, whereas the rail lines bear the expense of the roadways used by them. Thus, between 1910 and 1922 more than $3,000,000,000 was expended in this country upon the construction and maintenance of good roads, toward which the operation of motor vehicle carriers contributed comparatively little. In the speaker's opinion, the destruction of lightly built roads by heavy trucks was so great as to call for some remedy, and he suggested the construction of short stretches of hard surfaced roads designed primarily for the use of motor trucks, to be built only where the conditions were favorable to their use and where the saving, as compared with rail transportation, would be sufficiently large to justify the expense.

There was also an address on highway transport by Roy D. Chapin of the Hudson Motor Car Company, who urged a study of the place of the motor vehicle and its co-ordination with other facilities of transportation. Surveys by the Bureau of Public Roads and the State Highway Department in Connecticut, he said, showed that in that state 36 per cent of the motor truck traffic

was hauled a distance of 9 miles or less, 31 per cent between 10 and 29 miles, 19 per cent between 30 and 69 miles, and only 14 per cent more than 70 miles. Most of this haulage was within the state, and that for long distance was largely made up of special commodities, such as furniture, where the packing, handling and breakage charges made truck haulage cheaper than if the movement had been by rail. He believed that actual competition of the motor truck with the steam railroad was negligible, except for short hauls which the railroads consider unprofitable. He urged the construction of the railroad terminals in the suburbs of cities rather than in the centers and distribution of freight from them by trucks.

GROUP MEETINGS ON WEDNESDAY

The meeting of the transportation and communication group on Wednesday afternoon was devoted entirely to progress reports of the special committees to investigate various transportation topics, appointed by President Barnes. These committees, of which there are five, will report to a general transportation committee, whose personnel has not yet been completed.

The first report was on governmental relations to transportation and was submitted by George A. Post, who said the committee was studying different clauses of the railroad act and was unanimously opposed to government operation. Carl R. Gray, chairman of the committee on railroad consolidation, pointed out that this committee was considering the national aspects only of railroad consolidations and that its work would in no way interfere with or overlap that of the Interstate Commerce Commission. His committee reached the opinion that the economies possible by consolidation were not very important, but there were other advantages, such as reducing the problems of car interchange and rate adjustments. F. A. Delano reported for the committee on adjustment of relative freight rate schedules, and was followed by A. H. Swayne for the sub-committee on the relation of highways and motor transport to other transportation agencies.

Mr. Swayne said that this committee had organized three sub-committees, one to review the field of motor use outside of the terminal area, the second the field of motor use inside of the terminal area, and the third the legal aspects of highway transport in its relation to other carriers. P. H. Gadsden is chairman of the third committee. Arrangements have been made to secure data and other assistance from various government bodies, and the American Electric Railway Association will supply figures on the cost of operation of electric railways. The facts as assembled will be correlated either by government officials or the staff members of the committee. Assistance to the legal committee, of which Mr. Gadsden is chairman, is being given by the National Automobile Chamber of Commerce, which is preparing a statement of the municipal regulations of common carriers on the highways, by John E. Walker, former tax adviser of the Treasury Department, who is studying taxation of rail, motor and electric carriers; by the American Electric Railway Association, and by the Bureau of Public Roads. The committee has already secured enough facts to show that there is a broad field for the supplemental use of the motor bus and the electric railway and that some method of co-ordination is possible which will eliminate unnecessary competitive charges to the public, while still preserving the flexibility of service in which the public is most interested.

Progress was also reported by the committee on development of waterways and co-ordination of rail and waterway service by its chairman, W. L. Clause.

In the foreign commerce group meeting, George L. Duval explained some of the difficulties involved in marketing American goods abroad. J. Walter Drake, Hupp Motor Car Corporation, gave several fundamental principles which apply to the export of American manufactures in general. These are: (1) Mass production permits competitive prices. (2) Personal contact is needed with foreign selling agencies. (3) World markets are essential to balance domestic commerce. (4) The new tariff allows for prompt adjustment with nations which are favorable to us. (5) The success of any American industry abroad adds to the prestige of the others.

The session of the natural resources group was devoted to the subject of coal. A report of this meeting appears in another column.

At the meeting of the insurance group, Hon. Robert L. Luce, former Justice of the Supreme Court of the State of New York, said that regulation, which had been enforced on public utilities, is now being applied also to the insurance business. In England the insurance business is unregulated, and the rates there are correspondingly lower.

Asa S. Wing presented a table showing the investment in railroad securities by the life insurance companies from 1860 to 1922. Prof. William Leslie spoke in favor of government regulation of insurance.

A special meeting was arranged on Wednesday afternoon to discuss taxation. This group made the following formal recommendations, which were referred to the board of directors before going to the resolutions committee:

1. Capital gains and capital losses should not be recognized for income tax purposes.

2. The present 50 per cent maximum surtax should be reduced to 25 per cent.

3. There should be a general sales tax of one half of one per cent on turnovers to make up for proposed repeal of the so-called "nuisance" taxes, such as excise taxes on theater tickets, club dues, and occupations of various kinds.

4. There should be created a court of income tax appeals, entirely separate from the treasury department, which would sit in various parts of the country, so that persons and corporations might settle their cases with the government near their homes.

GENERAL SESSIONS ON THURSDAY

This session began with an address on the farmers' interest in transportation, by O. E. Bradfute, president of the American Farm Bureau Federation. This was followed by an address on the need of financial support for the railroads by W. N. Doak, senior vice-president Brotherhood of Railroad Trainmen. The speaker declared that the employees' interest in adequate financial support for the railroads must be apparent to all and that those employees who do not feel such interest should seek other fields of endeavor. Labor is also opposed to Federal ownership, control or operation. He saw help from the efforts of the Chamber to study the railroad situation. The public should be educated to adopt a sympathetic attitude toward the railroads and toward their employees in their efforts to furnish transportation, and much good can undoubtedly be accomplished by both railroads and employees going to the public with a joint appeal for fair dealing.

The final address of the session was by Walter W. Head, first vice-president American Bankers' Association, whose topic was the re-establishment of railroad credit. He pointed out that in 1920 railroad securities reached the lowest point in their history and the quotations today still are far below the normal trend of such prices in the years prior to 1914, though the roads were carrying the greatest traffic in their history and their efficiency has increased. The great need now is for increased facilities, especially terminals.

Two elements that enter into every loan are, first, whether the tangible assets are worth the outstanding capitalization, and second, the prospects for future growth. As regards the first point, in 1921 the Interstate Commerce Commission has valued the roads for rate-making purposes at considerably more than the market value of the outstanding securities, and only 6 per cent less than their par value, so that any reasonable allowance for increased cost since that time supports the belief that the railroads as a whole are not over-capitalized. As regards the second test, there is a general fear on the part of the investor that the railroads are victims of too much political pressure from particular interests. The government will probably continue to control rates and to mediate the wages, but with efficient management, loyal service from railroad labor and stability of regulation, renewed confidence should come.

RESOLUTIONS

Following the practice of the Chamber, a series of resolutions was presented at the final business meeting, for approval by the delegates present.

They were offered by the committee on resolutions and embraced a variety of topics. The following were of particular interest to electric railways.

One resolution declared that the present 3 per cent limit on immigration was not adapted to present conditions. To this 3 per cent a possible added 2 per cent quota on a selected basis was recommended, and it was suggested that this might lead to the placing of all immigration on a selective basis.

As regards the railroads, it was pointed out that in 1920 the country started on a new constructive transportation policy. It was urged that this liberal policy be followed in the future, and it was suggested that much valuable information would be available from the results of the transportation conference recently initiated by the Chamber.

A pledge of co-operation with the National Coal Commission was passed, coupled with the statement that the Chamber had already gone on record in adherence to the open shop principle.

Greater attention was recommended to methods of reducing the fire loss and civil responsibility for probable loss to others caused by gross negligence was urged.

On the subject of public utility regulation the Chamber passed unanimously a resolution favoring state regulation in preference to city regulation. The full public utility resolution follows:

Regulation of public utilities has developed through its various stages until the principle of regulation through a body created by the State has been recognized throughout the country as best calculated to result in decisions equitable alike to utilities and their patrons and to determine the questions of large importance both to utilities and their owners and to the public.

The advance which has thus been made should be maintained. As the source of the power of regulation of utilities, each State should exert this power through its own agency and should not attempt to delegate it to local authorities. Such a course would represent retrogression, and its consequences would be detrimental to the best interests of the public.

Complete Unionization of Coal Mines Would Be Ruinous

The Various Remedies Commonly Proposed Are Criticised—Six Suggestions Were Made on Other Ways by Which the Coal Situation Can Be Improved

THE disastrous results which would follow the complete unionization of the coal industry was the subject of a talk given before the recent meeting of the Natural Resources Production group of the United States Chamber of Commerce by J. G. Bradley, president of the Elk River Coal & Lumber Company. He emphasized the point that since 1917 the price of coal has been governed by difficulties of distribution. Priority orders during the war time, the railroad switchmen's strike, and the shopmen's strike so interfered with the transportation of coal that they became the dominant factors in the situation.

As illustrating the effect of railroad conditions upon the coal industry Mr. Bradley said that a shortage of 20 per cent in the number of cars available added 12 per cent to the cost of production, a 30 per cent shortage added 19 per cent, and a 60 per cent shortage added 54 per cent. The latter condition is that which now prevails in the West Virginia mining district. He predicted that the time would come, however, when production costs would again govern the price of coal.

The economic future of general business in this country depends upon the proper preparation of the coal industry to meet this situation. It cannot be met, Mr. Bradley said, if labor organizations are allowed to dominate the industry. He spoke of the annual burden of $15,000,000 to $36,000,000 which is added to the price of coal in order to pay the expenses of "absentee union leaders." Comparing the productivity of union miners and non-union miners, he stated that the average production of coal per man per year in the non-union fields of West Virginia is 1,500 tons, whereas the average for the whole country including union mines is only 650 tons. He declared that complete unionization of the coal mines would simply mean granting a subsidy to a particular group of workers, with consequent increased costs.

Legislation Not Effective Remedy

None of the plans yet proposed to improve conditions in the coal industry is adequate to solve the problem, according to George H. Cushing, publisher, Washington, D. C., who spoke on the same occasion. In his opinion it would be impossible to remedy existing evils of intermittent production and price fluctuation by legislative means alone. The answer lies rather in a comprehensive scheme which will gradually work improvement in the situation by helping the coal industry to help itself.

Mr. Cushing spoke of the various remedies that have been suggested and outlined the shortcomings of each. The first cure considered was the so-called "stabilization" plan. This means arbitrarily wiping out half of the existing mines in order that the other half may enjoy full-time productive activity. Half the miners would be compelled to seek other employment under this plan. He said that it was very doubtful if any practical and legal means could be found to accomplish such an end.

The second plan to be considered was that of community storage, whereby the mines could maintain a steady production in spite of seasonal fluctuations in demand. The objection to such a proposal is that it costs from 50 cents to 60 cents a ton to put coal in storage and take it out again. Hence the stored coal could not meet the price competition of coal coming direct from the mine unless a surcharge were added to the latter. In that case the effect would be to raise the price of all coal.

Consolidation of mines by districts is another plan that has been suggested. Under this arrangement the uneconomical mines would be put on the shelf and only the more efficient ones operated. Unfortunately, the overhead and capital charges of the operating mines would be nearly doubled by this plan, and the price of coal would be increased as under the storage plan.

The fourth scheme discussed by Mr Cushing was nationalization. This would result, he said, in changing the ownership without in any way solving the problem of operation. All of the four remedies have the general fault of creating a virtual monopoly backed by the federal government. He questioned whether any private corporation would be allowed to do of its own accord what it is urged that the state undertake.

Just what the recommendations of the Fact Finding Commission now investigating the coal industry will be it is impossible to forecast at this time. Mr. Cushing said, however, that the investigation is becoming so obscure, that one might be justified in thinking that the ultimate object is to evade the issue. At the present time the great users of coal, the railroads, the electric railways, and the electric power companies, are legally held to fixed rates, while at the same time they have to purchase fuel at whatever price is demanded. A bound consumer and a free producer are incongruous. But that does not mean that the producer should therefore be subjected to price regulation also.

Mr. Cushing then outlined the steps which could be taken to help the coal industry to help itself without any revolutionary changes. He mentioned first the necessity of putting the railroads in a better position to serve the mines. A second step should be an attempt to absolutely ban coal strikes, legally when possible, and by force of public opinion. In this connection the value of staggering the dates of contract expiration was mentioned. State laws requiring a certificate of competency before a miner can work should be abolished. The non-union mine should be encouraged in every possible way as a force to counteract the power of the miners' organizations. A nine months' notice to railroads should be required when a new mine seeks a spur connection. This would discourage wildcat ventures that decrease the ability of the carriers properly to serve regular mines. Lastly, public opinion should force the acceptance by the miners of all available labor-saving devices.

Iowa Convention Date Changed

THE annual convention of the Iowa Electric Railway Association will be held at Hotel Hanford, Mason City, Iowa, June 26, 27, 28, 29, instead of June 20, 21, 22, as previously announced.

Roller Bearings for Cars*

Experience in Germany Indicates That Many of the Difficulties Experienced with Ball Bearings on Electric Cars Have Been Overcome Through Use of Roller Bearings

TESTS on roller bearings, covering very long runs, show extremely great differences in power consumption due to the use of unsuitable materials, to poor workmanship and to inadequate maintenance. The greatest advantage of roller bearings over ordinary bearings for street car service is not found in a possibly smaller power requirement, but in their considerably greater reliability, their lower maintenance cost, the less lubrication required, and the absence of chafing between armature and pole faces of the motor. In fact roller bearings permit of a reduction of the air gap, thus improving efficiency and lessening heating.

Ball bearings were found unsatisfactory for heavy street car service, partly due to too high specific stress upon the balls, and partly on account of the wrong way in which the fiber of the steel is stressed in the balls. They are made by cutting off small pieces of a round wire which are then upset. Electric contact conditions are also much better for rollers than for balls. The great superiority of roller bearings over ball bearings for heavy service is now generally admitted by all factories producing both kinds of bearings.

Roller bearings were made originally with very long rollers, sometimes five to six times as long as their diameter. The development of high-grade steel, however, resulted in a considerable shortening, until today most rollers are made with a length equal to twice the diameter or less. For very heavy bearings, somewhat longer rollers or, better, two or more rows of rollers are used.

How Performance Can Be Secured

The following basic conditions must be maintained to guarantee best performance:

1. Shafts must be sufficiently heavy to prevent bending. It is useless to install roller bearings on shafts which can bend.
2. The highest grade steel should be used for the rollers, which must not show measurable wear after several years of operation.
3. Rollers must be made with utmost precision to distribute the stress upon them equally and to permit replacement.
4. Short rollers are preferable, because long ones may cause edging.
5. Heavy inner rings which cannot be rolled over or become loose are desirable.
6. All rings upon the shaft must be firmly pressed on, and they should be so arranged that an inspection of the bearing does not require removal of the rings.
7. Shafts should be of sufficiently tough steel to avoid loosening of the rings due to the constant blows upon them.
8. A durable but light construction of the roller cage is desirable.
9. All parts should be lubricated with a thick grease. The use of hollow rollers, running on a through-going bolt, is not recommended, because reliable and satisfactory lubrication is difficult to obtain.
10. Bearings must be absolutely dust and water proof. A small amount of dust will destroy the best bearing.
11. Good lubricants, free of acids and resin, should be used.
12. Bearings should be stored in a place where rusting is prevented.
13. Great care should be exercised in installing the bearing to insure exact alignment and to avoid foreign materials.
14. Bearings should be cleaned carefully at intervals, removing all old grease.

Barrel-Shaped Rollers Counteract Bending of Shaft

The necessity or advantage of conical rollers is not recognized in Germany. One concern uses barrel-shaped rollers, to counteract any possible bending of the shaft. To take up side thrust, experience has shown that for all railway car service a bead directly on the rollers or beads on the running rings are all that are necessary. Even after years of operation no measurable side wear could be found.

Great attention is being paid to an exact and uniform tempering of the rollers, a process usually kept secret. With a double roller set, the two rows of rollers should be as far apart as possible. To permit of quick and convenient inspection of the bearing it should be so designed as to permit the removal of the rollers without stripping of the front ring. Modern bearings are so built that they permit the removal of the commutator and even the armature punchings without removing the running ring from the shaft.

Good roller bearings require lubrication only every six months or yearly. The use of thin oil is not recommended, because of the large amount required, and because it is very difficult to prevent the oil from running out of the bearing.

The economies to be had from roller bearings open up new possibilities for use in urban service of a light four-motor double-truck car. The superintendent of the Stuttgart street railway system says that 10 per cent of the balls furnished in some trial ball bearings for the road had to be replaced within three years. Later their cars were rebuilt for roller bearings, and there were no failures during four years of operation. After 155,000 miles of service, no wear could be found in the bearings. While ordinary bearings consumed 35 lb. of oil for 250 operating days, the roller bearing consumed only 7 lb. of grease.

*Abstract of a paper presented by Director Albert at the International Street Railway Congress in Vienna.

Special Meeting of Traffic Association

ON APRIL 26 a meeting of the Central Electric Traffic Association was held in Toledo, Ohio, to determine whether the electric railways would compile a tariff covering the transportation of explosives and dangerous articles on passenger cars, or whether they would participate in a similar issue compiled by the steam railroads. It was decided at the meeting that the electric lines in the central territory would participate in the steam railroad tariff. It was further decided to reissue the interline intrastate joint passenger tariff covering Ohio lines in order to include the Northwestern Ohio Railway & Power Company in the tariff. Passenger fares will be adjusted in accordance with the local tariffs of participating lines.

Central Accountants to Meet

A PRELIMINARY announcement of the forty-fifth meeting of the Central Electric Railway Accountants' Association states that the meeting will be held on July 27 and 28 in one of the gardens on the Kentucky side of the Ohio River, in or near Louisville. The trip from Cincinnati to Louisville will be made on the *Queen City*, leaving at 5 p.m., July 26, and arriving at 9 a.m., July 27. Those who take the boat will be served dinner and breakfast thereon, and there will be dancing on the boat in the evening. Those who desire to join the party on the boat should send reservations not later than May 1 to J. C. Longon, auditor Cincinnati & Dayton Traction Company, Dayton, Ohio, accompanied by $2.25 for each, this being one-half of the total charge. The balance will be paid to the purser on the boat.

American Association of Engineers Holds Ninth Annual Convention

ON MAY 7 and 9 at the Monticello Hotel, Norfolk, Va., the American Association of Engineers held its ninth annual convention. Reports of standing and special committees covered the achievements, plans and aims of the association, and addresses full of both information and inspiration were given by government officials and others.

New officers of the association, as included in an announcement by the judges of election, are as follows: President, Webster L. Benham, Kansas City, Mo.; first vice-president, G. M. Butler, Tucson, Ariz.; second vice-president, Maurice Bein, Washington, D. C. The secretary of the association is C. E. Drayer, and the headquarters are at 63 East Adams Street, Chicago, Ill.

Maintenance of Equipment

Use of Supplemental Bar Strengthens Truck

THE use of an extra truss bar, supplementing the top member of the truck frame, has been found by the Buffalo & Lake Erie Traction Company to be an excellent way to prevent sagging of the truck side frame members on arch-bar trucks.

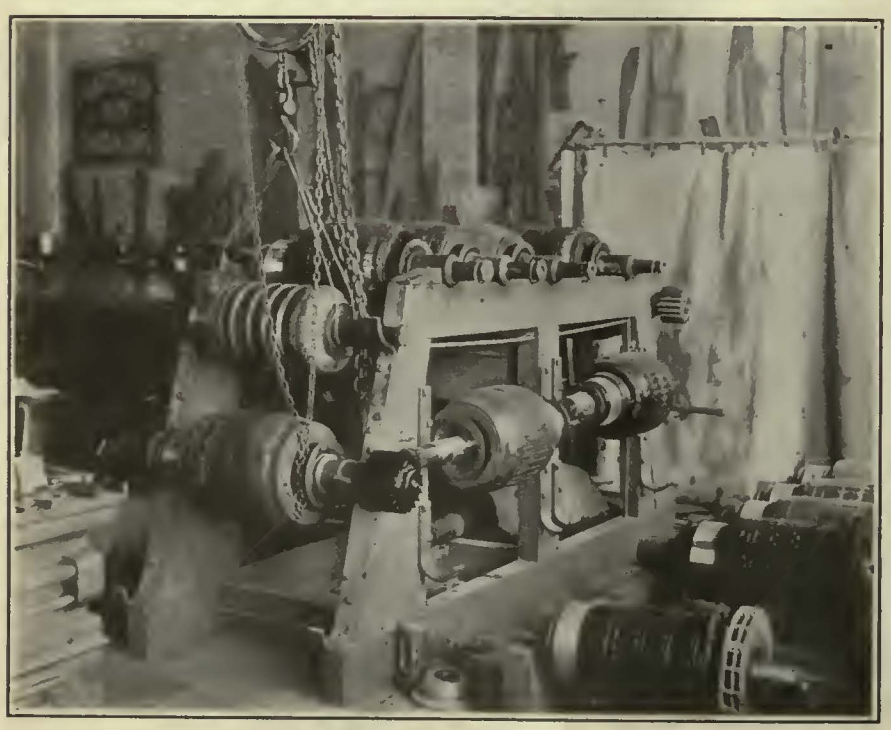
Reinforced Truck Under Low-Level Car

Considerable difficulty has been experienced because of such sagging and consequent springing out of shape of the truck frame. The trucks involved have been in hard service for some time. A ¾-in. x 3-in. steel bar was therefore bolted across the top of the truck frame on each side, as shown in the accompanying illustration. The supplemental bar is in contact with the top member of the frame over the journal boxes and bears on 1½-in. blocks at the center, thus forming a flat truss. The arrangement has proved to be a very satisfactory means to prevent springing of the truck frame and breaking of the diagonal members. All the trucks of this type are now being strengthened in the manner described.

Large Capacity Armature Rack

AN ARMATURE rack in use in the Easton shop of the Lehigh Valley Transit Company has provision for twenty-one armatures. Iron-bar stirrups are provided on the sides and ends, and the top and inside portion has grooves in the wooden framework to hold the shafts of the armatures. Four armatures are stored on each side, three on each end, five on the top and two inside the framework.

This rack is served by traveling hoists so that armatures can be picked up or installed in the rack without difficulty. Although the rack is of strong timber construction and is held together by tension rods, it can be readily picked up and moved about should it be desirable to change the location.



Large Capacity Armature Rack

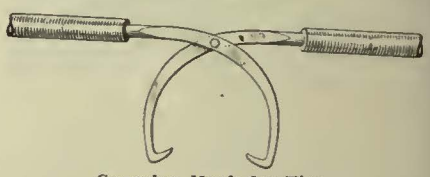
Convenient Track Shop Kinks

By J. S. WILDER

Engineer Maintenance of Way, Municipal Railway of St. Petersburg, Fla.

THE accompanying illustration shows a type of carrying hook which we have used with great success for switch ties, etc. This is made on the ice-tong principle, with iron pipe riveted to the handle to give additional length. The hollow pipe keeps the weight down.

We have found that six or eight hacksaw blades make an excellent substitute for a wood rasp. Of course new blades cut faster, but old ones cut smoother. A bolt put through the holes at either end holds the blades together.



Carrying Hook for Ties

An old stunt which I have used frequently for fixing a screw so that it cannot be unscrewed consists of filing off the two opposite corners at the slot. When this is done a screwdriver will slip out of the slot if one tries to back the screw out, but it will not interfere with turning the screw into place if the work is properly done.

Rainy days are frequently used for making various handy tools, such as different sized screwdrivers, wood chisels, etc. These are made of round spring steel. Where conveniences for tempering are not available, we have found that hammering them rapidly and lightly and then chilling them is a very satisfactory method. Round spring steel makes excellent chisels, but considerable care is required in tempering them. They must be chilled in oil and then have the temper drawn.

Sometimes a workman breaks a drill of a small size and has no other available for immediate use. In such cases a nail has been used by cutting off the head and hammering flat for about half its length. This is then sharpened with a file in a manner similar to that for flat bits, but the point should be made about twice as long and a little sharper. We do not bother to temper these small drills as they are made too easily and the hammering helps to harden the nail.

Oil Burner Used to Heat Cleaning Tank

BEARINGS, castings of various sorts, compressor parts, etc., are cleaned in the shops of the Buffalo & Lake Erie Traction Company by immersion in a tank of boiling Oakite metal cleaner and subsequent rinsing in another tank. Until quite recently the metal-cleaning tank was heated by natural gas, which is available at Erie, Pa.

This method has not proved entirely satisfactory, however, because variation of pressure made the natural gas an unreliable source of heat. Therefore a galvanized-iron flue was built in such a way that the heat of a Hauck oil burner could be concentrated against the lower part of the tank.

Three or four of these burners are used in the shops, and one can usually be found free when it is desired to heat the metal-cleaning vat. Good results and greater reliability have been secured from the replacement of the natural gas by this oil burner.

Gear Grease in Paper Cartridges

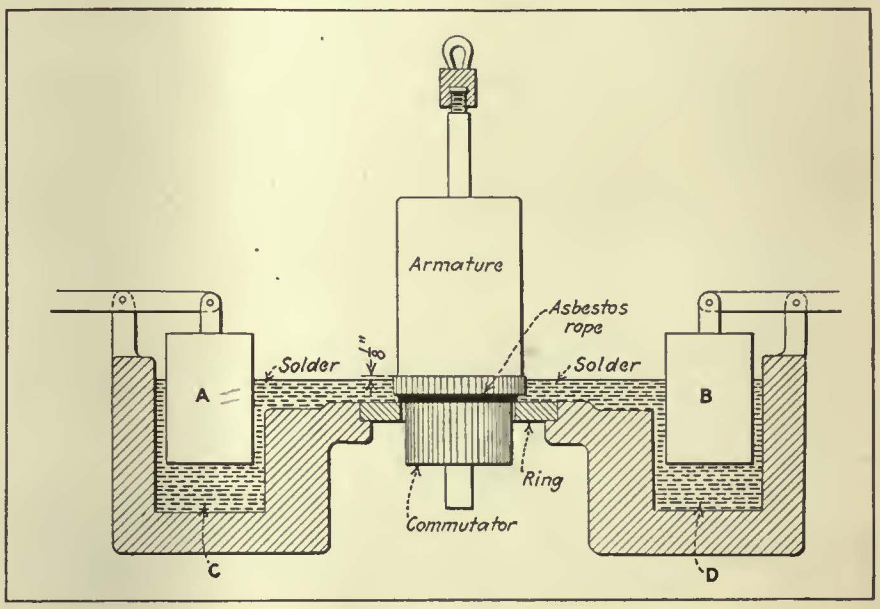
A CONVENIENT method of handling gear grease is that used in the shops of the Binghamton Railway. One pound of grease is made up into a roll about 2 in. in diameter and 8 in. long, by wrapping in a single thickness of newspaper. This paper wrapped cartridge is put right into the gears, paper and all, and it has proved to be a very handy method of applying the grease. The newspaper has no effect on the lubrication as it is ground up in the first few revolutions of the gears. No machine is used in the wrapping, which is done by an oiler during his leisure time. A supply of grease cartridges is kept on hand in the shop and their use has reduced the time spent in lubrication.

Soldering Railway Armature Coils to Commutator

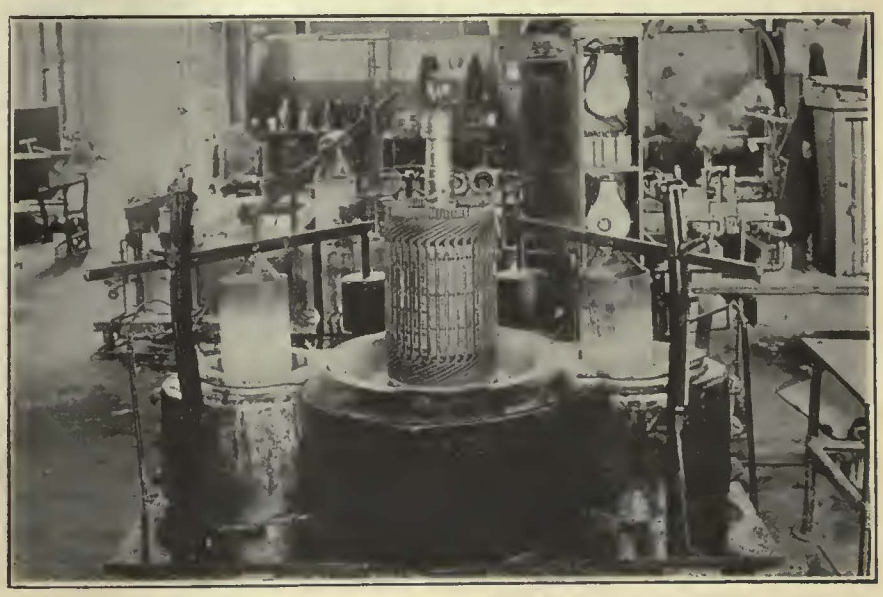
By Harry L. Signor
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company

BEFORE armature coil leads are soldered in the commutator neck slots, dirt, oil, insulating material or paint must be removed from these parts, after which they should be tinned. A substitute for tinning, which gives very good results, is to brush the metal parts, after they have been thoroughly cleaned, with a liquid flux which is left to dry. This forms a thin coating over the cleaned surfaces. It is important in selecting a flux to see that it does not contain any acid that may get to the insulation of the coils and cause short-circuits and grounds. A good, cheap and safe flux can be made by dissolving 1½ lb. of rosin in a quart of ether or denatured alcohol.

The most common material used in soldering is the alloy known as "half and half," which is made of approximately half lead and half tin. This solder is reasonable in price, has a melting point of 180 deg. C., flows readily when heated with a hot iron, is not hard to work and takes a good hold on the metal to be soldered. Pure tin, with a melting point of 230 deg. C., can be used, but is more expensive than "half and half," requires more skill in handling be-



Section of Soldering Pot



Soldering Pot Used for End Connections to Commutator

cause it flows very easily and rapidly, tends to spread beyond the surfaces to be soldered and is quite difficult to use on wire coils. When motor equipments are apt to be overworked and thus subjected to high temperatures and excessive speed, pure tin is used to solder the armature leads to the commutator necks and to solder the armature bands. When

Soldering Leads at the Side of the Commutator

tin is used as solder the clearance between adjacent parts should be as small as possible. For armatures operating under normal service conditions and not subjected to high temperature and unusual mechanical strains due to high speed, the "half-and-half" solder can be used with good results.

The types of soldering irons to be selected depends upon the method to be used in heating them. The most common type is one heated in a gas flame, and for ordinary work a 2-lb. or 3-lb. iron will give good results as it holds the heat a long time. Other types of iron have self-contained heaters, with a gas flame or an electric heating element.

On many properties the soldering of leads in the commutator neck is done from the top of the commutator. With this method there is a possibility of the solder working its way back of the commutator neck and short-circuiting adjacent leads, especially when pure tin solder is used.

An accompanying illustration shows a workman soldering leads at the side of the commutator, a method highly recommended. The armature should be raised about 6 in. at the pinion end so that excess solder will flow to the front end of the commutator neck, and thus reduce the possibility of short-circuiting the back of the neck.

When a large number of commutators are to be treated, pot soldering is recommended. By this means all the armature leads are soldered in one operation, without the danger of any excess solder working back of the commutator neck. The commutator to be soldered should have two or three turns of asbestos rope of from $\frac{3}{8}$-in. to $\frac{1}{4}$-in. diameter wound around it close up under the neck. The commutator is then placed in the ring of the soldering pot as shown in the accompanying cross-section. Rings of different size correspond to different diameters of the commutators. The plungers *A* and *B* are forced down into the solder, causing it to rise to approximately $\frac{1}{8}$ in. from the top of the commutator neck.

After several minutes of contact the plungers *A* and *B* are raised, allowing the solder to recede back into the pots *C* and *D*. The armature can then be lifted from the ring, and the asbestos rope taken off. The armature should then be put into a lathe and the commutator neck and surface brushed or face machined.

Easy Method of Making Compromise Joints

THE accompanying illustration shows two compromise joints which have been in service for some time on the lines of the Lehigh Valley Transit Company, Allentown, Pa., and were made in a rapid and easy manner.

The two rail sections were placed end to end on the steel-foundry floor with a layer of sand underneath. The smaller section was blocked up

Compromise Joints Made by Pouring Molten Steel About Rails

so as to bring the top into the desired location. A board was then placed on each side of the rail and molten steel poured in to make the desired joint. Holes were drilled through the web of the rail, so that the metal on the two sides is held together through these holes.

The boards were located so that the steel when poured would not interfere with the top or gage line of the rail. The compromise joints illustrated have been in service for more than two years and are in perfect condition.

New Equipment Available

New Hat Check Saves Abuse

THE redemption department of a railway whose passenger receipts are $1,000,000 per month is said to redeem upward of 250 card tickets monthly. Card tickets usually are purchased within thirty minutes of the departure of the train. Probably all but a negligible number of these tickets are used, so that a very considerable portion of this $750 per month represented is paid in redemption vouchers for tickets on which service is rendered.

Zone Hat Check

If conductors were required to hat check all passengers in day coaches, these card tickets would be lifted, provided a form of hat check were used that could not be counterfeited, as can so easily be done with a blank form. The A. H. Pugh Printing Company, Cincinnati, Ohio, has placed on the market a zone hat check, one form of which is shown. Each check can be used to designate fifty different destinations, and by a change of the zone symbol at the top (OA in the illustration), any number of stations can be covered.

The following advantages are claimed:

1. Having the date punched, it cannot be used a second time, even though the conductor fails to lift it before the passenger leaves.

2. While perfectly simple to those holding the key, it is devised to appear quite complicated to those who might attempt to misuse it.

3. Even those who might obtain the key would be deterred by the expense necessary to counterfeit the hat check and duplicate the conductor's punch dies, besides incurring the penalties provided.

The News of the Industry

Bondholders Agreeable

Seattle Investors Willing to Wait for the Return of Money Provided City Charges Fare that Will Pay

The City Council of Seattle has received a telegram from A. W. Leonard, president of the Puget Sound Power & Light Company, at present in Boston, expressing willingness on the part of the Old Colony Trust Company, trustee for the holders of the bonds of the Municipal Street Railway, to co-operate with the City Council and Mayor E. J. Brown "in any way consistent with sound principles," provided a fare is established by the city "which will return earnings adequate to cover the obligation of the present bonds."

Mr. Leonard said in part:

> I am pleased to report willingness on the part of the trustee to co-operate with you in any way consistent with sound business principles.
>
> I do find, however, a very strong reluctance on the part of the trustee to consider any suggestion whatever along the above lines until a rate of fare is established which will return earnings adequate to cover the obligations of the present bonds.
>
> After such earnings are again established, showing the city's good faith, I believe it would be possible for you to secure favorable consideration along lines desired in the resolution, no intimation having been made before I left Seattle as to whether the city could suggest to the trustee that by his acceptance he would accomplish the desire expressed in the resolution.
>
> I, of course, have been unable to make any definite statement to the trustee covering your ideas relative to reduced annual payments.
>
> As a result of an interview with representatives of the trustee and others interested, I feel justified in suggesting the appointment of a committee representing the city to confer with the trustee in Boston and am sure such committee would be met in full spirit of co-operation in the desire, if possible, to reach some mutually satisfactory solution, as the situation will eventually resolve into the question of what proposition the city can legally make, and what the trustee can legally accept.
>
> I would recommend that the committee include among others the Mayor, corporation counsel and superintendent of public utilities.

It will be recalled that the plea of the city was for the adoption of some practicable plan under which payment of the principal of the bonds might be extended over a longer period than was contemplated in the original purchase agreement.

The City Council has referred the message to the utilities committee. Presentation by the city of terms on which it would agree to refund the securities issued to purchase the municipal system is suggested as the first step in negotiations looking to that end. Every member of the City Council has gone on record in favor of opening negotiations with the holders of the street railway bonds for an extension of time and a resolution was unanimously passed proposing that negotiations be opened. One of the plans which may be suggested for paying the bonds will be the semi-annual payment of principal, instead of annual, as at present.

Mayor E. J. Brown states that it is doubtful if an increase in fares would be wise, even in view of the language of Mr. Leonard's telegram, which suggested that the city "show its good faith" by charging a sufficient rate of fare to meet the existing bonds and other charges.

The Mayor said:

> If we can have a 4 per cent interest rate on bonds running for thirty years, it would make an ideal condition and would make it possible to retain the 5-cent fare.

The Council is now considering an ordinance which would increase the present 5-cent fare, under which the system has been losing $4,000 to $5,000 daily, to 10 cents cash, or 8⅓ cents token. Mayor Brown is strongly opposed to such an ordinance, and it is possible that he may veto the measure after it is passed by the Council. In that event the putting of the increase into effect would be delayed at least thirty days to permit the ordinance to be passed over his veto. A majority of the Council members favor the passage of the increased-fare ordinance immediately. They want this done before negotiations are opened with the bondholders.

Bus Service Proposed for Canton

A dispute has developed over the plan of the Northern Ohio Traction & Light Company to install bus service in Canton. The idea was to put the buses on two routes as provided for by a resolution passed by the Council. In good faith the company ordered six buses of the type used in Akron for operation on what is known as the Gibbs Avenue route and the Fulton Road route. The company is now awaiting the court decision as to whether or not the buses shall be placed in service. When the Mayor refused to grant the company a license to operate it applied to the court for a permanent injunction. The case was tried a few days ago and taken under advisement. The excuse offered by the Mayor in court for his refusal to license the buses was that the charter under which the Northern Ohio Traction & Light Company is operating did not permit it to run buses. The six buses ordered seat twenty-four passengers each and driver. They are being built by the G. C. Kuhlman Car Company, Cleveland, and cost approximately $8,500 each. They are painted orange and are identical with the Akron buses except that they are even more up to date. The bodies are mounted on White chassis.

East Liverpool Rides Again

Paving Assessment Removed and Seven-Cent Fare Allowed in Controversy with Employees

Railway service has been restored in East Liverpool, Ohio. A tie-up there of nearly a year was ended on April 16 when the City Council enacted an ordinance granting concessions to the Steubenville, East Liverpool & Beaver Valley Traction Company. The passage of the ordinance followed an agreement reached between the employees and traction officials. According to the agreement the company is granted a 7-cent city fare with a 1-cent transfer. The company is also granted a five-year exemption from street paving assessments.

The controversy in Steubenville and East Liverpool had its beginning early in 1922. It was then that C. A. Smith, general manager of the company, notified the employees that when the wage contract expired on May 1 the company would deal with the men as individuals and not with any representatives of any "so-called labor union." Overtures were made to the railway, but the officials remained firm, with the result that the men walked out. Operation on all the company's lines in Columbiana, Hancock and Beaver Counties was tied up on May 1 and service was suspended on all lines in Jefferson County on May 4.

Shortly after the walkout became effective conferences were called at Steubenville, East Liverpool and Wellsville and attended by citizens, public officials and representatives of the men, but no settlement was reached. Meetings were also held in the cities of Wellsville and East Liverpool, but no great progress was made toward arbitration. One of the reasons for inaction was that a suggested member of the proposed board of arbitration was a member of Division 285 of the Amalgamated. The city of Steubenville, however, enforced its ordinance compelling arbitration. The board of arbitration there consisted of one member selected by the employees, one by the company and the remaining three appointed by the Common Pleas Judge of Jefferson City. It met at Steubenville on May 24, but the attempt at arbitration failed.

Only once up to this time did the company try to operate its cars. This effort was made at East Liverpool on May 4, but it was followed by so much disorder that this incident terminated for the time being all efforts to restore service.

Whether the car riders in Steubenville were more anxious than riders

elsewhere to have the railway operate or whether the attempts made in Steubenville toward a settlement were more constructive than those made elsewhere, at any rate on July 10, 1922, a conference was held which resulted in the resumption of service in Jefferson County. At this final meeting in Steubenville the company did deal with the union. The wage contract signed by the men represented a cut of 5 to 8 per cent.

Meanwhile conditions remained at a standstill in East Liverpool. In the fall of 1922 the company proposed an ordinance which provided for an increase in fares and the placing of the East Liverpool situation in the hands of the State Public Utilities Commission. On Nov. 7 voters of East Liverpool defeated the railway ordinance by a big majority. The company had hoped that the passage of the ordinance would be a step toward a solution of the matter, but the defeat of the measure practically brought the matter back to the status of affairs at the inception of the tie-up.

Later a councilmanic ordinance which provided also for a fare increase met the same fate as the railway ordinance. The vote at the special election on Feb. 27 of this year was in this case 2,227 for and 2,527 against passage. The ordinance voted on called for a 7-cent city fare, a 10-cent intercity fare and a 1-cent transfer. When traction officials learned the result of the election they declared that it appeared that the people of East Liverpool did not want electric railway service. Further, they said that the company would make no effort to operate until the people showed a desire for such operation. Meanwhile interurban cars of the company had been operating outside of the East Liverpool city limits, non-union men being in charge of them.

Although at the annual meeting of the company it was stated that the strike of the employees was not discussed, shortly thereafter came word that a settlement was near at hand. The end came on April 16 after a period of 350 days. General Manager Smith announced that service would be restored immediately, and within a day cars were in use on the entire division.

City Free to Renew Attempt to Take Over Railway

On the ground that the United States Circuit Court of Appeals had authority finally to pass on the case in its legal status, the United States Supreme Court on May 7 dismissed the appeal of William R. Begg and Arthur C. Hume, receivers of the Manhattan & Queens Traction Corporation, against the city of New York and others. Future proceedings, if taken by another remedy at law, may properly be considered by it, the Supreme Court held.

Receivers were appointed for the railway when the line was only partly completed. The receivers applied to the United States District Court for an injunction against the city, alleging that the city, through its Board of Estimate & Apportionment, was threatening to adopt a resolution declaring a forfeiture of franchise and of the completed part of the line because of the failure to complete within the prescribed time. The District Court granted a temporary injunction and after a hearing made the injunction permanent. The Circuit Court of Appeals reversed this decree and ordered the injunction dissolved, whereupon the receivers appealed to the Supreme Court.

The effect of the decision is to open the way to the city, if it so desires, to renew the steps taken by it to secure the forfeiture of the franchise of the company.

Home Rule Bill Fails

Hylan's Home Rule Measures Defeated —Uncompromising Attitude Responsible

Only the absolutely uncompromising attitude of the Democratic administration at Albany in respect to regulation of service and capitalization prevented the passage of a bill during the closing hours of the legislative session which adjourned on May 4 giving to the city of New York home rule over the transit situation. The Assembly defeated almost the entire administration program by a party vote.

Working night and day the Legislature before adjournment dumped more than 700 bills into the Executive Chamber.

Five important amendments to the public service commission law were passed, however, and are now in the hands of the Governor. These bills include:

The Walker bill (Senate Print No. 1,291) fixing the price of gas in New York City at $1 per 1,000 ft. and prescribing a standard of 650 B.t.u. per 100 cu.ft.

The O'Brien bill (Senate Print No. 1,837) amending section 65 public service commission law, prohibiting gas corporations from charging for service, equipment or apparatus.

The Ryan bill (Senate Print No. 2,247) amending subdivision 1, section 49, public service commission law, by providing that commission may fix maximum rate or charge for any common carrier, or street railroad, notwithstanding that a higher rate or charge has been heretofore authorized by general or special statute. Provision for temporary increase or decrease in rates is striken out. There are other changes.

The Knight bill (Senate Print No. 2,353) amending various sections of the public service commission law relative to verification and filing of annual reports of corporations engaged in public service operations.

The Kaufmann bill (Assembly Print No. 1,848) adding a new section 53-a to the public service commission law requiring electrification of railroads in New York City.

The Legislature also passed for the second time the Ferris amendment to section 7 of Article VII of the constitution, which authorizes the use of not to exceed 3 per cent of the lands of the forest preserve for the building of transmission lines and the erection of power and generating stations for electrical development of state-owned water powers. This is, perhaps, the most important measure passed by the Legislature in many years in relation to development of water power, as without such amendment to the constitution any development of St. Lawrence power could not be carried across the Adirondack preserve. The amendment will go to the people for ratification at the general election in November.

Extension of Menominee Franchise Is Sought

The Menominee & Marinette Light & Traction Company is seeking a renewal of its electric light and power, street railway and gas franchises in Menominee, Mich. The franchises have been drawn up by the franchise committee, but in their present form are not considered fair or practicable by the company.

The electric light and power franchise of the company expired on March 25, 1921, its gas franchise expired on Feb. 28, 1923, and its railway franchise expired on April 7, 1923.

J. P. Pulliam, vice-president and general manager of the company, said recently to the Council:

> It may be urged that the company is violating the law in occupying the streets, alleys and public places of this city without a franchise. No law is being violated by the company in so doing. Such occupancy is a matter of sufferance on the part of the city. At any time that the city feels like taking the full responsibility of saying to the company that it no longer wants it to furnish light, heat, power and street railway services and no longer to occupy the streets, you have the right to do so and the company will be compelled to obey. The law of the State of Michigan has clothed you with that power.
>
> The company feels that the franchise as a whole is unsatisfactory and unworkable and the company would be doing a gross injustice to itself if it were to accede to the terms of the franchise.

Another Erie Canal Contract Award

The second contract for the electrification of the old Erie Canal bed in Rochester, N. Y., was advertised to be let by the city Board of Contract on May 9. The project, which includes the installation of rapid transit interurban passenger and freight service on the site of the abandoned canal, has been described in various issues of the ELECTRIC RAILWAY JOURNAL. The second contract is for the work between Court Street and the Rochester & Eastern Railway crossing in Brighton. The City Engineering Department estimates the cost of this installation at $1,800,000. The initial contract for the first section of the line was awarded some time ago and the work is being pushed rapidly.

Pittsburgh Wage Negotiations Continue

The receivers of the Pittsburgh Railways and the wage committee of motormen and conductors met again on May 8, but reached no agreement as to the amount of the increase in pay to be granted. This was the first conference with Edward McMorrow, Chicago, general executive board member of the Amalgamated. Another meeting was set for May 10.

Des Moines Men Seek 70-Cent Rate

Union employees of the Des Moines City Railway, Des Moines, Iowa, have asked the company to submit the question of an increase in wages to a board of arbitration. The agreement governing wages to be paid the men expired on March 1 of this year and the men demand a rate of 70 cents an hour. When Des Moines cars were put back in service in October, 1921, after a shutdown of seven weeks, the men accepted a cut in wages of 7 cents an hour. They now claim that in comparison with other wage scales they are not receiving proper compensation. The agreement between the company and the men provides that questions as to wage scales which cannot be settled otherwise will be submitted to a board of three arbiters, one representing each side and a third chosen by the two others. The men have named their business agent, Ben J. Wiley, as their representative, but no choice has yet been made by the company.

Erie Employees Receive Ten per Cent Increase

The threatened strike by the employees of the Buffalo & Lake Erie Traction Company, Erie, Pa., was recently averted by the amicable settlement of the wage controversy. The company granted a 10 per cent increase, which amounts to 5 cents an hour for the older men. The previous scale in cents per hour was 42, 46 and 50. This has been increased 10 per cent, with the operation of one-man cars paying 5 cents additional. The men had demanded a maximum of 65 cents for two-man cars and 75 cents for one-man cars.

New Jersey Men Seek 30 per Cent Advance

Wage demands which would increase the present pay of platform men, maintenance of way men, shop men and cleaners by 30 per cent have been prepared for presentation to the Public Service Railway, Newark, to become effective at the expiration of the present working agreement between the company and its employees which terminates on Aug. 1.

The wage demands are for the following increases:

First three months, 46 to 61 cents an hour.

Next nine months, 48 to 63 cents an hour.

Thereafter, 50 to 65 cents an hour.

Operators of one-man cars would be raised from 55 to 80 cents an hour.

The demands also include increases for men working as extras, pending the obtaining of a full-time job. These men now get a guarantee of $20 a week. The increase sought is $25, with the working day reduced from thirteen to twelve hours and with a full day's pay for those employed on runs of from six to nine hours.

Embodied in the demands will be a request of the men for one day off a week.

The agreement now in force was entered into by the company and the men on June 22, 1921, following a vote of the men to accept a wage cut of approximately 10 per cent from Aug. 1 of that year. The agreement was to run two years. The new scale meant a 5-cent an hour reduction in the salary of all platform men, their rate at the time being 51 cents an hour for the first three months of service, 53 cents for the next nine months and 55 cents an hour thereafter. Operators of one-man cars received 5 cents an hour extra.

Chicago Surface Men Demand 80-Cent Rate

Negotiations have been opened between Division 241, employees of the Chicago Surface Lines, and Henry A. Blair, president of the company, on demands formulated by the division at a regular meeting held on May 7. The new demands were presented to Mr. Blair on May 10, and negotiations were started immediately. Meetings will be held daily if necessary until an agreement is reached.

Under the new demands the maximum hourly pay would be increased from 70 cents to 80 cents. In addition to the wage increase the men voted to demand one day off duty in every seven and to require the company to discard all one-man cars, which are being placed on outlying lines in increasing numbers by the company.

No strike ballot has been polled, and it is unlikely one will be taken unless negotiations fail.

Although the "L" has received notice from Division 308 regarding the expiration of the present contract, no new demands have been received by that company from the men. Whatever action is taken by the surface men is likely to be followed by the "L" men.

Wage Arbitration in Prospect in Grand Rapids

The employees of the Grand Rapids Railway, Grand Rapids, Mich., are seeking an increase in wages to 60 cents, with 65 cents for operators of one-man cars. The company feels that this is unreasonable. Arbitration appears to be ahead as the only way out. The offer of the company to the men was 48 cents an hour for the first three months served, which is recognized as the apprentice period, and 50 cents an hour thereafter with 55 cents an hour for safety car operators. This scale, the company has explained, was arrived at after a thorough analysis of its financial condition and ability to pay without being compelled to increase the present rate of fare.

L. J. DeLamater, vice-president and general manager of the company, said recently:

> Inasmuch as the majority of our cars will be operated by employees who will receive the 55 cents an hour rate we feel and know that we have offered the very limit without punishing the car riders of the city and under the existing conditions we can only ask, if necessary, for an arbitration of the matter, which we will doubtless do, as provided for in Section 32 of the franchise we are operating under, this being the section that in large part was drafted by the union leaders. Under the existing conditions I am sure our position must be acknowledged as at least fair, if not more than fair.

Three-Day Strike in Lawrence

The strike of the employees of the Eastern Massachusetts Street Railway at Lawrence was settled shortly after 10 p.m. on May 8 when the men voted to return to work in the morning, pending arbitration of the questions in dispute.

The strikers had asked for an increase in wages amounting to 35 per cent, for an eight-hour day instead of a nine-hour day as at present, and the application of the seniority rule to all employees. The road has agreed to arbitrate all these demands, except the application of the seniority rule to the miscellaneous men, and the strikers have accepted this agreement.

The settlement was reached as a result of the mediation of W. H. Mahon, national president of the Amalgamated. The 150 men who went on strike had been declared outlaws by John F. Reardon, local Amalgamated committee man for Massachusetts.

One of the new clauses provides that in case the company decides to operate buses, the same working conditions and agreements will apply to the men on the buses as on the street cars.

Five-Cent Increase for Akron Men

Platform men of the Northern Ohio Traction & Light Company, Akron, Ohio, voted on May 7 to accept an increase of 5 cents an hour. The vote followed an offer of the company, and there was very little objection to accepting. The wage increase makes the new wage scale for trainmen on this system:

City: First year, 48 cents; second year, 50 cents; third year and thereafter 53 cents.

Suburban: First year, 49 cents; second year, 51 cents; third year and thereafter 54 cents.

Interurban: First year, 53 cents; second year, 55 cents; third year and thereafter, 58 cents.

The contract was signed on May 8. It dates from May 1, however.

Fresno Men Receive Increase of Two Cents an Hour

Trainmen of the Fresno Traction Company, Fresno, Calif., received a pay increase of 2 cents an hour effective April 16. The new scale is as follows: First year men, 49 cents an hour; second year men, 50 cents; third year men, 51 cents, and fourth year men, 53 cents an hour. Men operating one-man cars will receive 4 cents an hour in addition to the above scale. The average working day is 9½ hours.

Mayor Against Michigan Measure Defining Joint Operating Rights

The so-called Lee bill was introduced recently into the Michigan State Legislature by Representative Lee. The purpose of the bill is to give the State Public Utilities Commission power to order electric railways to connect their tracks physically for joint use and to confer upon the commission the power to determine the rental to be charged each of two railways for the right to operate over the tracks of the other.

The Mayor of Detroit and Corporation Counsel Wilcox say the bill is the first step in a movement to take away from the city of Detroit the right to control its streets with respect to the operation of the cars of the municipal railway system as provided by the state home rule act.

Mayor Doremus regards the measure as endangering the work of the board of arbitration recently appointed by the Detroit United Railway and the city of Detroit to fix the rentals that the city shall charge the Detroit United Railway for the privilege of operating interurban cars into the city of Detroit over the lines of the municipal railway. This board is reported as practically ready to render its decision.

It is argued in favor of the bill that if Detroit bars the D.U.R. interurban cars from entering the city, the people of Port Huron and other Michigan cities traveling to Detroit by interurban would have to transfer to city cars at the Detroit city limits.

The opposition to the bill points out, on the other hand, that the question of barring the D.U.R. interurbans from the streets of Detroit was voted down by a large majority when the question was recently submitted to a referendum of the people of Detroit.

Canal Abandonment Plans Advance Another Step

The long talked-of scheme of using the bed of the old Morris Canal for a high-speed electric railway line connecting Newark, N. J. and suburban communities, was advanced another step recently when Governor Silzer named five men to the committee which will study the problem.

The men selected by the Governor are C. C. Vermeule, who was for many years topographical and consulting engineer for the State Geological Survey; E. D. Duffield, president of the Prudential Insurance Company; S. P. Leeds of Atlantic City; A. W. Drake of the American Telephone & Telegraph Company, and W. O. Morgan. The latter is well known in the electric railway industry, having been in turn connected with the Greensboro (N. C.) Electric Company, the Sheboygan (Wis.) Railway & Electric Company, the Empire United Railways of Syracuse, N. Y., and the Buffalo, Lockport & Rochester Railway. Other members of the committee are to be selected by various municipalities through which the canal passes.

No definite plans have yet been agreed upon for the use of the canal as an electric line. In a statement made a few days ago T. N. McCarter, president of Public Service Railway, said that his company would be interested in using a portion of the old waterway for rapid transit purposes. The part that would be so used, however, is comparatively short and would have more the character of a subway in the city of Newark than an interurban line.

At the same time the plan to change the location of the Hudson & Manhattan Railroad station in Newark has again been brought forward. It is proposed to extend the railroad underground to a point opposite the Public Service Terminal and establish a direct connection with the lower level of that structure. Many of the passengers desiring to change from the tube trains to street cars would then transfer without going out of doors. The plan now talked of is essentially the same one that was proposed some years ago, but abandoned on account of the war.

London Underground Officials Visit United States

J. C. Mitchell, secretary and treasurer of the London Underground System; A. Rozier, superintendent of rolling stock of the London General Omnibus Company; E. Boys, secretary of the London Suburban Traction Company, and Ivor Fraser, publicity manager of the London Underground System, are on a visit to the United States. They arrived on May 4 on the *Mauretania* and expect to return on the *Aquitania* on June 12.

They plan to study railway problems and transportation by bus, and started on May 9 on a tour of cities in the East and the Middle West which will include in the order named Albany, Montreal, Toronto, Buffalo, Cleveland, Detroit, Chicago, St. Louis, Cincinnati, Pittsburgh, Washington, Baltimore and Philadelphia. They expect to return to New York about May 30 and will then spend a week studying conditions in and around New York.

It is under Mr. Fraser's direction that the excellent work in bettering public relations in London has been done for the so-called Underground group, reference to which has been made many times in the ELECTRIC RAILWAY JOURNAL. This work, it will be recalled, has included the advertising of the lines, one of the most important features of which has been the use of posters reproduced from time to time in these pages. Mr. Fraser's principal object is to learn all that he can in the short time at his disposal about the relations of the railways with the public. He has expressed very keen interest in the work of the State committees on public utility information. The other gentlemen in the party will concentrate on the particular phases of railway work in which they specialize. In speaking of bus operation in London Mr. Fraser said that the remarkable fact was that there seemed to be no limit to the bus patronage. No sooner were additional buses installed than their capacity was almost immediately exceeded. He said there appeared to be no saturation point in sight. On his program is included a stop over at Atlantic City to attend the sessions at the convention of the Associated Advertising Clubs of the World.

News Notes

Ten-Cent Increase for Cedar Rapids Men.—Effective May 1, a wage increase of 10 cents an hour was granted to all employees of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa. This makes the maximum for men with six months service 50 cents an hour. The increase affects all employees in Cedar Rapids, Marion and Kenwood Park.

Serious Accident on Cuban Road.—Twenty-five persons are reported to have been killed and more than fifty injured in a head-on collision on May 6, between Hershey Electric Railway trains near Camasi, Province of Matanzas. The trains were rounding a curve at high speed when they crashed. Fire started immediately in the wreckage and a number of the victims were burned to death in the blazing coaches.

Tacoma Sued on Account of Municipal Railway.—The United States government has filed suit in the Federal Court at Tacoma, Wash., against the city of Tacoma for $232,398, alleged to be due the United States Shipping Board for extensions and improvements on the Municipal Street Railway during the war. The suit, which is a bill in equity, follows a demand of Mayor A. V. Fawcett that the government either cancel the debt or determine its status in court.

Wage Advance in Sioux City.—Employees of the Sioux City Gas & Electric Company, Sioux City, Iowa, have accepted the proposal of the company for an increase of approximately 7 per cent in wages. The new scale went into effect on May 1. Under the new agreement first-year men receive 45 cents an hour, second-year men 47 cents an hour and third-year men and over 50 cents. This is an increase from the present scale of 42, 44 and 48 cents an hour. The men demanded a 20 per cent increase.

Bill Ousting Commission Killed.—Senate Bill No. 23, introduced by Senator Bender of Cleveland in the General Assembly, calling for the abolition of the State Public Utilities Commission, was, on Mr. Bender's own motion, killed in the Senate utilities committee recently. Not an individual in the entire state of Ohio came to support the bill, while investment bankers, chambers of commerce and other organizations of business men flooded the committee with their protests against it. Consequently Mr. Bender made a motion to postpone the bill indefinitely.

Financial and Corporate

$316,423,557 P. R. T. Value

Figures Revised as of May 1, 1923, Were Submitted to Commission at Hearing on May 4

Valuation proceedings were conducted on May 4 before Commissioner Clement of the Pennsylvania Board. E. D. Booker, of Philadelphia Rapid Transit counsel, conducted the cross-examination of W. K. Myers, vice-president in charge of finance, and A. E. Hibner, valuation engineer.

The company at the same time submitted to the Public Service Commission a new figure on the valuation of its property, bringing the June 30, 1919, valuation up to date in restating that valuation as of May 1, 1923, at $316,423,557.

The company's valuation engineer, A. E. Hibner, testified that he made an investigation of the trend of prices since the June 30, 1919, valuation, and obtained a reproduction cost of the P. R. T. property as of May 1, 1923, including all overheads of $316,423,557.

Mr. Hibner explained the difference between the trend of prices shown by the company's price curve and that prepared by the city's expert, Robert M. Feustel. According to Mr. Hibner, Mr. Feustel's trend is composed largely of the all-commodities index prepared by the U. S. Bureau of Labor, and consequently reflects the abnormally low prices that have prevailed in the last three years for farm products. He explained that the prices of manufactured products such as power plant and substation equipment and cars are not reflected in the all-commodities index. He testified that there were other inaccuracies in the figures of the city's expert, among which was the price of structural steel erected for the first quarter of 1922, which Mr. Feustel based upon a price of $55 per ton. The company's expert explained that this was the price prevailing prior to the war and that he obtained a price of $70 per ton from the books of a large local structural steel fabricator.

The company's valuation engineer also considered as inaccurate the city's trend figure of 52 per cent for lumber, as the price quoted by the Lumbermen's Service Bureau of Philadelphia for the first quarter of 1922 showed that the average price of four sizes of yellow pine lumber was 77 per cent as at June 30, 1919.

The low price used for structural steel erected and for lumber, together with the low rate given to labor, resulted in the city's trend of the cost on buildings being low.

A reappraisal of the company's land by J. A. Patterson, William Levis and Edwin C. Hunter, the company's real estate experts, showed the right-of-way to have a value at May 1, 1923, of $2,326,334 compared with the June 30, 1919, appraisal of $2,021,242, and other land used in electric railway service to have a value of $8,371,458 compared with the June 30, 1919, appraisal of $6,179,074.

On the same day the railway submitted to the commission through its vice-president of finance, W. K. Myers, its budget of estimated financial results from operation for the year 1923 compared with 1922 actual.

The passenger revenue for 1923 is estimated at $44,000,000 as compared with $41,759,000 actual for 1922. This is an increase of 5.37 per cent.

Mr. Myers stated that the estimate of passenger revenue is based on a careful study of statistics relating to the normal annual increase in passengers during the last twenty years, and the general economic condition in the latter part of 1922, as compared with the beginning of the year.

The renewal and depreciation reserve appropriation is stated at $8,560,400. The same sum was appropriated for the years 1921 and 1922. The estimated expenditures for the renewal and depreciation reserve is stated at $8,835,500. The balance in the renewal and depreciation reserve as of Dec. 31, 1922, was $4,737,993; the estimated balance in the reserve at Dec. 31, 1923, is stated at $4,462,893.

In explaining the estimated cost of extensions and betterments for the year 1923, Mr. Myers stated that he only included such construction as the company felt sure would be completed during the year. No estimate was included for the major portion of the crosstown lines, the proposed bus line on Roosevelt Boulevard and Broad Street, the trackless trolley on Oregon Avenue or the Southern carhouse.

Mr. Myers said: "While the company hopes to get started on all of these improvements during the year 1923, we as yet have no definite assurance that we can do so, and for that reason I have not included their estimated costs in this tabulation."

$109,468 Surplus for Toronto

Transportation Commission Makes Public Results of First Sixteen Months of Municipal Operation

H. H. COUZENS, general manager of the Toronto Transportation Commission, on April 17 sent to the board of control and the City Council of Toronto, Ont., a statement of the accounts showing the result of the first sixteen months of the commission's operation of the lines formerly embraced in the system of the Toronto Railway. The period covered is from Sept. 1, 1921, to Dec. 31, 1922. The statement is not intended to be a railway operating report, but was prepared in order to reply to points raised by the City Council.

The gross revenue for the sixteen months of operation amounted to $15,723,482. The expenses of operation, including the cost of electrical energy, totaled $10,968,614, leaving net income of $4,754,867. Interest on and redemption of debt, together with depreciation, absorbed $3,493,610. Reserves for unredeemed tickets, workmen's compensation and public liability were $575,000. Reserves for contingencies were $437,569. Organization expenses were $139,218. Thus there was left a surplus of $109,468 for the period under review.

PASSENGERS CARRIED AND FARES

During the period under review 249,015,476 passengers were carried. The average rate of fare (based on the tickets sold and cash fares), equalled 6.165 cents. Traffic was adversely affected until the fall of 1922 by the rehabilitation work under way, and the consequent disorganization of the service. Since then, however, there has been a marked increased in the number of revenue passengers carried. This is shown by the following figures for the four months ended Dec. 31, 1921, and 1922:

1921	1922	Increase (1922 over 1921)
61,870,213	65,447,506	3,577,293

Mr. Couzens says that this improvement has been maintained to date.

An analysis of the component items of the cost, expressed as fractions of the average fare, is as follows:

	Per Passenger, Cents	Per Cent
Maintenance of trackwork including overhead and buildings	0.290	= 4.62
Maintenance of equipment	0.628	=10.01
Cost of power	0.602	= 9.61
Conducting transportation (i.e., the expenses of operating the cars) excluding maintenance	2.499	=39.85
General and miscellaneous expenses	0.386	= 6.15
Interest on and redemption of capital and depreciation	1.403	=22.38
Reserves	0.406	= 6.49
Organization expenses	0.056	= .89
Total	6.270	=100

The difference between the total cost of 6.27 cents and the average fare paid per revenue passenger, 6.165 cents, represents the sundry revenue from sources other than those obtained from passengers.

Mr. Couzens explains that before the work of rehabilitation was commenced, it was estimated that at least three years would be required to rehabilitate the property and bring the service to

TORONTO TRANSPORTATION COMMISSION REVENUE ACCOUNT FOR THE SIXTEEN MONTHS ENDED DEC. 31, 1922.

SECTION I—SHOWING NET INCOME FROM OPERATIONS

EXPENDITURE

Cost of electric current including operation and maintenance of substations	$1,499,606
Expenses of operation, maintenance, repairs, administration and taxes, including accrued charges	9,469,009
Net income available for fixed charges, carried to Section II	4,754,867
	$15,723,482

SECTION II—SHOWING DISPOSITION OF NET INCOME

Interest	$2,588,181	
Less: Interest on idle funds	532,506	
		$2,055,676
Redemption of debenture debt (repayment of capital)		425,108
Depreciation		1,012,828
Organization expenses		139,218
Reserve for unredeemed tickets		175,000
Reserve for workmen's compensation and public liability		400,000
Reserve for contingencies		437,569
Net income carried to surplus account		109,468
		$4,754,867

standard, but that while little more than one-half of this period has gone, the progress made has been such that, provided no unforeseen circumstances arise, the work will probably be substantially completed this year.

The principal work done to the end of the year 1922 includes the following:

TRACKWORK

Extensions	40 miles
Total rehabilitation	49 miles
Repaired and welded	31 miles

NEW ROLLING STOCK

The following were delivered as at the end of 1922:

Cars	262
Buses (gasoline)	eight double deck three single deck
Trolley buses	four single deck

It is explained that the gasoline and trolley bus services were started partly as an experiment in order to see what the result would be under climatic conditions peculiar to Toronto and in order to give service in districts which could not be properly served by street cars at present. According to Mr. Couzens the results have justified expectations, and "while not in our opinion the most economical and suitable for mass transportation purposes, buses will, we are confident, fill a useful place in the general plan of transportation."

One complete carhouse and yard at Eglington, two large extensions of carhouses and yards, one at St. Clair and the other at Danforth, and one yard extension at Russell have all been constructed.

Mr. Couzens says that pending the conclusion of the hearing of the appeal against the decision of the majority of the arbitrators in the Toronto Railway purchase case it is perhaps not desirable to go into details of the award, but that the amount of the award is very greatly in excess of the value of the assets transferred to the commission for incorporation in the unified system.

In discussing the question of fares Mr. Couzens says that the figures show that the results do not justify a fare reduction. On this point he says in part:

As has been pointed out, the average fare on the system is 6.165 cents per passenger. When considering the question of fares and comparing them with those previously in force, the following obvious facts are often overlooked:

1. The area served by the commission with one fare is practically 35 square miles as against 17 in the case of the Toronto Railway, i.e., more than double the area.

2. Prior to the date when the service was unified, there were four systems operating in the city (each with a separate fare) as follows: Toronto Railway; Toronto & York Radials, three separate divisions, each charging a separate fare; Toronto Civic Railway, four divisions, each charging a separate fare; Toronto Suburban Railway.

Thus a passenger, other than those riding in the central section of the city, was required to pay more than one fare, with the additional inconvenience of transferring from one system to another.

In the case of all of the foregoing, excepting the Toronto Suburban, service is now given at a single fare over the whole of these lines as well as over the extensions laid by the commission. In the case of the Toronto Suburban Railway, however, service in most of the area is given, to a great extent by the commission's buses in West Toronto, and in most of the remaining area by street car lines operated by the commission.

It is, therefore, clear that many passengers today are carried at practically the same rate of fare as formerly, and have a service already substantially improved which will be still further improved when rehabilitation is completed and the new system operating at maximum efficiency.

With a universal fare every extension added to the system increases the cost without a corresponding increase in the revenue, as it means carrying the passengers a greater distance for the same fare. The extensions made were necessary, however, in order to give the service to which car users were already entitled.

An analysis of fares in 607 cities on this continent shows that fares range from 5 to 10 cents. Of this total more than 40 per cent are higher than in Toronto at present, and more than 30 per cent are the same as in Toronto. It will, therefore, be seen that more than 70 per cent of all these cities are paying as high or a higher rate than Toronto, yet in all cases they have the advantage of systems constructed in pre-war days, the majority having the benefit of the much lower cost of materials which obtain at any time in the United States, and at the same time the vast majority paying lower wages than in Toronto.

In some cases with systems constructed at low pre-war prices and paying lower wages, the 5-cent fare is in force. In Toronto, with a large arbitration award, a rebuilding program which had of necessity to be carried out at times when prices are high, a system that cannot be efficiently and economically operated until rehabilitation is completed, it is obvious that a higher fare is necessary.

As a direct illustration Mr. Couzens points to the case of the Montreal Tramways. He says that here is a long-established and well-organized enterprise, operated efficiently, but that the fare is the same as in Toronto, while the trainman's rate of wage in Toronto is 25 per cent higher than in Montreal, and in other grades the difference is even more marked.

In considering these accounts, Mr. Couzens says it must be borne in mind that the figures are of necessity in some particulars approximate only, due to the following:

1. Provision has been made for the amount of the award as issued by the majority of the arbitration board which was formed to determine the price to be paid by the city for the property of the Toronto Railway. There is also included interest on the amount of the award as from Sept. 1, 1921. The city has lodged an appeal, the final outcome of which has not been determined.

2. The figures included in the cost of electrical energy are tentative, as the accounts are subject to review based on the cost of power supplied by the Hydro-Electric Power Commission of Ontario through the Toronto-Niagara Power Company and the Toronto Hydro-Electric System.

3. The figures are not yet available covering the operation of the city section of the Metropolitan Division of the Toronto & York Radials from the date on which the "Clean-up Deal" became effective, to the time when the T. T. C. commenced to operate from Farnham Avenue to the North City limits on Yonge Street.

The provision for depreciation cannot be finally determined pending the settlement of the appeal in connection with the arbitrators' award. After the amount of the award is finally settled, the same must be divided into sub-totals covering the various groups of assets which have different years of useful life.

There are other items yet to be adjusted which are correlated and cannot yet be finally determined.

With respect to these matters Mr. Couzens says that in the interest of sound finance adequate provision has been made in the accounts to cover all reasonable contingencies in respect to the matters still subject to possible adjustment.

Injunction Invoked in St. John

The New Brunswick Power Company is seeking an injunction against the building of a competitive power distribution system in St. John. According to the *Financial Post*, Toronto, E. N. Sanderson has presented a new offer to the City Council to sell the common stock of the company to the city for $305,000. This offer was summarily refused.

Despite the fact that two of the city commissioners admit the building of a duplicate system is unwise, preparations for the construction of the system have been resumed. The Mayor says he has a mandate from the people to go through with the construction of the duplicate power distribution system.

Mr. Sanderson, who is president of the Federal Light & Traction Company, has offered to distribute the hydro-electric current from the Musquash provincial station for two years at stipulated rates. This offer, like over a dozen others, has been rejected.

Oakland Terminal Lines to Be Sold

On application of the Mercantile Trust Company and the Union Trust Company, San Francisco, Calif., Judge James G. Quinn at Oakland has entered a decree of foreclosure against the San Francisco-Oakland Terminal Railways and has appointed Joseph P. Lanktree, 500 Broadway, Oakland, commissioner to conduct the sale of the properties. The trust companies were acting in behalf of the holders of securities of the company on which interest has been in default since 1919. It is expected that the properties will be bought in by the representatives of the committee of the bondholders.

Critical Period Ahead

San Francisco Non-Partisan Citizens' Agency Concerned for Future Municipal Railway

In the analysis of the finances of the San Francisco Municipal Railway, the San Francisco bureau of governmental research in its monthly publication, the *City*, said in the January, 1922, issue that "the critical period in Municipal Railway affairs is to come, with the supervisors contemplating, and committed in part to, a $1,600,000 expenditure program out of the depreciation fund, which will leave nothing for depreciation purposes."

$2,115,000 OF WORK ORDERED

Since that time various extensions and construction work, as well as bus lines, have been recommended, and the supervisors have ordered work requiring an expenditure of at least $2,115,000.

An analysis published in the February, 1923, issue of the *City* contains the following:

The capital expenditures involved in the extensions the supervisors have embarked upon, including equipment, total $1,165,000. An additional $200,000 is required immediately, according to the city engineer, for an addition to the Potrero barn, and for the city's share of track repairs on lower Market Street. Further, the city engineer states that an additional $750,000 must be provided for a shop and barn, including land for same, if the Sunset and Ocean View extensions are built and operated.

The total unencumbered balance in the depreciation fund to cover these proposed expenditures, which total $2,115,000, is $1,105,000. Although the gross set aside in the depreciation fund is averaging $45,000 per month, or $540,000 per year, the future net accumulation to the fund will probably not exceed $290,000 per year. Taking account of the $1,000,000 minimum depreciation reserve recommended by the city engineer, the program embarked upon by the board is approximately $2,009,000 in excess of the present available depreciation fund balance.

In the opinion of the bureau the depreciation reserve is being erroneously considered, first, as a gross amount set aside instead of the net amount actually available, and, second, as a surplus fund available for expenditures for any desirable project. The depreciation fund is not a surplus fund, and was purposely set apart from surplus funds to avoid this very confusion. The surpluses from operations, which have totaled over $2,900,000 for the period 1913-1922 inclusive, have practically all been expended, approximately $1,560,000 of such expenditures being for additions and betterments and advances to the city's general fund on account of Twin Peaks and Stockton Street tunnel costs.

A proper charge to cover depreciation is in exactly the same category as any operating charge. Expenditures required for depreciation, however, are cumulative and deferred; the replacement and renewals to offset depreciation and obsolescence are not required until original units of plant or equipment reach the end of their economical service. When such time comes the burden of replacement or renewal is usually too great to be borne out of the then current operating revenues of the property; if the funds have not been set aside as the depreciation has accrued, it may be difficult and costly, or even impossible, to provide such funds.

Following publication of the annual report of the Municipal Railway for the year ended June 30, 1922 (abstracted in ELECTRIC RAILWAY JOURNAL, March 3, 1923, page 384) the *City* contained further reference to the subject of depreciation:

The depreciation reserve is also of interest, from the standpoint of continued financial integrity of the system. The $1,603,000 reserve as of June 30 was probably no larger than actually required for accrued depreciation of the property. As shown by the income account, a gross of $3,463,774 (18 per cent of gross revenues) has been set up in the depreciation reserve since the start of operations in 1912. The disposition of this amount is not shown in the printed financial statement, but it is estimated, using approximations, that $1,100,000 has been used for bond redemption, $250,000 for accident claims, $450,000 for wage increases and $210,000, net, for additions, betterments, advances, etc. The June 30 balance has been reduced, as of Jan. 31, to less than $1,150,000; the next balance sheet will record an important shrinkage in this item.

The statements show that all surpluses of the earlier profitable years have been expended, and that part of the depreciation reserve has been diverted to operating and additions. The universal policy of retaining part of surplus as "insurance" against future emergencies and losing years has not been followed. On the other hand, with the surpluses expended, there is a continually strong pressure to disburse the balances remaining in the depreciation reserve for additional extensions.

First Surplus Since Service-at-Cost Became Effective

The growth of population and general business development are reflected in the annual report of the Memphis (Tenn.) Street Railway for 1922, just turned over to Commissioner Horace Johnson by T. H. Tutwiler, receiver. For the first time since the company has been operating on its cost-of-service plan, approved by the Public Utilities Commission, its report shows a surplus for the past year above cost of operation and the 6½ per cent allowed the stockholders on their investment. The surplus amounted to $63,675 and cut the deficit of $200,771, piled up prior to January, 1922, to $137,096.

The entire revenue of the company from all sources amounted to $3,153,195. The cost of service during this time was $3,098,519. This included the expenditures for maintenance, operation, taxes, renewal and reserve fund, a return of $786,707 to the stockholders and $12,751 interest on the deficit. There were 44,481,903 passengers on all cars of the company during the past year, and a total of 7,618,914 car-miles were traversed.

Auction Sales in New York.—At the public auction rooms in New York on May 9 the following electric railway securities were sold: 202 shares Nova Scotia Tramways & Power Company, Ltd., ordinary shares, $15 per share; $5,000 Cleveland, Elyria & Western Railway extended 7 per cent certificates, 64⅜ per cent.

Another Brooklyn City Dividend.—The board of directors of the Brooklyn City Railroad on May 8 declared a regular quarterly dividend of 20 cents a share on the outstanding capital stock, payable on June 1, to stockholders of record at the close of business on May 19, 1923.

Road Sold to Representative of First Mortgage Bondholders.—The property of the Montgomery Transit Company has been sold to Nicholas Larzelere, Norristown, Pa., attorney for the bondholders, for $150,000, the amount of the first bond issue, of which the Norristown Trust Company is trustee. The sale was decreed on foreclosure proceedings. The line reaches Norristown by agreement with the Reading Traction Company, Reading, Pa. The road is about 12 miles long.

Debenture Bonds Offered.—Stroud & Company, Inc., Otis & Company, Howe, Snow & Bertles, Inc., and R. E. Wilsey & Company are offering a new issue of $1,500,000 Tide Water Power Company, Wilmington, N. C., fifteen-year 7 per cent sinking fund gold debenture bonds due Oct. 1, 1937, at 97 and interest to yield over 7.30 per cent. The bonds are redeemable as a whole or in part at the option of the company on six weeks' notice up to and including Oct. 1, 1927, at 110 and accrued interest, the redemption price decreasing 1 per cent for each year thereafter. Earnings available for interest charges on the debenture bonds for the year ended June 30, 1922, were equal to over 3.8 times the annual requirements.

Receivership Said to Be Ahead of Interurban.—A receivership is threatened for the Oregon Electric Railway, operating into the heart of the Willamette Valley from Portland, Ore., because of the apparent inability of the company to meet the interest due on $2,000,000 of bonds. The company has sixty days grace, but no promise of payment has been made. W. E. Turner, president, states that the company is unable to pay the interest because of the unsatisfactory financial condition of the road. The interest is a semi-annual payment of $50,000. The plight of the road is directly traceable, it is claimed, to the competition of buses and automobile trucks and to the privately owned automobiles in use on the main-traveled highways of the county. The company recently placed in effect reduced fares, making the round-trip tickets from Portland to Salem 50 cents lower than heretofore. Even this reduction has failed materially to stimulate traffic.

Little Rock Bonds on 6.45 Per Cent Basis.—Harris, Forbes & Company, Bonbright & Company and Tucker, Anthony & Company, New York, N. Y., are offering at 94½ and interest, yielding about 6.45 per cent, $2,500,000 of Arkansas Central Power Company first lien and refunding mortgage gold bonds, due 1948. Issuance of the securities is subject to authorization by the Arkansas Railroad Commission. As stated in the ELECTRIC RAILWAY JOURNAL for May 5 the Arkansas Central Power Company, incorporated in April, 1923, has taken over the physical property formerly owned by Little Rock Railway & Electric Company, and now does the entire commercial electric power and light and street railway business in Little Rock, Ark., also providing all electricity commercially distributed, directly and indirectly, in North Little Rock. The bankers explain that the railway system has for many years produced substantial profits, but that the electric power and light business is steadily increasing, the relative importance of the latter being shown by the fact that more than two-thirds of the net earnings for the twelve months ended Feb. 28, 1923, were derived from the sale of electricity.

Traffic and Transportation

Sorry Situation in Youngstown

Street Railway Commissioner So Describes Failure of Public to Respond to New Fare Plan

Harry Engle, street railway commissioner at Youngstown, Ohio, is visibly disappointed at the way things have been going in Youngstown since the sale of the weekly pass was discontinued. The change in fares has not had the stimulating effect on traffic which Mr. Engle anticipated. He wants the public to have the facts so that "they will not be surprised when it shortly becomes necessary to inaugurate a higher rate of fare."

It will be recalled that the sale of the weekly pass good over the lines of the Youngstown Municipal Railway was discontinued on April 1. The new rate of fare adopted for a trial period was 7 cents cash, three tickets for 20 cents, and 1 cent for a transfer. The rate previously in effect was 9 cents cash, six tickets for 50 cents, 1 cent for a transfer and an unlimited ride weekly pass for $1.25.

According to Mr. Engle's estimate the operation of the line in April will show a net deficit of $28,000. He sees an 8-cent fare ahead. Mr. Engle's lament at the way things are going is, perhaps, best expressed in his own words. In a letter to the Council on May 2 he said:

> You will recall that the present fare scheme was adopted on the basis of an eight weeks' trial. Without figuring too closely I have rather assumed that it was a two months' trial, involving the months of April and May. You will further recall that the resolution adopting the present fare scheme provided that if it were not successful, the company at the end of the trial period should have the right to adopt a new rate of fare, to wit: seven tickets for 50 cents, 8 cents cash and 1 cent for a transfer.
>
> Detailed figures for the operation during April will not be available for many days, but it is now possible to make an estimate of the situation which will be quite accurate. My estimate of the gross earnings for the month of April is $129,000. My estimate of the total car-miles operated for the month is 392,760, and on the basis of an operating cost of 40 cents a mile, it is reasonable to assume that the total cost of the operation of the property for the month of April will be about $157,100. It thus appears that the operation of the cars during April will show a net deficit of about $28,000.
>
> I am very sorry that people generally have not more thoroughly appreciated the reduction of car fare which was provided for them. We all know that the new rate of fare was a reduction and that the application of this fare would have a tendency to decrease our income, but I also know that we all felt that the reduction of fare to our car riders would have the happy effect of stimulating the car riding habit to a point where an increased number of patrons would make up for the decrease in the revenue.
>
> It thus becomes readily apparent that the present fare scheme is not a success and it is inevitable, therefore, that an increase of car fare will follow on June 1. This is a very sorry situation, but the people are bringing it upon themselves. If people will not take advantage of the service which we are providing for them, it can have no other effect than that of increasing the car fare for those who ride on the cars.
>
> I shall bring this situation to the attention of Council on next Monday night, but I thought the members of your committee should be apprised of the situation first. Further, I am sincerely of the opinion that the public should be told the facts of the situation, so that they will not be surprised when it shortly becomes necessary to inaugurate a higher rate of fare.

At the Council meeting on May 8 consideration of the matter was put over.

De Luxe Bus Service Started in Milwaukee

De luxe motor bus service was started in Milwaukee, Wis., on May 2 by the Wisconsin Motor Bus Lines, a subsidiary of the Milwaukee Electric Railway & Light Company. The company placed in operation on that date ten twenty-five-passenger, single-deck, type "J" Fifth Avenue coaches and one fifty-two-passenger, double-deck, type "L" Fifth Avenue coach. Announcement was made at the same time that nine additional double-deck buses now on order with the Fifth Avenue Coach Company are expected very shortly and will be placed in service as quickly as received, replacing or supplementing the single-deck buses. The route chosen follows some of the finest streets in Milwaukee, tapping the exclusive east and west side residential districts and passing along Lake Michigan and through the downtown business district.

Montreal to Study Service Improvement

The Montreal Tramways Commission has instituted studies of ways and means to meet the traffic revival which has taken place in Montreal during recent months. J. Rowland Bibbins, consulting engineer, Washington, D. C., has been retained by the commission to supervise these studies and subsequently to recommend proposed plans of service betterment.

Montreal is moving rapidly into a city of the million-population class with relatively short haul, resulting from dense settlement. While the riding habit had temporarily declined, it is again on the increase in spite of the increasing use of automobiles, which have multiplied five times in six years.

The plan of the city has tended to heavy traffic concentration on a few main streets, most of them narrow, with the result that, for a city of this size, the transit system is operating with unusual density and concentration of loading. Moreover, Montreal has to struggle in winter with excessive snowfall and in summer with a great volume of transient motor traffic during the vacation months. These circumstances have produced traffic conditions of growing severity, requiring more effective methods of relief in the future.

Eight-Cent Fare Asked

Buffalo Company Sees Increase as Only Way Out of Present Intolerable Condition

The International Railway, Buffalo, N. Y., has applied to the Public Service Commission for permission to increase its rate of fare on the city lines from 7 cents, or four tokens for 25 cents, to 8 cents, or four tokens for 30 cents. In a letter addressed to the City Council Herbert G. Tulley, president of the company, explains that the increase has been made necessary because of losses totalling more than $5,000,000 sustained since the start of the strike of platform employees on June 1, 1922.

President Tulley says that the strike would not have occurred except for the assurance given to the men by Mayor Frank X. Schwab that they would win. Even at the present time the company is suffering a loss in gross revenues at the rate of more than $1,700,000 a year. The earnings thus lost would, if enjoyed by the company, be available to carry out paving desired by the municipal authorities.

It is pointed out that the International now pays 3 per cent of its gross earnings to the city of Buffalo for the right to carry passengers. Mr. Tulley charges that the Mayor continues to permit the illegal operation of jitneys, which, through the resulting loss in the company's gross earnings, decrease the city's own revenues more than $50,000 a year. Mr. Tulley says:

> The International has endeavored to cooperate to meet the city's service-at-cost views, but since the necessary legislation was not obtained, and the city still encourages jitney competition, the company, to avoid decreasing the service to a point of inconveniencing the public, is obliged to appeal to the Public Service Commission for relief.

Henry W. Killeen of counsel for the International said that the 8-cent fare asked by the company will be made part of the present fare proceedings now before the State Public Service Commission. The City Council already has petitioned the commission for the restoration of the 5-cent fare in Buffalo and in connection with these proceedings the commission has been taking testimony at a series of hearings in Buffalo on the value of the physical properties of the International. The company places a valuation of $96,000,000 on its properties within the city of Buffalo.

Competitive Bus Routes Not Permitted

Applications for certificates of convenience and necessity for the operation of bus lines in the city of Buffalo, N. Y., have been denied by the Public Service Commission. The applications denied were those made by the Buffalo Jitney Owners' Association, the Motor Bus Drivers' Union and Ernest K. Jaggard. In its decision denying the applications for permits to operate buses in Buffalo, the commission holds that all the twenty-one lines or routes, if operated.

would be in competition with existing lines of the International Railway. Under such conditions, the commission says it cannot grant the necessary certificates.

"The principal purpose of the Legislature in requiring certificates of public convenience and necessity was to prevent just such ruinous competition as would exist in this case," says the report of the commission. The memorandum then cites various decisions to substantiate this view.

It also is set forth in the report of the commission that the petitioners "have no funds with which to finance the enterprise and have no definite plans for procuring such funds."

Railway to Seek Bus Rights at Once

Early action is planned by the New York State Railways in the matter of the installation of an auxiliary bus line to tap recently built-up sections on Rochester's west side. After a recent inspection of the proposed route by railway and city officials and residents of the section through which the line will run, the railway announced its intention to apply to the City Council on May 8 for permission to operate.

The tentative route extends from Genesee Street through Genesee Park Boulevard to Chili Avenue to Garfield Street to West Avenue, there connecting with the Main Street West car line. An extension of this line from West Avenue through the new subway to Gates Center via the Buffalo road is under consideration. Application for permission to proceed with this extension will be made to the Gates Center town authorities when the route is finally decided upon.

Four or five buses will be required for the proposed line, according to James F. Hamilton, president of the railway. All bus operations of the company will be conducted by the Rochester Co-ordinated Bus Lines, Inc., a recently organized subsidiary.

The Common Council is expected to act favorably upon the grant of an ordinance for Dewey Avenue bus operations by the company when the matter comes up. No opposition to the plan was expressed at a recent hearing. This line is an extension of the Dewey Avenue trolley line and will operate to Britton Road in the town of Greece. The town board has already granted the necessary permission. A future extension of the line to Latta Road in Greece is planned, the railway already having a franchise for this extension.

The current fare, 7 cents cash or 6½ cents by ticket, with transfers to trolleys, will be charged within the city limits. Outside the city a 3-cent fare will be in effect.

The bus lines contemplated by the company are part of the railway's plan to provide adequate service for the rapidly growing residential sections of the city and suburbs by the use of buses as an adjunct to its railway service.

Weekly Pass Used to Welcome Shriners at Washington

One of the features of the safety-paper weekly passes of the Washington-Virginia Railway is the use of a different timely symbol surprinted on the face in red. The Shriners' convention to be held at Washington in June, therefore, enables the railway to pay a compliment to the visitors by printing their famous star and crescent on the pass which will be valid during the week of June 4-June 10. The back of the pass will also be used to advantage for a statement of some of the many famous places along the lines of the Washington-Virginia Railway. The pass is sold at $1.60, which is the cost of only four round trips between Washington and Alexandria. In consequence the pass will be a good proposition for almost any visitor who wishes to take several trips on the Mount Vernon division and then transfer his privilege to someone else.

Residents Must Accept Consequences of Abandonment

Communities where the residents desert the interurban railways and patronize motor buses to such an extent that the interurban is operated at a loss need not appeal to Ohio courts to compel the electric line to continue operating at a loss. It will do them no good. Chief Justice C. T. Marshall of the Ohio Supreme Court so ruled in an opinion handed down on May 3. This opinion was shared by six of the seven other judges, who voted to uphold the Public Utilities Commission in refusing to order the receiver of the Indiana, Columbus & Eastern Traction Company to continue operation of cars over a 12-mile stretch between Columbus and Grove City.

Another Railway Wants to Substitute Buses

The Pennsylvania-Ohio Electric Company wants to discontinue railway service in Mahoningtown and substitute a bus line in its place. To this end it has made a proposition to the Mayor and the City Council.

For several years one of the chief matters of discussion between the company and the Council has been the service to the important industrial district of New Castle known as Mahoningtown. This is the heaviest traffic line in New Castle, but service has been indifferent due in a large part to the condition of the tracks and to the large number of railroad crossings on the line. In fact, the condition of the track on Cedar Street is such that it will have to be renewed if railway service is to be continued. This renewal will cost in excess of $50,000. The company points out that manifestly it would be undesirable to expend this sum in renewing the track and paving on Cedar Street, practically all of which amount would be a direct maintenance charge against the operation of the line, unless it was decided permanently to continue service to Mahoningtown with street cars. It is further pointed out that even after such improvements have been made the delays to traffic now encountered at the railroad crossings will in no way be lessened.

In his plea to the Mayor and the Council to substitute buses for the trolley cars R. N. Graham, manager of railways of the company, said:

> Within the past few years the modern city bus has been developed to such an extent that it is a comfortable, speedy and dependable means of traffic. At the present time this company is operating four motor bus lines in the city of Youngstown, and I am perfectly safe in stating that this operation is giving the greatest satisfaction to the public and furnishes comfortable, speedy and convenient transportation to the different sections of the city which the buses serve.

Six-Cent Fare Privilege Extended.—Mayor Ainslie of Richmond, Va., has approved the ordinance passed previously by the City Council to extend the 6-cent fare privileges to the Virginia Railway & Power Company for a period of six months. The company has filed its official acceptance of the terms of the ordinance. The extension was granted upon the contingency of a settlement being reached between the city and the company upon the question of a blanket franchise. Within a month, it is believed, City Attorney Cannon will be prepared to advise the committee as to the rights and privileges of both the city and the company in the settlement of the problem.

Agreement Reached on Providence Loop Plan.—An eight-loop plan cutting all crosstown railway lines and looping them at Dorrance Street has been agreed upon by the members of the joint standing committee on railroads and representatives of the United Electric Railways, Providence, R. I. No definite time was fixed for the new arrangement to become effective, but it will be put into operation as soon as possible. Under the plan, all fares can be collected from the passenger upon entering the car on inbound trips and upon leaving the car on outbound runs. This particular feature, it is hoped, will greatly decrease delays in car traffic downtown.

Hattiesburg Joins Weekly Pass Brigade. — The Hattiesburg Traction Company, Hattiesburg, Miss., a Cities Service property, has joined the users of the unlimited-ride weekly pass. This makes almost twoscore weekly pass installations. The pass was started on April 23 at $1 against a one-zone fare of 5 cents and a two-zone fare of 8⅓ cents ticket and 10 cents cash. In addition to this encouragement to greater patronage, D. E. Byerly, general manager, advises that the rail is to be relaid on two lines and that the rolling stock will be spruced up to make the ride-selling campaign as effective as possible. The local press gave the plan a liberal send-off. Arrangements are also being made for co-operative publicity by merchants and railway. The pass was installed following an analysis of conditions by Walter Jackson.

Book Reviews

Engineering Economics—First Principles

By J. C. L. Fish, Professor of Railroad Engineering, Stanford University. Second Edition. McGraw-Hill Book Company, Inc., New York, N. Y.

Graduates of engineering colleges are criticised for their lack of knowledge of the economic side of their profession. There is warrant for this criticism, but not as much as formerly, because the technical schools, realizing the lack, have been improving their courses to include financial considerations. The field being comparatively new, the literature of economics with special relation to the need of engineering students is only in process of development. Here is where Professor Fish's book fits in, although this does not imply that its field is limited to the technical school. It would do no practicing engineer any harm to review the subject by reading this interesting, comprehensive and original book.

The above three adjectives have been chosen to characterize "Engineering Economics" for the following reasons: The treatment is interesting because it is logical, it relates its statements with illustrations drawn from the every-day life of the engineer, and its style is crisp and clear. In other words, the author leaves no doubt in the reader's mind as to what he intended to say.

The comprehensiveness of the text is suggested by the following partial list of topics: Analysis of problem of investment; interest; practical analysis of first cost; business units; business statistics; valuation; errors in estimating, and engineering reports. Supplementing the regular chapters are appendixes containing such things as sample articles of incorporation, tables of formulas and values for use in economic computation, questions and problems, and an extensive bibliography, sufficient to keep a studious engineer busy for a lifetime.

From the standpoint of originality, this book is striking in its typographical make-up, different type faces being used to emphasize the definitions, illustrations, etc. Paragraphs are numbered so as to indicate the chapters in which they occur and the order in those chapters. For example, paragraph 1321 is the twenty-first paragraph in chapter 13. Similarly figures are numbered to correspond with the paragraphs in which they occur, and the order in which they occur in those paragraphs. For example, Fig. 1324b is the second figure given to illustrate Par. 1324. Formulas are numbered like figures, but the numbers are placed in parentheses to the right of the formulas.

Although the present book is a second edition, it is virtually a new work, based on the discovery, by the author, that the fundamental problem of engineering economics is choice of investment, and not choice of structure as he assumed in writing the earlier book. Starting, therefore, with the problem of the capitalist, large or small, who desires to place his money to the best advantage, the author shows step by step how all engineering economics is an application of sound investment principles.

Thermal Stresses in Steel Car Wheels

Technological Paper No. 235, United States Bureau of Standards. Copies obtainable from Superintendent of Documents, Government Printing Office, Washington, D. C.

An investigation of the stresses induced in steel car wheels from heating the tread has been carried out at the Bureau of Standards in a manner approximating severe service conditions. A large number of rolled, forged and cast steel wheels both new and worn were tested. In the tests the wheels were mounted on a hollow water-cooled axle and the treads were heated by passing an electric current through a soft steel resistor which encircled the wheels. The results of the investigation show how the wheels are deformed from high tread temperature, giving the magnitude and distribution of stresses throughout the wheels. The new data can be used to advantage in considering the question of proposed changes of design and manufacturing practice.

Preparation, Transportation and Combustion of Powdered Coal

Bulletin 217, Bureau of Mines. By John Blizard. Published through the courtesy of the Canadian Department of Mines by the United States Bureau of Mines, Washington, D. C.

The interest in the burning of pulverized fuel in power plants is of recent development, although it can hardly be said of recent origin. For the past two or three years, however, rapid progress has been made until today the subject is one of foremost importance in the power-plant design field. Mr. Blizard's treatise comes along just in time to be of great assistance in this field. It is as nearly up-to-date a compilation of present practice as could be expected, although if written today it would make a still more impressive showing for this method of firing boilers. It contains more than 125 pages of illustrations and text, mostly descriptive, and is fully indexed.

Year Book of American Engineering Standards Committee for 1923

Published by the committee, 29 West Thirty-ninth Street, New York City.

The 1923 year book of the A.E.S.C. points out that there are 205 national bodies co-operating in its work through officially accredited representatives. The number of national organizations on the main committee is now thirty-three. On sectional committees there are 917 individuals serving. The dues paid by the members of the main committee are not sufficient to support its work, and a new plan of sustaining memberships has been worked out. A total of 121 projects now have an official status before the committee, in twenty-six of which the American Electric Railway Association is co-operating.

The year book contains a detailed statement of the work of the committee to date, an outline of its purpose, organization, method of work, etc.; lists of the standards approved during 1922 and before the committee on Jan. 1, 1923 (forty-five in number); the constitution of the committee; a complete list of the standardization projects cross-indexed so as to indicate the co-operating organizations; a financial statement, and other items of interest.

Rate Making for Public Utilities

By Lamar Lyndon. McGraw-Hill Book Company, Inc., New York, N. Y. 201 pages.

This latest addition to the literature on rate making was written, according to the author, because none of the works published "seems to cover certain essential features, nor are the present treatises adapted for the reading of engineers, municipal authorities, bankers and business men, generally, who desire to be informed on this subject." These works only state that because of the opposing decisions of courts and commissions, "a conclusion is hardly to be reached on any but a few of the questions involved."

This book appears to give the author's interpretation of certain of the mooted questions of valuation. Many of his statements indicate unfamiliarity with ordinary financial practices. Operating and fixed charges frequently are confused in the text. The author favors original cost as a basis of value, in preference to the cost of reproduction. In the course of the text, several citations are given from commission and other decisions, none of which, however, is recent, nearly all being more than ten years old.

The treatment of depreciation, in general, is good, and is substantially in agreement with recent opinion. Many readers will disagree with the chapter on "Intangibles," as the author favors elimination of some items included in ordinary valuation work. In sharp contrast with the remainder of the book, which in general takes the non-utility point of view, is the theory advanced by the author of allowing the utility to capitalize operating losses. This is not confined to early losses during the building up of business, but advocates continuing this capitalization in all years when a profit is not earned.

Little space is given to the actual problems of rate making, and the few examples included are not conclusive. There is no general discussion of the various theories advanced for rate making.

While, for the sake of noting a different viewpoint, this book may be worth the reading by the experienced engineer or lawyer who is familiar with utility valuation and rate making problems, it lends itself but poorly to its stated purpose of informing the layman on these questions.

Personal Items

New International Vice-President

Mr. Mack Has Worked Up from Ranks —Oldest Official in Point of Years of Service

H. L. Mack, who has been elected vice-president in charge of engineering of the International Railway, Buffalo, N. Y., and a director of the company, has been associated with traction lines in Buffalo since 1890. The position to which Mr. Mack has been elected is a new one with the company. He will make his headquarters in the Littell Building, Buffalo.

Mr. Mack was born in Lawrenceburg, Ind., in 1865. He received his education in a rural school. His first job on a railroad was with the Big Four in 1881 as a section worker. A year later he held a similar position with the Cincinnati Southern. From 1888 to 1889 he was a lineman for the Western Union Telegraph Company on the Big Four. He next served with the Bell Telephone Company, Cincinnati, in a similar position from 1889 to 1890.

In 1890 Mr. Mack became a lineman for the Cincinnati (Ohio) Street Railway in charge of a line wagon. He held that position for two years, when he went to Buffalo to work for the old Buffalo Street Railway, which was taken over by the International Railway. Mr. Mack's first position with the traction lines in Buffalo was in charge of repair and maintenance of overhead lines.

Two years after entering the service of the company at Buffalo the maintenance and construction departments were consolidated, and Mr. Mack was made supervisor of the merged departments, which included conduits, cables, etc. In 1910 Mr. Mack had his jurisdiction extended to cover tracks and line and he has held that position ever since. With his promotion to the position of vice-president in charge of engineering, Mr. Mack will have complete supervision over all mechanical and electrical departments. In 1915 he took over the bridge and building departments.

During the thirty-three years that Mr. Mack has been associated with the traction lines in Buffalo, he has had a large part in the work of electrifying all the local and interurban lines of the company. When he went to Buffalo there were fewer than 90 miles of lines operated by electricity. Horse cars were still in use on the rest of the system. Now the International Railway has more than 475 miles of electrified lines. Mr. Mack had complete supervision over the construction of the new Buffalo-Niagara Falls high-speed interurban line and other building projects of the International Railway, including the new substation in North Division Street.

W. F. McDanel

W. F. McDanel Succeeds D. D. McMahon with Beaver Valley Company

W. F. McDanel has been appointed cashier of the Beaver Valley Traction Company, New Brighton, Pa., to succeed D. D. McMahon, resigned. Mr. McDanel was born in 1897 at New Brighton, Pa. He was graduated from the New Brighton public schools and then entered Washington & Jefferson College in 1916. He left college and enlisted in the United States Army Air Service in 1918, and served until January, 1919, when he was honorably discharged as lieutenant. From 1919 until November, 1920, he served in the traffic department of the Pittsburgh Railways. He was then employed as assistant dispatcher by the Beaver Valley Traction Company, in which position he served until May 1 of this year.

Mr. McMahon was born in Birkenhead, England, on April 23, 1890. He was educated at St. Wilfrid's College, North Staffordshire. Mr. McMahon entered the service of Lever Brothers, Port Sunlight, England, in 1918 as a clerk. He came to America in 1909. His first work for the Beaver Valley Traction Company was as a conductor. In 1911 he was promoted to cashier, in which position he served until 1915, when he was granted leave of absence to join the British army, which service he entered as a private. At the time of his discharge in 1920 he had been promoted to Captain of Infantry. Mr. McMahon was wounded twice during his term of service; the first wound, which was due to a piece of shell lodging in his neck, invalided him for more than ten months. In 1920 he resumed his duties with the Beaver Valley Traction Company, but resigned on May 1, 1923, to accept a position as outdoor supervisor for the Liverpool & North Wales Steamship Company, Liverpool, England.

D. D. McMahon

Alabama Public Service Commission Appoints Engineers

Announcement has been made of the signing of a contract, with the approval of Governor William W. Brandon of Alabama whereby I. F. McDonnell, consulting engineer for the Alabama Public Service Commission for several years, and C. VanDenberg, principal assistant to Mr. McDonnell, will devote their entire time to the work of the commission. The commission has announced the appointment of Conrad H. Ohme of Birmingham as inspector and supervisor attached to the department of engineering. Mr. Ohme has had wide experience as an engineer, having been engaged in civil, mining and supervising engineering for many years. He has devoted much time, it is stated, to the construction of water works, sewer systems and power plants, also streets and municipal public service plants. Among others he supervised the construction of the power dam for the Tallassee cotton mills.

Rawson Collier Joins Dwight P. Robinson & Company Staff

Rawson Collier, until recently general sales manager of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., has joined the organization of Dwight P. Robinson & Company, Inc., engineers and constructors, of New York.

Mr. Collier was for five years a member of the firm of Collier & Brown, consulting engineers, Atlanta, leaving this firm to become connected with the Georgia Railway & Electric Company. Here his work covered sixteen years, during which time he was connected with practically every department in the company. At the time of leaving he was general sales manager of the company. Mr. Collier was graduated from the Massachusetts Institute of Technology.

E. J. Nash is now acting superintendent and purchasing agent of the Butte (Mont.) Electric Railway. J. S. Wathey was formerly superintendent and purchasing agent.

Mr. Burke Made Manager at Keokuk

Walter H. Burke has been appointed to the position of manager of the Keokuk Electric Company, which does the railway, light and power and gas business in Keokuk, Iowa. The Keokuk company is under the general management of Stone & Webster, Inc., Boston, Mass., and Mr. Burke has been located in the home office of that organization for several years in connection with matters pertaining to the southwestern group of companies under Stone & Webster management.

Mr. Burke was graduated from the University of Maine with the class of 1906 and entered the employ of the General Electric Company. Following his service with that company, he held various operating positions as assistant to the manager of the street railway and light and power property at Dallas, Tex., and assistant general superintendent of light and power of the

W. H. Burke

Milwaukee Electric Railway & Light Company.

Mr. Burke is a member of the American Electric Railway Association and is active in the affairs of that association. He is also a member of the New England Street Railway Club and various other clubs, and has been a frequent contributor to the technical press, particularly on subjects pertaining to economic phases of the public utility industry.

H. B. Terrell succeeds W. E. Casey as claim agent of the Southwestern Gas & Electric Company, Texarkana, Ark.

T. P. Pinckard, who recently succeeded G. R. Cottrelle as president of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., has long been engaged in engineering and utility activities. He joined the forces of the Westinghouse Electric & Manufacturing Company in 1905 at its Baltimore sales office after completing the apprenticeship course at East Pittsburgh. In 1907 he secured a transfer to the Kansas City sales office of the company. Three years later he severed connections with the Westinghouse Company and became sales manager of the Peoria Gas & Electric Company, Peoria, Ill. Prior to assuming the presidency of the Windsor, Essex & Lake Shore Rapid Railway he was associated with the Burling Engineering & Construction Company, New York City, Windsor Gas Company and the Dominion Traction & Lighting Company.

Judge Parsons Appointed to New York Commission

Governor Smith shortly before the adjournment of the New York State Legislature transmitted to the Senate the nomination of James A. Parsons, Hornell, as public service commissioner to succeed Charles G. Blakeslee, Binghamton, whose term of office expired on Feb. 1, 1923. Judge Parsons served for a number of years as a Deputy Attorney-General, was executive counsel during a portion of Governor Smith's first term and occupied that position at the time of his appointment. The appointment was immediately confirmed. It is anticipated Judge Parsons will continue to act as counsel to the Governor until disposition has been made of the thirty-day bills, when he will assume the duties of his new office. The term of office of public service commissioner is ten years.

M. P. Randall is assistant treasurer of the Alabama Power Company, Birmingham, Ala. J. A. Shepherd, auditor, formerly performed the duties for both officerships. F. P. Cummings is now commercial manager instead of F. D. Mahoney.

Charles H. Bigelow, for the last ten years chief mechanical engineer for the Millville Manufacturing Company at Millville, N. J., has resigned to accept the position of plant engineer for the Spicer Manufacturing Corporation, South Plainfield, N. J., makers of universal joints and clutches for automobiles. Mr. Bigelow was formerly connected with the Boston Elevated Railway and was one of the original members of the American Electric Railway Engineering Association, in which he has always held his membership.

Leon C. Bradley of Birmingham has been made director of the Bureau of Public Utility Information of Alabama, according to the announcement of the committee. Mr. Bradley has been connected for a number of years with daily newspapers in Birmingham and Tuscaloosa. He was one of the founders of the Tuscaloosa *News* in 1910 and served as business manager and later as editor of that newspaper. At the time the United States entered the World War he was city editor of the Birmingham *Age-Herald*. For more than a year Mr. Bradley has been connected with the Alabama Polytechnic Institute, serving as publicity director in the Greater Auburn Campaign, and more recently as secretary and treasurer of the Auburn Alumni Association and as a member of the faculty of that institution.

T. J. Hanrahan has succeeded George H. Hunter as master mechanic of the Pacific Coast Railway, San Luis Obispo, Calif.

W. W. Trench, assistant secretary of the General Electric Company, has been appointed secretary of the various committees which will administer the Charles A. Coffin Foundation, a fund of $400,000 which has been created by the board of directors of the General Electric Company, the income from which, approximately $20,000 a year, is to be employed in making awards for meritorious service in the electrical field.

E. A. Bradner Heads New Mexico Association

E. A. Bradner was recently elected president of the New Mexico Public Utilities Association. Mr. Bradner has been identified with public service corporations for more than thirty years. Starting as an arc-light trimmer, he has held all intermediate positions up to that of manager, which office he now occupies with the Las Vegas Light & Power Company and the Las Vegas Transit Company For a number of years Mr. Bradner was chief engineer and superintendent of the Grays Harbor Railway & Light Company, Grays Harbor, Wash, and later became manager of the central station at Hobart, Okla., holding this position until 1919.

E. A. Bradner

E. A. Grove succeeds N. P. Hansen as roadmaster of the Grand River Valley Railway, Grand Junction, Col.

J. E. Hester, master mechanic of the Anderson shops of the Union Traction Company, has resigned to accept a position with the Indiana Public Service Company at Scottsburg, Ind. He will have charge of the shops at that place. Mr. Hester has been connected with the Union Traction Company, Anderson, Ind., in the mechanical department in various capacities since September, 1900. He has held the position as master mechanic for the past five years.

Manufactures and the Markets

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

Coal Consumers Should Make Purchases Now

Rate of Reduction of Both Hard and Soft Coal Greater than Last Year, but Stocks on Hand Low

The present situation in regard to the production of anthracite coal may be briefly outlined as follows: The strike in the anthracite field was settled in the middle of September, 1922, and by the end of the month, with all the mines in full operation, maximum production was reached. The average weekly production since the first week in October has been approximately 2,000,000 tons, which is the highest weekly average sustained over the same number of consecutive weeks in any year for which figures are available. The report of the Geological Survey of April 28 shows that the cumulative output during the present calendar year, from Jan. 1 to April 28, is 31,602,000 net tons, an increase of 45 per cent over the production in the corresponding period of 1922.

A somewhat similar situation prevails in regard to soft coal production. During the period of suspension in the unionized bituminous fields (April 1 to Aug. 16, 1922) the non-union mines were producing at the rate of 5,000,000 tons per week. With the resumption of work in the unionized fields, total production increased rapidly, until by the first week in October shipments had reached 10,500,000 tons per week. This weekly average continued until the first of April, 1923. Since that date there has been a slight decline attributable to a change in market conditions in certain sections of the country.

Figures published by the United States Geological Survey show that the cumulative production in the calendar year, from Jan. 1 to April 21, exceeds by 29,000,000 tons the production during the same period in 1922. The average weekly production for April of this year has been about 10,000,000 tons.

As a result of the five months strike anthracite stocks were practically exhausted. Government reports show that on Oct. 1, 1922, a selected list of retail dealers had on hand less than 13 per cent of the supply usually carried on that date. Despite the record production maintained during the winter, conditions on March 1 had but slightly improved. As a matter of fact, supplies on hand on March 1 were about equal to those on hand Oct. 1, 1922, about seven days' margin.

Figures for supplies in the hands of dealers on April 1 are not available nor are there any statistics showing supplies in the hands of the householder. Rationing of domestic anthracite coal was necessary throughout the winter, however, and as there has been little opportunity to accumulate a surplus, it can be confidently stated that the householders' bins are bare.

In anticipation of the strike, stocks of bituminous coal on hand April 1, 1922, were the highest on record, being in excess of 63,000,000 tons. As a result of the strike and with production from the non-union mines insufficient to meet consumption, stocks were so heavily drawn upon during the summer that on Sept. 1 they had been reduced to 22,000,000 tons, the lowest level on record except that of June 1, 1920, when only 20,000,000 tons were on hand. With resumption of mining, the stocks gradually increased and on Feb. 1, 1923, there were on hand 38,000,000 tons. Since that date, however, there has been a decrease. The report of March 1 showed 36,000,000 tons, and it is believed that there has been a further decline since March 1. Stocks are lower today than at the corresponding period in any year of which there is a record.

Policy of Buying

A report on general conditions in the coal trade issued by the Federal Fuel Distributor on April 1 shows that in many producing fields the mines were idle, due to "no markets." This condition, coupled with the fact that users' stocks are being drawn upon, indicates that the consumer is holding back his purchases.

As a matter of insurance, as a help in the transportation difficulty and in order to assist in stabilizing the working time of the miners, the Coal Commission suggests the immediate purchase and storage of coal. Purchases as far as possible should be made through regular channels, in order to avoid duplication of orders and prevent a runaway market.

It should also be borne in mind that the present contract in the anthracite region expires Aug. 31, 1923, and while it may be expected a new agreement will be consummated, there is even then a possibility that production may be curtailed during negotiations which precede the final reaching of a contract. The best insurance against a strike is coal in the bins of the householder.

The great value of storing coal to meet emergencies threatening the usual processes of industry was fully demonstrated in 1922, and this lesson may well be applied in 1923. As an evidence of what can be done in storing bituminous coal, the figures of last year may be reviewed. On April 1, 1922, when the strike began, there was in storage over 63,000,000 tons. On March 1 of this year the Geological Survey reports 36,000,000 tons. This figure should be increased by Sept. 1 to above 65,000,000 or 70,000,000 tons.

Cement Production Increase Shown

At the meeting of the Chamber of Commerce of the United States in New York, May 8, Frederick W. Kelley, president of the Portland Cement Association, outlined the benefits which have resulted from having uniform specifications. The manufacture of Portland cement in this country began about fifty years ago, and has grown by leaps and bounds since that time. In 1892, about twenty years after manufacture began here, the annual production was in the neighborhood of 500,000 bbl. In 1902 it was 17,000,000, and last year about 115,000,000. It is estimated that the maximum production capacity is nearly 150,000,000 bbl.

From 1885 until 1903 the only standards for testing cement were those determined by the American Society of Civil Engineers. However, many engineers felt it incumbent upon themselves to add new details here and there, so that there was really no uniform standard at all. A comparison was made in 1898 of ninety-one different sets of specifications for Portland cement and it was found that no two were alike.

The cement specifications of the American Society for Testing Materials were first adopted in 1902, and progress in that direction continued until in 1921 a single standard had been generally accepted throughout the United States. Membership in the Portland Cement Association now depends on adherence to that standard, and poor quality product has been almost eliminated.

Manufacture is now much more widely distributed than used to be the case, and factories are therefore nearer to their markets. In 1902 Portland cement was made at sixty-five factories in nineteen states, 65 per cent of the production being in the Lehigh Valley of Pennsylvania. In 1922, 118 factories in twenty-seven states were making cement, and only 27 per cent of the product came from the Lehigh Valley.

Metal, Coal and Material Prices

	May 11, 1923
Metals—New York	
Copper, electrolytic, cents per lb.	16.06
Copper wire base, cents per lb.	19.50
Lead, cents per lb.	7.25
Zinc, cents per lb.	7.225
Tin, Straits, cents per lb.	43.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	6 375
Somerset mine run, Boston, net tons	2.75
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.875
Central, Ill., screenings, Chicago, net tons	1.575
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	2.75
Weatherproof wire base, N. Y., cents per lb.	19.25
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.21
White lead, (100-lb. keg), N.Y., cents per lb.	13.375
Turpentine, (bbl. lots), N.Y., per gal.	$1.24

Rolling Stock

Wisconsin Public Service Corporation, Manitowoc, Wis., has received a new city car from the St. Louis Car Company for use on its Manitowoc lines.

Toronto Transportation Committee will purchase cars to the value of $1,660,000 this year. It will also purchase snow-fighting equipment and buses to the value of $90,000, a total for rolling stock of $1,750,000.

Memphis Street Railway, it is reported, will award contracts within the next two months for forty new cars. This is an expenditure provided for as part of the rehabilitation work to be carried out under the improvement program following the discharge of the receivers.

Manitowoc & Northern Railway, Manitowoc, Wis., has added to its equipment two new one-man interurban cars built by the St. Louis Car Company. The cars weigh 15 tons each. They will replace in service older cars which have been sold to the Evanston Street Railway, Evanston, Ill.

Niagara Junction Railroad, Niagara Falls, has purchased two electric locomotives from the Westinghouse Electric & Manufacturing Company, increasing the total number now in service to five. Each of the new locomotives will weigh 43 tons, and will be equipped with four Westinghouse type 552-FA-17 motors rated at 65 hp., and having HLF control. The railroad originally intended to purchase one locomotive weighing approximately 81 tons, but later decided that with two locomotives a more flexible service could be rendered. This railroad operates on 600 volts direct current, drawing its power from an overhead trolley wire by a wheel and pole or pantograph.

Track and Roadway

Milwaukee Electric Railway & Light Company will install about 5,000 thermit joints this year. This is the approximate number installed during 1922.

Jacksonville, Fla.—The City Commission, although refusing to approve or disapprove the plan, has by a vote of three to two adopted a revised draft of Commissioner St. Elmo W. Acosta's resolution seeking a popular vote on the question of whether the city of Jacksonville shall build and operate an electric railway to Pablo Beach, either by bond issue or from the earnings of the electric plant.

Indiana Service Corporation, Fort Wayne, Ind., has started the work of double tracking its line south on Calhoun Street from Pontiac Street. The double-tracking has been made necessary by the great growth in the southern part of the city, and by the erection of the $1,000,000 south side high school on Calhoun Street about eight blocks south of Pontiac Street. The board of public works granted permission for the work as soon as the traction company broached the project.

Pittsburgh Railways in a petition filed in the Federal court has asked for permission to spend $189,510 to rehabilitate double tracks in Brownsville Road through the Boroughs of Mount Oliver, Knoxville, Carrick and Brentwood. Another petition asked for permission to purchase an automobile truck tower for the repair of trolley wires in the East End district at a cost of $4,500.

Detroit United Railway is expecting to build about 1¼ miles of track this year in Flint, Mich., to reach the Durant automobile plant. It is also expecting to build 1.05 miles of second track near Flint, with the addition of an interlocker where the tracks cross the Père Marquette Railway lines. The track on Packard Street, Ann Arbor, is also to be reconstructed for about a half mile. Seventy-pound A.S.C.E. rail will be used on cedar ties on a gravel foundation, with cement from the bottom of the tie to the top of the rail, and the joints will be welded. Recent construction by the company has included a change of track over the Rouge River bridge in Wayne County, near Detroit, and on the West Jefferson Street bridge in Detroit. The cost of these two pieces of construction was about $60,000 total.

Shops and Buildings

Eastern Wisconsin Electric Company, Sheboygan, Wis., has purchased ground for an addition to its steam generating plant at Sheboygan, upon which it is proposed to expend $180,000.

San Diego (Calif.) Electric Railway has made application to the City Council for permission to extend its Woolman Avenue line to Imperial Avenue at Thirty-ninth Street from its present terminus at Woolman and Thirtieth Street. It is understood the company desires the franchise so that it can abandon the Imperial Avenue line beyond Thirty-second Street. At present both the Imperial Avenue and Woolman Avenue routes are operated over the same line as far as Twenty-fifth and Imperial.

New Incorporations

San Antonio & Rio Grande Valley Traction Company, Falfurrias, Tex., has been organized by V. P. Williams of Dallas and associates for the purpose of building and operating an electric railway between Falfurrias to a point on the St. Louis, Brownsville & Mexican Railroad near McAllen, about 60 miles. It is planned ultimately to extend the line to Point Isabel, on the Gulf Coast, and to San Antonio. According to Mr. Williams financial arrangements for building the first section of the road have been made.

Trade Notes

E. W. Rockafellow, for a number of years general supply sales manager of the Western Electric Company, has become a vice-president of the National Pole Company, Escanaba, Mich., and will represent that company at 220 Broadway, New York.

S. P. Wright & Company, district representatives of the Conveyors Corporation of America, 326 West Madison Street, Chicago, have moved their offices from 109 East Broadway, Butte, to 812 East Iron Street, Butte. The Wright organization handles the sales of American Steam Jet Ash Conveyors in the State of Montana.

Johns-Pratt Company, Hartford, Conn., manufacturer of Noark fuses, meter service and protective devices, cutout bases, fuse accessories, vulcabeston packing and insulating parts, and Johns-Pratt molded insulation, has established an export division with office at 30 Church Street, New York City. E. Wilhelm Droosten and W. L. Urquhart, who have had extensive experience in handling export business of electrical manufacturers, will be in charge of this division.

Ross F. Hayes has resigned as general sales manager of the Curtain Supply Company to engage in the railway supply business, with office at 2 Rector Street, New York City. He is now Eastern representative of the Henry Giessel Company, Chicago, manufacturers of water coolers for service on railway passenger cars and locomotives; the Protecto Manufacturing Company, Chicago, manufacturers of metal-bound weather stripping; the Anti-Freezer Company, Chicago, manufacturers of "The Anti-Freezer" for prevention of freeze-ups in air-brake systems, and other manufacturers engaged in building car fittings and other devices for use in the electric railway field.

New Advertising Literature

Golden Anderson Valve Specialty Company, Pittsburgh, Pa., has issued an illustrated booklet describing its patent cushion valves of various types, such as triple-acting non-return valves, plain non-return valve, quick-closing emergency-trip valves, combined throttle and automatic engine-stop valves, steam pressure reducing valves, etc.

Crouse-Hinds Company, Syracuse, N. Y., has issued catalog No. 2,000, on condulets. This is a new publication which supersedes all previous catalogs and bulletins. Its more than 700 pages are replete with information on fittings for every conceivable situation, including many for use on railway cars. The book is fully indexed in terms of catalog numbers and names of articles, and there is also a picture index. It is flexibly bound and is furnished with a thumb index.

Bankers and Engineers

Laying Resilient ties in con *traffic* and without temporary crossovers

DAYTON

crete *without interruption to*

Think of having a permanent, easy-riding track n a permanent concrete foundation without nterrupting service during construction and ithout the expense of temporary crossovers.

)n the page opposite are shown city and inter-rban cars operating on a five- and thirty-minute eadway, respectively, while dry concrete is eing tamped under the ties.

he setting of unseasoned concrete is not, in ny way, disturbed by the operation of the cars ver it.

he asphalt cushion in the *resilient* tie absorbs ne shocks so effectively that they do not reach ne green concrete.

ests have proved this construction sound. On ther properties where this method was em-loyed the concrete was found to be in perfectly ood condition after 3 years of service.

esilient ties are fundamentally and practically ght, moreover, they permit of a saving of $6000 a ile over wood ties laid in concrete. *Ask for de-criptive literature.*

The Dayton
Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient TIE

cushion the shock on the rolling stock

Great Northern depot at Minneapolis.

GREAT NORTHERN RAILWAY

Two 307 H. P. Edge Moor Boilers in this station supply power for the Minneapolis depot.

THE Great Northern installed its first Edge Moor Boilers in the shop at Allouez, Wis., in 1902. Now the Great Northern has fourteen Edge Moors, representing seven separate orders, in its depots and shops at Minneapolis, St. Paul, West Superior and Allouez.

The Pennsylvania, the Reading, the New York Central, and the Soo Line are among the other railroads that have equipped shops or terminals with Edge Moor Boilers.

Construction details and performance records, together with much valuable data for the plant operator, are contained in the Edge Moor catalogue. Tell us where to send your copy.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE

New York Chicago St. Paul Boston Pittsburgh Charlotte

Six 260 H. P. Edge Moor Boilers in the Dale Street Shops of the Great Northern at St. Paul.

EDGE MOOR Water Tube BOILERS

EDGE MOOR BOILERS
EDGE MOOR, DEL. U.S.A.

FOR INCREASED FUEL ECONOMY

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

DRAFTSMEN, experienced steam and street railway, special track work draftsmen and calculators; advise experience and salary in first letter. P-546, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

FIRST-CLASS draftsman wanted for street railway master mechanic's office. Must be competent in car design and should have some mechanical and electrical engineering ability. P-542, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

MASTER mechanic wanted by Interurban Railway Company located in the northwest; must be thoroughly competent, able to take charge of shop, and equipment consisting of 15 interurban motor cars and other trailer equipment; state when available and give full references in first reply. P-547, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT wanted for small city and suburban line, Eastern territory. State experience and salary expected. P-550, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ACCOUNTING executive, thoroughly experienced in all branches of large properties: street railway, light, power and gas utility, open for engagement. Capable of assuming full control of all accounting work. PW-543, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant, personal reasons for desiring a change. PW-533, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a practical, progressive, efficient transportation man who is capable of taking over all details of transportation and handling same in a manner that will get results and be a credit to any property. Present relations are pleasant. Personal reasons for desiring a change. High grade references as to character and ability. Would prefer city and suburban property. Address with details PW-544, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

FOR SALE

G. E. CO. ROTARY CONVERTER

60 cy., 13,200 or 6600 v. A.C. to 500 v. D.C., 2200 kw.

Includes the following:

Item 1—Type HCC, 16 pole, 2200 kw., 450 r.p.m., 590 v. Synchronous Converter with booster and instruments.

Item 2—3 type WC, 60 cy., 900 kva., 13,200-6600 v. primary, 368 v. secondary, water-cooled Transformers with 10% taps above and below normal and 50% starting tap.

Item 3—Complete 3 panel switchboard for the above. Built 1917

Has been run only for test—prompt shipment—attractive price

Picture of Converter appeared in March 17th issue.

Apply General Chemical Company
40 Rector St., New York, N. Y.

Interurban Car Bargains

4—Cars, excellent condition, weighing 25 to 28 tons each; seating 54; complete equipment; 4 Wh. 306 motors for 600 v. D.C. operation.

Will furnish photographs and full specifications upon application.

Warren & Jamestown Street Railway Co.
Warren, Pa.

FOR SALE

Porcelain Insulators

2,000 22,000-v., 1-in. pin hole

The Northwestern Ohio Ry. & Pr. Co.
Oak Harbor, Ohio.

TO HELP YOU

SELL USED EQUIPMENT

"Searchlight" Advertising

G-2

Notice to Manufacturers of and Dealers in Radio Receiving Apparatus, Electrical Marine Equipment, Electrical Railway Equipment, and Other Electrical and Steam Machinery

TAKE NOTICE that on Thursday, the 24th day of May, 1923, at 2 o'clock in the afternoon, at the plant of the Horne Manufacturing Company, 243 Mercer Street, Jersey City, New Jersey, the undersigned, receiver of said Company, will offer for sale all of the assets of the said Company under order of the United States District Court for the District of New Jersey.

The entire assets of the corporation will first be offered in one lot, in bulk. Thereafter, said assets will be offered in lots as follows:

(1) Radio apparatus, consisting of receiving sets, finished and partly finished, and unassembled parts, finished and partly finished, tubing, aluminum and brass pieces.

(2) Electrical marine interior equipment for ships, consisting of watertight electrical fixtures, mechanical telegraph fittings and voice tube fittings, finished and partly finished.

(3) Electrical railway fittings, consisting of handbrakes, partly finished, and trolley bases, partly finished.

(4) Machinery, motors and necessary shafting, belting and other power transmission appliances.

(5) Fixtures and raw material not apportioned, consisting of brass rod, steel rod, tubing, boards, work-benches, small tools, bins, and office fixtures.

(6) Accounts receivable, together with good will, trade marks, patents and patent rights, electrotypes and catalogues.

Bidders will be required to deposit with the receiver at the time of bid, ten per cent in cash or certified check. The balance is to be paid within five days after confirmation of the sale by the United States District Court.

Purchasers will be required to remove articles purchased before June 5, 1923.

All bids and offers are subject to confirmation by the Court, to which such bids will be submitted for approval on May 28, 1923, at 10:30 A. M., Post Office Building, Trenton, New Jersey.

Dated May 7th, 1923.

JAMES A. HAMILL,
Receiver of Horne Manufacturing Company.

ROTARY CONVERTER

1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

"SEARCHLIGHT"

Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take advantage of it — For Every Business Want

"Think SEARCHLIGHT First"

0165

FOR SALE

SAFETY CARS

16 Standard Birney. Practically New.

TRANSIT EQUIPMENT COMPANY
Cars—Motors
501 Fifth Avenue, New York

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

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

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa

WHAT AND WHERE TO BUY

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

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Electric Service Sup. Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones Br. & Metal Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Bearings an Bearing Metals
Ajax Metal Co.
Baldwin Locomotive Works
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Le Grand, Inc., Nic
Westinghouse E. & M. Co.
Bearings Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Western Electric Co.
Boilers
Babcock & Wilcox Co.
Edge Moor Iron Co.
Boiler Tubes
Edge Moor Iron Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Western Electric Co.
Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Western Elect. Co.
Westinghouse E. & M. Co
Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
Bates Exp. Steel & Tr Co
Electric Ry. Equip. Co
Electric Service Sup Co
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
National Ry. Appliance Co
Westinghouse Tr. Br Co
Brake Shoes
Amer. Br. Shoe & Fdry Co
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M I Co
Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I Co
General Electric Co
Johns-Manville Inc.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

Brooms, Track, Steel or Rattan
Amer. Rattan & Reed Mfg. Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.
Brushes, Graphite
U. S. Graphite Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Bus Seats
Hale & Kilburn
Heywood-Wakefield Co.
Cables (See Wires and Cables)
Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes Carbon)
Car Lighting Fixtures
Electric Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Inc., Nic
Catchers and Retrievers, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Western Electric Co.
Change Carriers
Cleveland Fare Box Co.
Circuit Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M Co.
Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Rome Wire Co.
Coils, Choke and Kicking
General Electric Co.
Westinghouse E. & M. Co.
Coin-Counting Machines
Cleveland Fare Box Co.
Electric Service Sup. Co.
Internat'l Register Co., The
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrapping Machines
Cleveland Fare Box Co.
Commutator Slotters
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Compounds (Insulating & Splicing)
Johns-Manville, Inc.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
Compressors, Air, Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor, Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.
Connectors, Traller Car
Consolidated Car-Heat'g Co.
Electric Service Sup. Co.
Ohio Brass Co.
Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Electric Service Sup. Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Cord Adjusters
National Vulcanized Fibre Co.
Cord, Bell, Trolley Register, etc.
Brill Co., The J. G.
Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Silver Lake Co.
Cord Connectors and Couplers
Electric Service Sup. Co.
Samson Cordage Works
Wood. Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co
Cross Arms (See Brackets)
Crossings
Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frog and Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Crushers, Rock
Allis-Chalmers Mfg. Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Sup. Co.
Morton Mfg. Co.
Dealers Machinery
Electric Equipment Co.
General Electric Co.
Derailing Devices (See Track Work)
Derailing Switches
Ramapo Ajax Corp.
Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Detective Service
Wish Service. P. Edward
Door Operating Devices
Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Draft Rigging (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Sup. Co.
Ears
Ohio Brass Co.
Ebony Asbestos Wood
Johns-Manville, Inc.
Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., J. A.
Western Electric Co.
Electric Grinders
Railway Track-Work Co.
Electrodes, Carbon
Railway Track-Work Co.
Electrodes, Steel
Railway Track-Work Co.
Enamels
Beckwith-Chandler Co.
Engineers, Consulting, Contracting and Operating
Allison & Co., J. R.
Archbold-Brady Co.
Arnold Co., The
Becler, John A.
Bibbins, J. Rowland
Day & Zimmerman
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Inc., Dwight P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Engineering Corp., The J. G.
Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Fare Boxes
Cleveland Fare Box Co.
National Ry. Appliance Co.
Ohmer Fare Register Co.
Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Le Grand, Inc., Nic
Fibre and Fibre Tubing
Johns-Manville, Inc.
National Vulcanized Fibre Co.
Westinghouse E. & M. Co.
Field Coils (See Coils)
Fire Extinguishers
Johns-Manville, Inc.
Flangeway Guards, Steel
Godwin Co., Inc., W. S.
Flooring Composition
Johns-Manville, Inc.
Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co
Frogs and Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)
Wharton, Jr., & Co., Wm.
Frogs, Trolley
Ohio Brass Co.
Furnaces, Electric
Pittsburgh Elec. Furnace Corp.

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co
Williams & Co., J. H.
Fuses, Refillable
Columbia M. W. & M. I. Co
Gages, Oil and Water
Ohio Brass Co.
Gaskets
Johns-Manville, Inc.
Power Specialty Co.
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gas Producers
Westinghouse E. & M. Co.
Gates, Car
Brill Co., The J. G.
Gear Blanks
Carnegie Steel Co.
Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co
Gears and Pinions
Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co
Electric Service Sup. Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
Generating Sets, Gas-Electric
General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
Western Electric Co.
Westinghouse E. & M. Co.
Girder Rails
Lorain Steel Co.
Goggles, Eye
Smith Heater Co., Peter
Gongs (See Bells and Gongs)
Greases (See Lubricants)
Grinders and Grinding Supplies
Railway Track-Work Co.
Grinders, Portable
Railway Track-Work Co
Grinders, Portable Electric
Railway Track-Work Co.
Grinding Bricks and Wheels
Railway Track-Work Co.
Ground Wires
Page Steel & Wire Co.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail and Manganese
Ramapo Ajax Corp.
Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co
Hammers, Pneumatic
Ingersoll-Rand Co.
Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Heaters, Car (Electric)
Consolidated Car-Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and Water
Smith Heater Co., Peter
Heaters, Car (Stove)
Electric Service Sup. Co.
Sterling Varnish Co.
Westinghouse E & M. Co.
Helmets, Welding
Railway Track-Work Co.

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Industrial Flooring
Johns-Manville, Inc.

Instruments, Measuring and Recording
Electric Service Sup. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
National Vulcanized Fibre Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Okonite Co.

Insulation, Slot
Irvington Varnish & Ins. Co.

Insulators (See also Line Material)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Electric Service Sup. Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co.

Insurance, Fire
Marsh & McLennan

Jacks (See also Cranes, Hoists and Lifts
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.

Junction Boxes
Standard Underground Cable Co.

Lamp Guards and Fixtures
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc and Incandescent (See also Headlights)
Anderson Mfg. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Anderson Mfg. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
Electric Service Sup. Co.
Electric Ry. Equip. Co.
General Electric Co.
Johns-Manville, Inc.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

Locomotives, Electric
Baldwin Locomotive Works
General Electric Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Galena Signal Oil Co.
Universal Lubricating Co.
Vacuum Oil Co.

Lubricants, Oils and Greases
Galena Signal Oil Co.
Universal Lubricating Co.
Vacuum Oil Co.

Machine Tools
Columbia M. W. & M. I. Co.

Machine Work
Columbia M. W. & M. I. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Special Track Work
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

Meters (See Instruments)

Motor Buses (See Buses, Motor)

Motor Leads
Dossert & Co.

Motormen's Seats
Brill Co., The J. G.
Electric Service Sup. Co.
Wood Co., Chas. N.

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
General Electric Co.

Nuts and Bolts
Allis-Chalmers Mfg. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Oils (See Lubricants)

Packing
Electric Service Sup. Co.
Johns-Manville, Inc.
Power Specialty Co.
Westinghouse E. & M. Co.

Paints and Varnishes (Preservative)
Ackley Brake & Supply Corp.
Beckwith-Chandler Co.

Paints and Varnishes for Woodwork
Beckwith-Chandler Co.
National Ry. Appliance Co.

Pavement Breakers
Ingersoll-Rand Co.

Paving Guards, Steel
Godwin Co., Inc., W. S.

Paving Material
Amer. Br. Shoe & Fdry. Co.

Pickups, Trolley Wire
Electric Service Sup. Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Pipe Fittings
Power Specialty Co.
Westinghouse Tr. Br. Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers—Rubber Insulated
Electric Service Sup. Co.
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Pole Line Hardware
Ohio Brass Co.

Poles, Metal Street
Batea Exp. Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co
Western Electric Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Ry. Equip. Co.
Electric Service Sup. Co.

Poles and Ties, Treated
Bell Lumber Co.
International Creosoting and Construction Co.
Page & Hill Co.

Poles, Ties, Post, Piling and Lumber
Baker Wood Preserving Co.
Bell Lumber Co.
International Creosoting and Construction Co.
Le Grand, Inc., Nic
Page & Hill Co.
Southern Cypress Mfgrs. Assn.

Porcelain, Special High Voltage
Lapp Insulator Co.

Pothead
Okonite Co.

Power Saving Devices
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Production Engineering
Sherman Service, Inc.

Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

Pumps, Vacuum
Ingersoll-Rand Co.

Punches, Ticket
Bonney-Vehslage Tool Co.
International Reg. Co., The
Wood Co., Chas. N.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.

Rails, Steel
Carnegie Steel Co.

Railway Material
Johns-Manville, Inc.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car-Heating Co.
Westinghouse E. & M. Co.

Rail Welding
Rail Welding & Bonding Co.
Railway Track-Work Co.

Rattan
Amer. Rat. & Reed Mfg. Co.
Brill Co., The J. G.
Electric Service Sup. Co.
Hale & Kilburn
St. Louis Car Co.

Registers and Fittings
Brill Co., The J. G.
Electric Service Sup. Co.
International Reg. Co., The
Ohmer Fare Register Co.
Rooke Automatic Reg. Co.

Reinforcement, Concrete
American Steel & Wire Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

Repair Work (See also Coils)
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

Resistance, Grid
Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Resistances
Consolidated Car-Heating Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Roller Bearings
Stafford Roller Bearing Car Truck Corp.

Roofing, Asbestos
Johns-Manville, Inc.

Sanders, Track
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.

Sash, Metal Car Window
Hale & Kilburn

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seating Materials
Brill Co., The J. G.

Seats, Bus
St. Louis Car Co.

Seats, Car (See also Rattan)
Amer. Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Hale & Kilburn
Heywood-Wakefield Co.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Con. Car Heating Co.
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Electric Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Amer. Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.

Sockets & Receptacles
Johns-Manville Inc.

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Track-Work
Lorain Steel Co.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.

Steel Castings
Wharton, Jr., & Co., Wm.

Steels and Steel Products
Morton Mfg. Co.

Steps, Car
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co
Westinghouse E. & M. Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Ohio Brass Co.

Strand
Roebling's Sons Co., J. A.

Superheaters
Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switchbaxes
Johns-Manville, Inc

Switch Stands and Fixtures
Ramapo Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches, Track (See Track, Special Work)

Switches and Switchboards
Allis-Chalmers Mfg. Co.
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Tampers, Tie
Ingersoll-Rand Co.
Railway Track-Work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Ramapo Ajax Corp.

Telephones and Parts
Electric Service Sup. Co.
Western Electric Co.

Terminals, Cable
Standard Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Con. Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Tickets
Globe Ticket Co.

Ticket Choppers and Destroyers
Electric Service Sup. Co.

Ties and Tie Rods, Steel
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Mechanicle
Dayton Mechanical Tie Co.

Ties, Wood Cross (See Poles, Ties, etc.)

Tongue Switches
Wharton, Jr., & Co., Wm.

Tool Steel
Carnegie Steel Co.

Tools, Track and Miscellaneous
Amer. Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Hubbard & Co.
Railway Track-Work Co.

Towers and Transmission Structures
Batea Exp. Steel Truss Co.
Westinghouse E. & M. Co.

Track Expansion Joints
Wharton, Jr., & Co., Wm.

Track Grinders
Railway Track-Work Co.

Trackless Trolleys
St. Louis Car Co.

Track, Special Work
Barbour-Stockwell Co.
New York Switch & Crossing Co.
St. Louis Frog & Switch Co.
Wharton, Jr., & Co., Wm., Inc.

Transfers
Globe Ticket Co.

Transfer & Issuing Machines
Ohmer Fare Register Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.

Treads, Safety, Stair Car Step
Morton Mfg. Co.

Trolley Bases
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Ackley Brake & Supply Corp.
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Materials, Overhead
Ohio Brass Co.

Trolley and Trolley Systems
Ford-Chain Block Co.

Trolley Wheels and Harps
Thornton Trolley Wheel Co.

Trolley Wheels, (See Wheels, Trolley Wheel Bushings)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.
Rome Wire Co.
Western Electric Co.

Trucks, Car
Baldwin Locomotive Works
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Tubing, Yellow and Black Flexible Varnishes
Irvington Varnish & Ins. Co.

Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Turbines, Water
Allis-Chalmers Mfg. Co.

Turnstiles
Electric Service Sup. Co.
Ohio Brass Co.
Perey Mfg. Co.

Upholstery Material
Amer. Rattan & Reed Mfg. Co.

Valves
Westinghouse Tr. Br. Co.

Vacuum Impregnation
Allis-Chalmers Mfg. Co.

Varnished Papers
Irvington Varnish & Ins. Co.

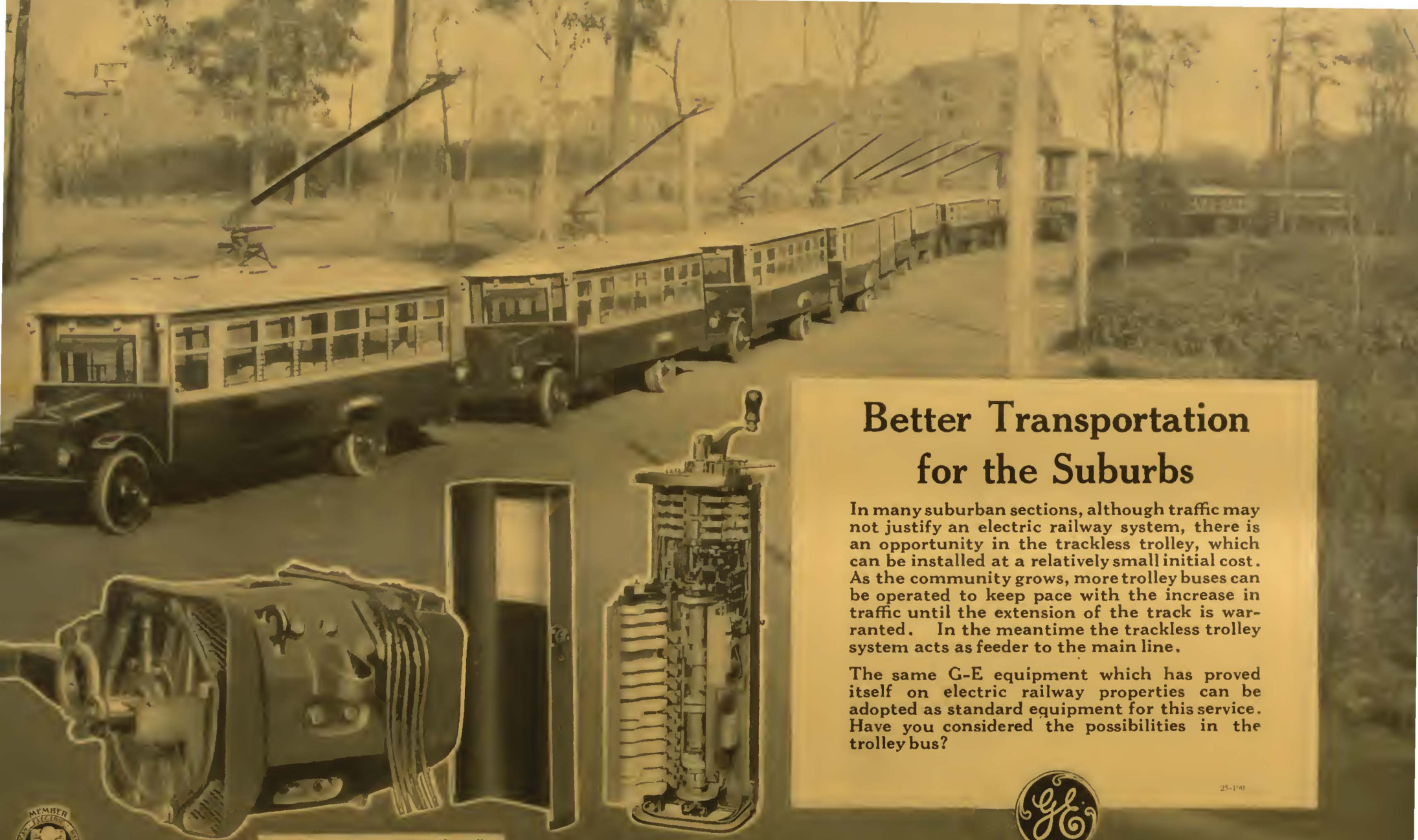
Varnished Silks
Irvington Varnish & Ins. Co.

Ventilators, Car
Brill Co., The J. G.
National Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility

Welders, Portable Electric
Electric Railway Improvement Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.

Welding Processes and Apparatus
Alumino-Thermic Corp.
Electric Railway Improvement Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

ALPHABETICAL INDEX TO ADVERTISEMENTS



Better Transportation for the Suburbs

In many suburban sections, although traffic may not justify an electric railway system, there is an opportunity in the trackless trolley, which can be installed at a relatively small initial cost. As the community grows, more trolley buses can be operated to keep pace with the increase in traffic until the extension of the track is warranted. In the meantime the trackless trolley system acts as feeder to the main line.

The same G-E equipment which has proved itself on electric railway properties can be adopted as standard equipment for this service. Have you considered the possibilities in the trolley bus?

25-180

The GE-258 Motor and K-63 Controller are successfully driving many of the trolley buses now in service.

MEMBER ELECTRIC RAILWAY ASSOCIATION

GENERAL ELECTRIC