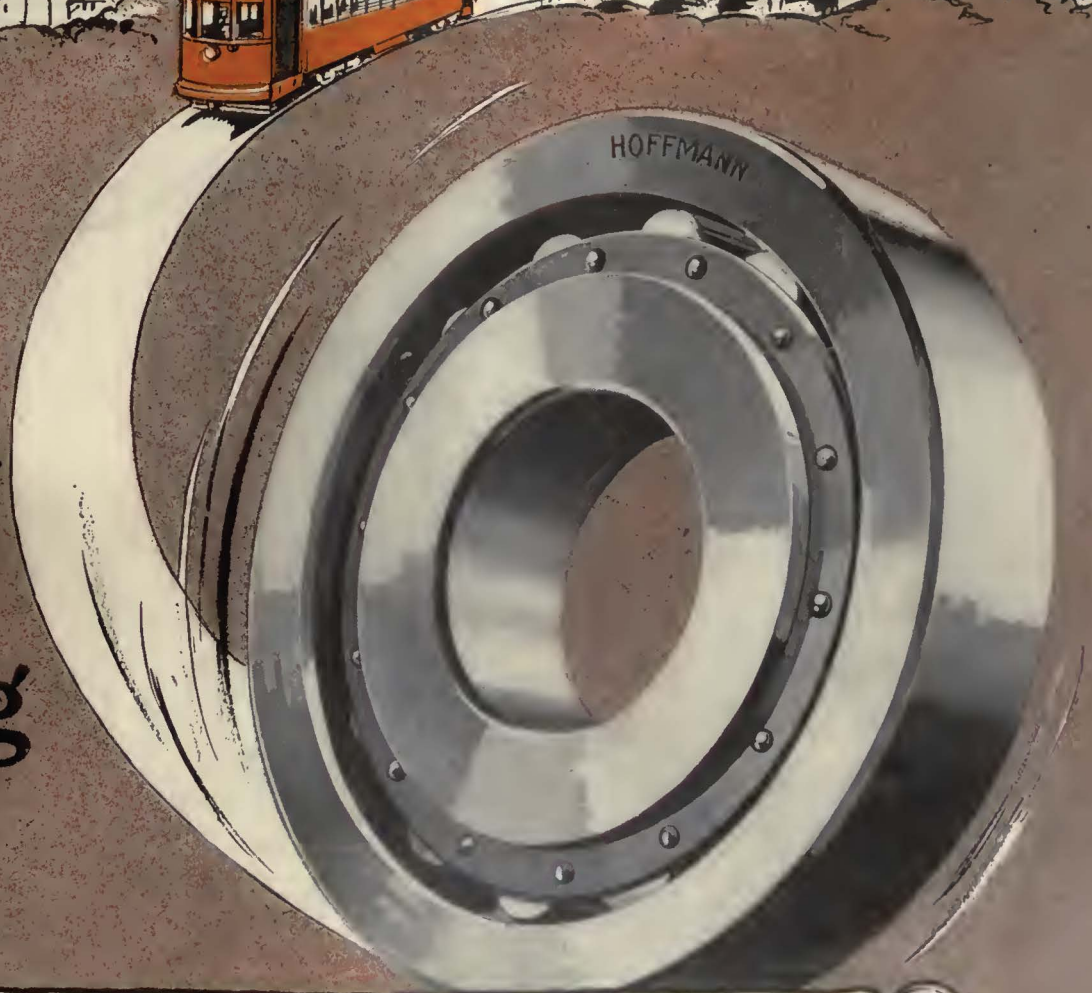


ELECTRIC RAILWAY JOURNAL

McGraw-Hill Publishing Company, Inc.

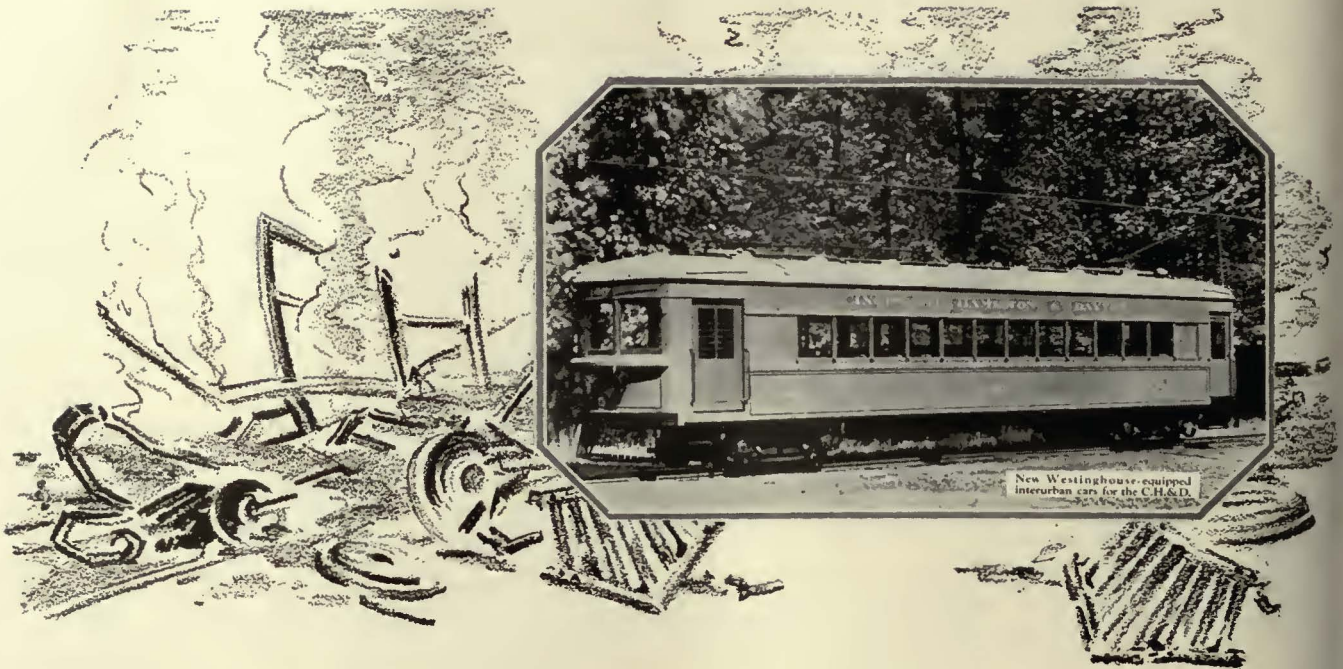
October 8, 1927

Twenty Cents per Copy



More
mileage
per
motor
bearing

HOFFMANN
PRECISION ROLLER BEARINGS



C&D

Fire Their Dead Wood

JUNE 22 marked the birth of a new era for the Cincinnati, Hamilton and Dayton interurban line. On that night they put the torch to their old rolling stock and started a fire that was both destructive and constructive.

For years these obsolete cars had been discouraging patronage and holding operating costs at an excessive figure. Under the recent reorganization, the new executives set out to correct this deficiency by a complete rehabilitation of the road.

At one stroke they cleaned their books of dead wood and cleared their tracks for modern light weight cars, equipped with Westinghouse 535-A-3 motors, HL Control, and type M resistors, so as to attract increased patronage and greatly cut operating costs.

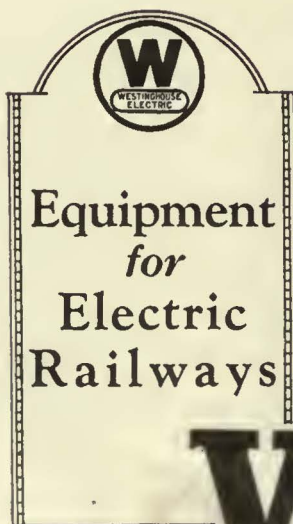
And rolling stock was not their only consideration. They even went further to insure the maximum economy of operation and installed eight Westinghouse automatic substations.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

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



1927



Westinghouse

ELECTRIC RAILWAY JOURNAL

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Now that the
Convention is over

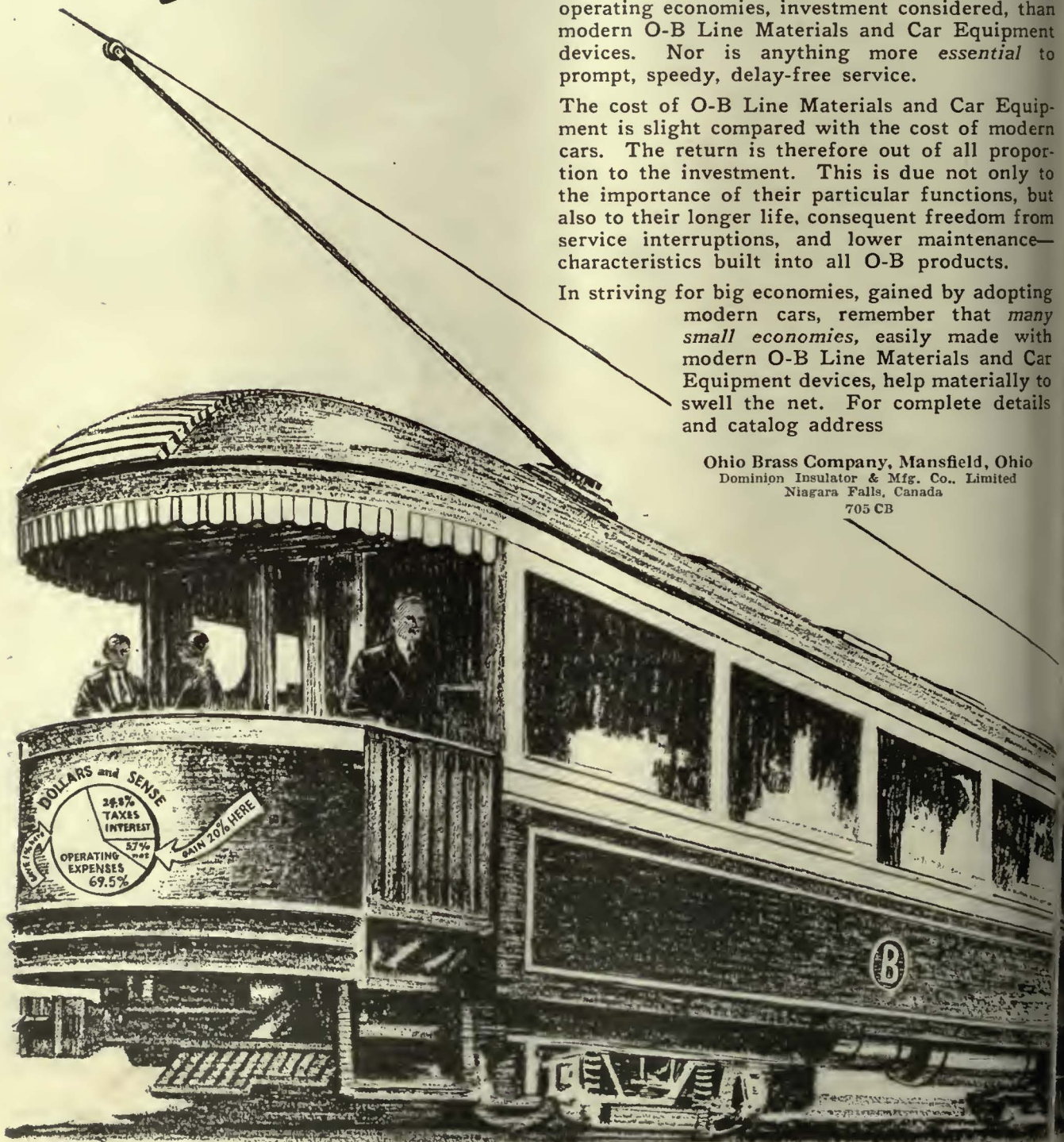
Take the Dollars

NO electric railway equipment offers greater returns from the standpoint of effecting operating economies, investment considered, than modern O-B Line Materials and Car Equipment devices. Nor is anything more essential to prompt, speedy, delay-free service.

The cost of O-B Line Materials and Car Equipment is slight compared with the cost of modern cars. The return is therefore out of all proportion to the investment. This is due not only to the importance of their particular functions, but also to their longer life, consequent freedom from service interruptions, and lower maintenance—characteristics built into all O-B products.

In striving for big economies, gained by adopting modern cars, remember that many *small economies*, easily made with modern O-B Line Materials and Car Equipment devices, help materially to swell the net. For complete details and catalog address

Ohio Brass Company, Mansfield, Ohio
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705 CB



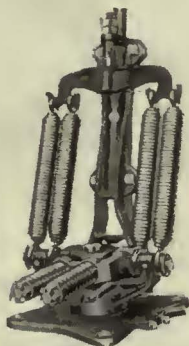
and Sense Special



O-B Marathon Ear
LONGER life, 320,000 car passes and more, fewer ear replacements and wire breaks. Lower yearly cost explains its industry-wide popularity.

O-B Spring Lock Hanger
A SHOCK absorber that takes hard spots out of the overhead. Affords smooth, quiet passage of trolley wheels, less wear and depreciation. Page 465.

O-B Type C Splicer
HOLDING power exceeds strength of new wire. Tapered approaches, narrow cross-section, flat, smooth under-run cause least disturbance to trolley wheels.



O-B Form 4 Base
FLOATS on Timkens. Has balanced spring assembly. Insures instant response to variations in overhead, long life, low upkeep. Cat page 776.



O-B Type BC Frog
PERMITS wheel to travel on groove instead of on flanges, resulting in longer life. Tests made by five properties show average life of half a million car passes.



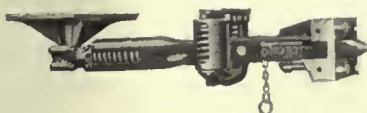
O-B Special ZP Headlight
APRISMATIC reflector headlight for city cars. Armao Iron, rust resisting, dust proof casing. Low first cost as well as maintenance.



O-B Tilton Bond
LARGE steel terminals, open on rail side, make good welding easy. Large contact area insures maximum strength and excellent conductivity. Cat. page 667.



O-B Trolley Catcher
CATCHES and holds a flying pole. Positive "anti-step-up" feature prevents damage to overhead. "One Shot" lubrication. Cat. page 758.



Tomlinson Automatic Coupler
MAKES air and electrical connections. Coupled and uncoupled automatically from platform. Interlocking disconnecting switch insures safety. Cat. pages 780-878.



O-B Wheel and Harp
ELIMINATES all oiling, gives longer mileage, reduces maintenance and replacements, prevents rapid wear on overhead. For city service only.



Provide greater net income for the future by building endurance and permanence into your overhead car lines and modernizing car equipment now. O-B Catalog on request.

Ohio Brass Company, Mansfield, Ohio
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 SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS
 LINE MATERIALS
 RAIL BONDS
 CAR EQUIPMENT
 MINING MATERIALS
 VALVES

BETTER TRANSPORTATION

*Here's the newest aid
to track betterment*



Flexible manipulation of grinding wheel is made easy.



Grinding wheel arm swings aside to pass cars without removing trolley pole.

Eureka Radial Rail Grinder

A small, light, portable grinder for use where flexible manipulation of the grinding wheel is desirable. Fine for grinding Thermit joints before finishing with the "Vulcan" which then makes a perfectly smooth joint.

Eureka is also suitable for grinding off surplus weld metal under heavy traffic conditions. Swivel joints permit tilting the grinding wheel at any angle, at the same time allowing grinding wheel to travel in a straight line. A small hand wheel raises and lowers the grinding wheel. Ball and roller bearings keep friction minimized.

Eureka, with grinding wheel, weighs 375 pounds. It's 46 in. from grinding wheel to vertical column extended, 36 in. when telescoped.

With arm swung into position against handles, Eureka measures 40 in. overall, 26 in. wide, 34 in. high. The 10 in. diameter, 1 in. face grinding wheel runs at 1950 r.p.m., with a 1½ hp., 550 v. d.c. ball bearing motor, made especially for its job.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

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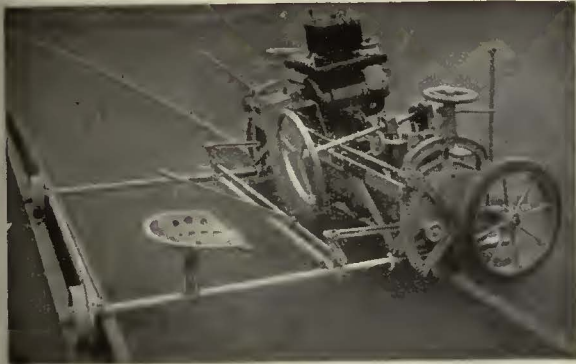
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H. F. McDermott, 208 S. LaSalle St., Chicago
Equipment & Engineering Co., London
P. W. Wood, Railway Supply Co., New Orleans, La.
Frazar & Co., Japan



Eureka with Outrigger for open track.

DEMANDS BETTER TRACK

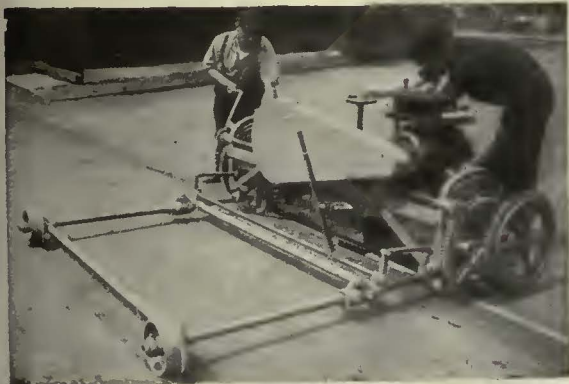
Here are other standard aids on successful roads



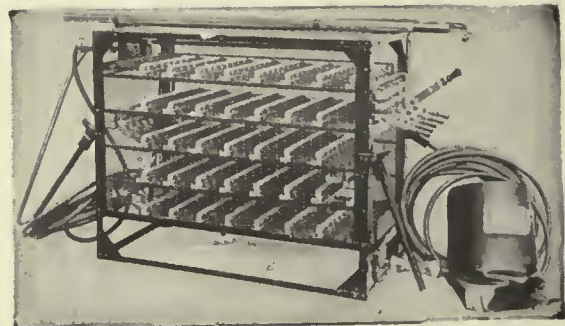
"Improved Atlas" Rail Grinder



Reciprocating Track Grinder



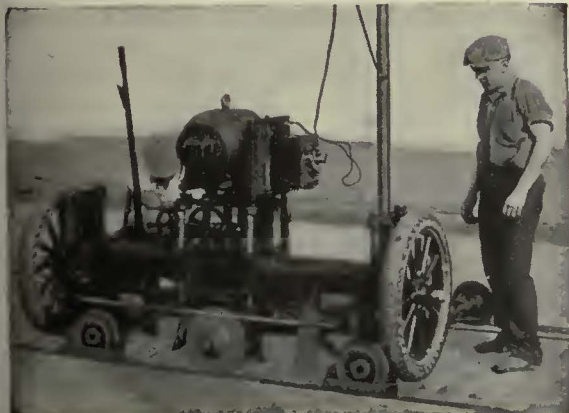
"Vulcan" Rail Grinder



"Ajax" Electric Arc Welder



"Hercules" Swing Frame Rail Grinder



"Imperial" Track Grinder

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

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- Frazar & Co., Japan

No Expense for Maintenance



The whole purpose of the "One-Wear" Steel Wheel is to give a prolonged un-interrupted service life without periodical re-turning.

Thus maintenance is avoided and availability of equipment is increased.

But to desire these advantages is not to have them. It takes a special wheel metal found only in Davis "One-Wear" Steel Wheels to develop the unusual qualities that give life to the "One-Wear" idea.



AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST. LOUIS



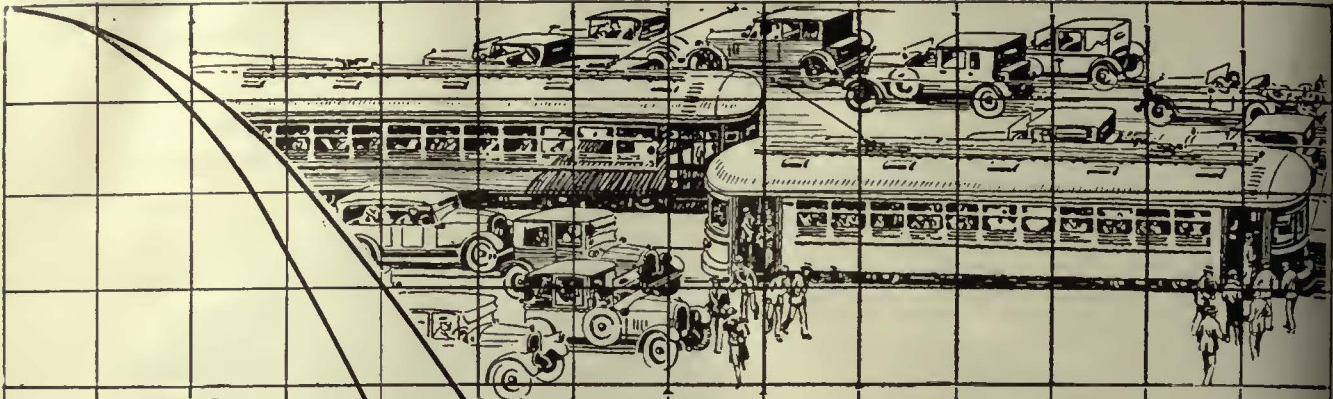
NEXT WEEK

We will announce complete details and specifications of the new tie-laying and the new compression tamping machines that caused so much comment at the AERA convention.

These new machines make the track dollar go farther, make the maintenance dollar more unnecessary than ever.

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, OHIO

TWIN TIES ARE ALL STEEL



**The
Westinghouse
Variable Load
Brake**

**Accelerating Traffic
by Better
Decelerating**

helps to accelerate traffic

because —

It automatically adjusts braking effect to suit car loading.

Its effectiveness is independent of fluctuation in main reservoir pressure.

It decreases the time of brake application and release.

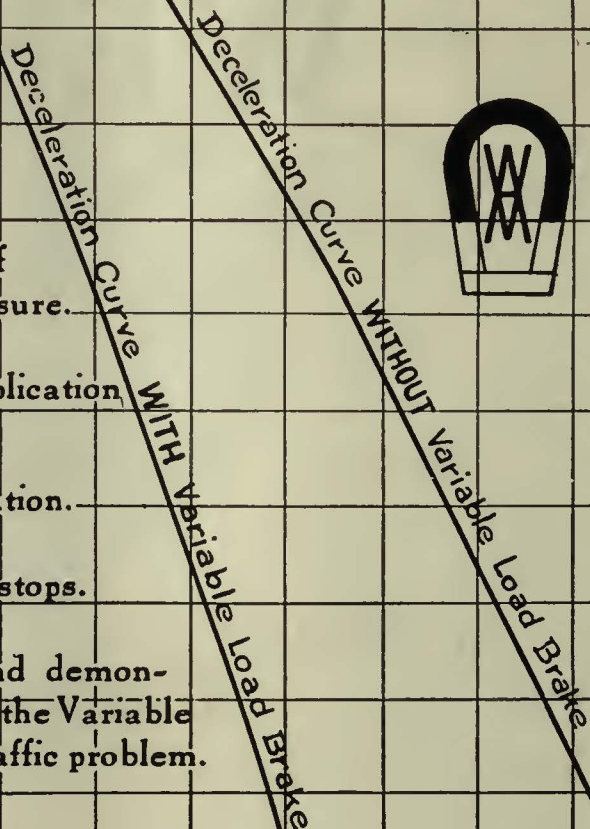
It permits a higher rate of retardation.

The result---consistently shorter stops.

Let our representative amplify and demonstrate these statements. Perhaps the Variable Load Brake will help solve your traffic problem.

Westinghouse Traction Brake Co.

General Office and Works : Wilmerding, Pa.



WESTINGHOUSE VARIABLE LOAD BRAKE



And NOW

A TWO YEAR COMPARISON
of the CHEVY CHASE COACH LINE



One year ago we gave the figures
for the first 12 months operation

They told their own story

Today, comparison shows greater
gains and lower costs for this sec-
ond year.



YELLOW COACHES *do* BUILD REVENUE



1st Year Operation

year ending September 14th, 1926



Miles operated	344,666
Revenue passengers	283,275
Earned revenue	\$70,818.75
Earned revenue per mile	20.6c
Operating expense per mile	22.25c



**YELLOW COACHES MADE GOOD
IN WASHINGTON ON A 25-CENT
FARE DE LUXE SERVICE—**



2nd Year Operation

year ending September 14th, 1927



375,256	=	30,590	GAIN
354,196	=	70,921	"
\$88,548.95	=	\$17,730.20	"
23.6c	=	.03c	"
21.39c	=	.86c	"



NOW SEE WHAT THEY DID
THE SECOND YEAR FOR THE
CAPITAL TRACTION COMPANY

How and where the reduction of .86c. in operating cost was made

FROM the very beginning, the operation of the exclusive Chevy Chase Coach Line was a success.

Inaugurated on September 15, 1925, to operate on a route eight miles long, connecting the Chevy Chase suburb of Washington, D. C. with the downtown section, including the Union Station and the Capitol, *the company was making money within eleven weeks.*

Operating cost per mile the first year was 22.25c. During the second year, using the identical same items for comparison, costs dropped to 21.39c. The complete analysis is offered for inspection in the panel.

Everybody rides on the Chevy Chase Coach Line— cabinet officers, diplomats, plenipotentiaries, senators, congressmen, school children, everybody— and 70,921 more passengers rode during the second year. As operating costs per mile go down, earned revenue per mile is advancing; a clear gain of 3c. this second year over the first.

Nine Yellow Type Y Parlor Coaches are used. Do they stand the gaff? Recently the first six had the heads of their motors taken off for the first time after 100,000 miles and all were found to be in good condition. This, coupled with the fact of 213,493 coach miles and only one stop for mechanical trouble, shows the kind of service being rendered by Yellow Coaches.

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

Cents Per Mile

	FIRST YEAR	SECOND YEAR
MAINTENANCE		
Buildings.....	0.30	0.02
Bus Bodies.....	0.39	0.31
Bus Chassis.....	1.12	1.25
Tires and Tubes.....	1.75	1.73
Shops and Garage Equipment	0.01	0.01
Service Cars.....	0.06	0.02
Maintenance and Operation		
Depreciation.....	5.13	5.20
	<hr/>	<hr/>
	8.76	8.56
GARAGE OPERATION		
Garage Employees.....	1.41	1.40
Garage Supplies and Expenses	0.66	0.43
	<hr/>	<hr/>
	2.07	1.83
TRANSPORTATION		
Chauffeurs' Wages.....	5.66	5.66
Gasoline.....	3.38	2.89
Lubricants.....	0.22	0.34
Other Transportation Expenses	0.47	0.25
	<hr/>	<hr/>
	9.73	9.14
TRAFFIC PROMOTION		
Advertising.....	0.04	0.05
GENERAL AND MISCELLANEOUS		
Officers' Salaries.....	0.32	0.30
Injuries and Damages.....	0.11	0.59
Insurance.....	0.01	0.05
Rent of Equipment.....	0.16	0.02
Miscellaneous and General.....	0.05	0.01
	<hr/>	<hr/>
	0.65	0.97
Taxes.....	1.00	0.84
	<hr/>	<hr/>
Operating Expenses and Taxes	22.25	21.39

YELLOW TRUCK & COACH MANUFACTURING CO.

SUBSIDIARY GENERAL MOTORS CORPORATION

5801 WEST DICKENS AVENUE, CHICAGO, ILL.



**For Your
Ready Reference
ESSCO Catalog No. 7**

To increase your patronage, add attractiveness and efficiency to your cars by selecting your equipment from the broad line of Keystone Car Specialties.

They're all listed, described and illustrated in ESSCO Catalog No. 7.

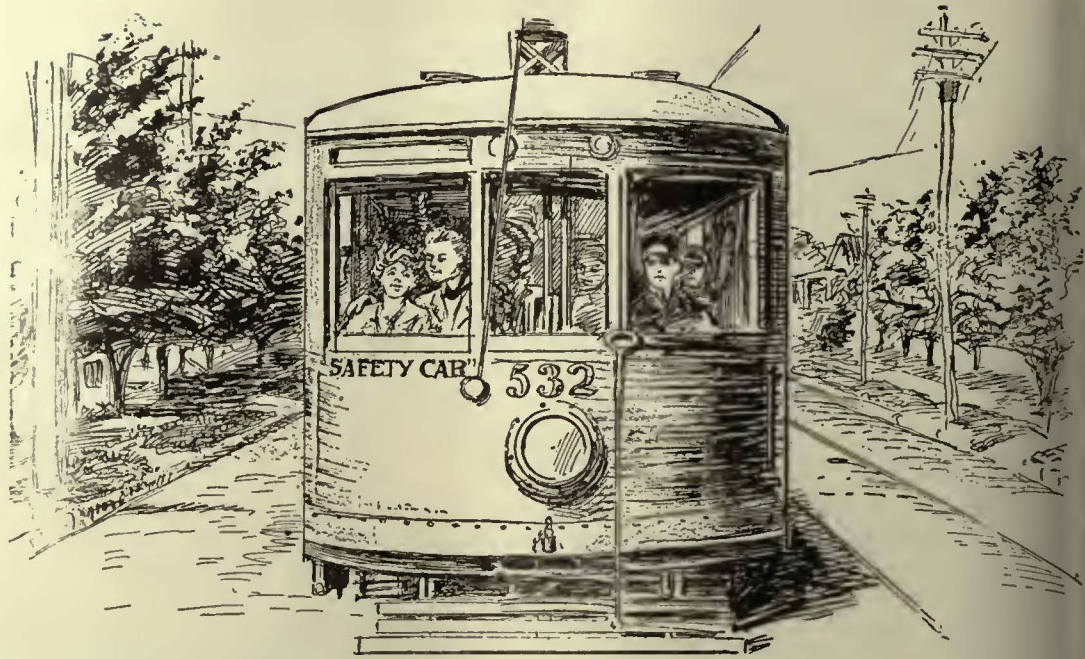
Send for your copy today!

**Some items found
in ESSCO CATALOG No. 7**

- | | |
|------------------------------|-----------------------------|
| Golden Glow Headlights | Automatic Door Signals |
| Faraday Signal Systems | Standard Trolley Harps |
| Hunter-Keystone Signs | Standard Trolley Wheels |
| Steel Gear Cases | Peerless Coil Winding Tools |
| Motorman's Seats | Peerless Armature Machines |
| Lighting Fixtures | Insulating Materials |
| Headlight Resistances | Cass Commutator Stones |
| Air Sanders | Sand Driers |
| Trolley Catchers | Peerless Pinion Pullers |
| Shelby Trolley Poles | Employee Badges |
| Rotary Gongs | Line Material |
| International Fare Registers | Portable Lamp Guards |
| Fare Register Fittings | |
| Samson Cordage | |
| Air Valves | |
| Cord Connectors | |
| Trailer Connectors | |

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 W. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES Co.
 MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



Safeguarding
 accelerated Transportation Service

The objective of modern railway systems is to expedite the movement of traffic—for the sake of their patrons and their profits.

There is a growing demand today for—

- More frequent service—
- Shorter, quicker stops—
- Less delay at entrance and exit—
- A speedier getaway—
- And, maintenance of the basic element of safety.

All these requirements are met to an efficient degree when complete protective and convenience-promoting devices are provided—as embodied in Safety Car Control Equipment. Accelerated transportation service is thereby adequately safeguarded.



SAFETY CAR DEVICES CO.
 OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

*We make the Safety Car Control Devices
 which make the Safety Car.*

TORONTO



NP

Fifty-Two More Cars Equipped With Treadles

Toronto is but one of more than sixty cities where the use of NP Treadle Exit Doors is rapidly extending. Two hundred and sixteen treadle cars are now operated in this city—an increase of fifty-two cars in the last twelve months and an indication of the growing popularity of treadles among both operators and the public.

NATIONAL PNEUMATIC COMPANY.

Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN
TORONTO, CANADA, BY

Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building



MODERN OVERHEAD IS A MEASURABLE ECONOMY

We have spoken
of Phono's
greater safety
and freedom
from Wire
breaks—

Here are figures
to prove it!

		COPPER		PHONO-ELECTRIC	
		B.S.LB.	CONDITION	B.S.LB.	CONDITION
	V.D.—364.8 mils Area—.1046 sq. in.	5520	New	8200	New
	V.D.—300 mils Area—.08108	4280	Good	6360	Above new copper
	V.D.—275 mils Area—.07214	3810	Fair	5650	Still above new copper
	V.D.—250 mils Area—.0633	3340	Dangerous	4960	Above good for copper
	V.D.—200 mils Area—.0466	2460	must come down	3650	Dangerous
	V.D.—150 Area—.0311	1640	Down	2435	Must come down

MANY important roads we have questioned gave this as the *chief* reason for their use of Phono-Electric Trolley Wire.

Certainly when Phono is installed over busy intersections in the heart of such cities as Philadelphia, Cleveland, Baltimore, San Francisco and Chicago the factors of safety and uninterrupted service must weigh heavily.

The chart reproduced above shows clearly the value of Phono-Electric in this respect. But it does not show an equally important angle to the subject,

which is the *absolute uniformity* of Phono-Electric Wire, foot for foot and reel for reel. The Phono Book contains a wealth of pithy information on the subject of modern overhead construction. May we send you a copy.



Ledrite Brass Rod, Phono-Electric Contact Wire, Plumrite Brass Pipe, Phono-Hi-Strength Wire, Tubular Plumbing Goods, Condenser Tubes, Sugar Tubes, Brass, Bronze and Copper Sheets, Auto, Bicycle and Copper Tubes, Auto, Bicycle and Pressure Pumps, Auto Accessories, Stampings, Engravers' Copper, Specialties, Screw Machine Products, Pressed or Drawn Products, Oil and Grease Guns.

BRIDGEPORT BRASS
PHONO-ELECTRIC PHONO HI-CON PHONO HI-STRENGTH

A COMPLETE WIRE SERVICE FOR ELECTRIC RAILWAYS

Bridgeport Brass Co., Bridgeport, Conn. • New York • Philadelphia • Chicago • Detroit • Cleveland



Out of the
Greatest Con-
vention in
Electric Railway
History comes a clear
picture of the
road ahead—

- and the cars that will



*— still a step ahead
of the modern trend!*

CINCINNATI

make it most profitable

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

You have seen the finest exhibit of modern rolling stock ever assembled for the benefit of our industry. You have had ample opportunity to compare Cincinnati Balanced Lightweight Cars with the finest examples of carbuilding from other up-to-date shops.

Weigh two things more before making your final decision. First, that Cincinnati Balanced Cars are jig-built. All parts are interchangeable on any one car order. Replacements can be ordered from the factory with absolute assurance of fit. Repair and maintenance costs are reduced to a minimum.

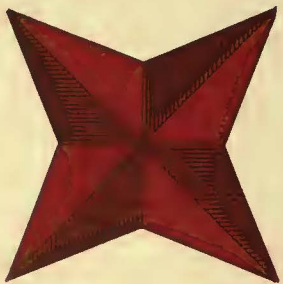
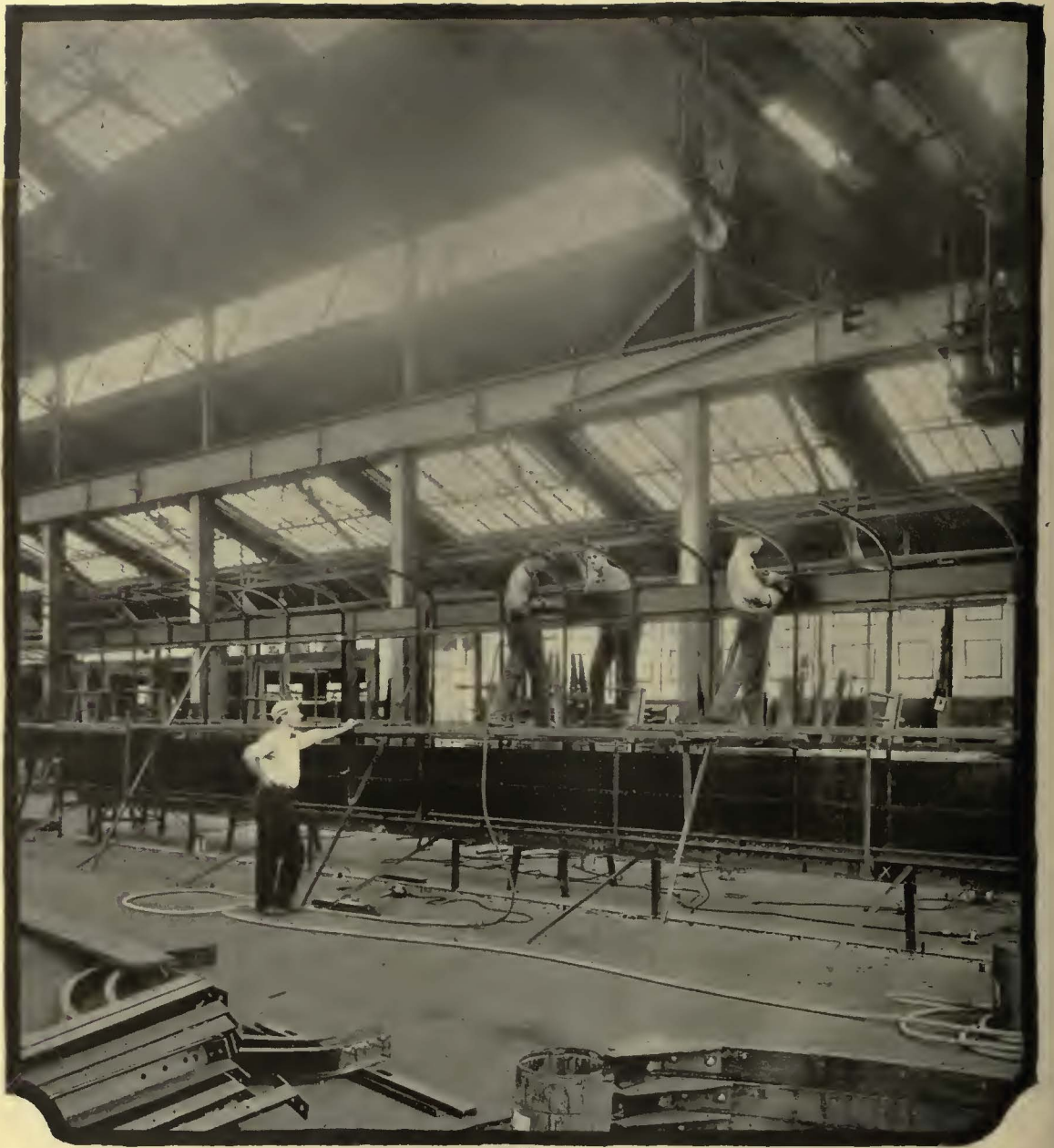
Secondly, bear in mind that by the unique Curved Side Construction of Cincinnati Cars, a full 7 inches extra inside width is possible while bettering the average hub and wagon clearances outside.

Furthermore, by building Cincinnati Cars on a thoroughly modern production basis, and by bringing both design and construction under one competent control, it is possible to produce the best in up-to-date rolling stock at a competitive price.

CINCINNATI CAR COMPANY
Cincinnati, Ohio

**BALANCED
LIGHTWEIGHT**

CARS



The above photograph illustrates a point made on the previous page. It shows part of the main erection shop in Cincinnati with the side-frame of a Cincinnati Car being built up on a special jig. Similar precision methods are used in building up the under-frame, piers and vestibule units, roof and cast aluminum window frames. In this way absolute interchangeability is assured with low production cost and the highest grade workmanship. All items well worth your consideration in choosing the cars which must make money for you, not only today but in the years to come.

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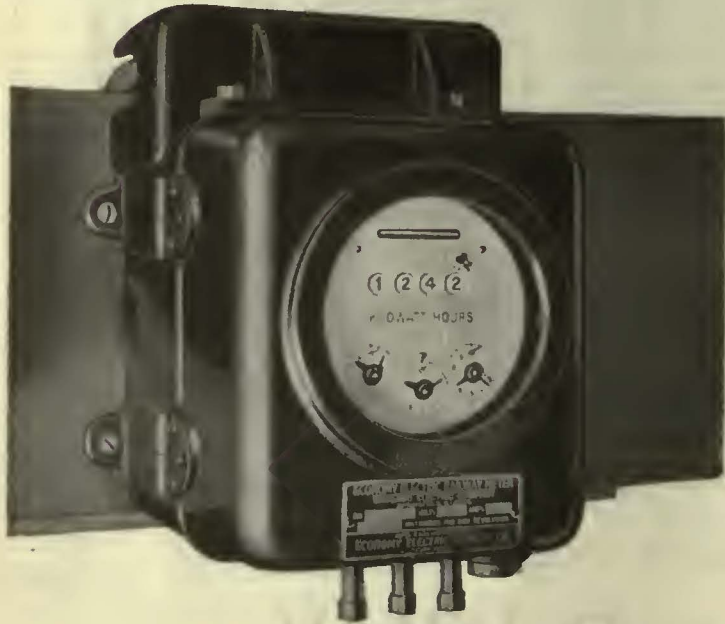
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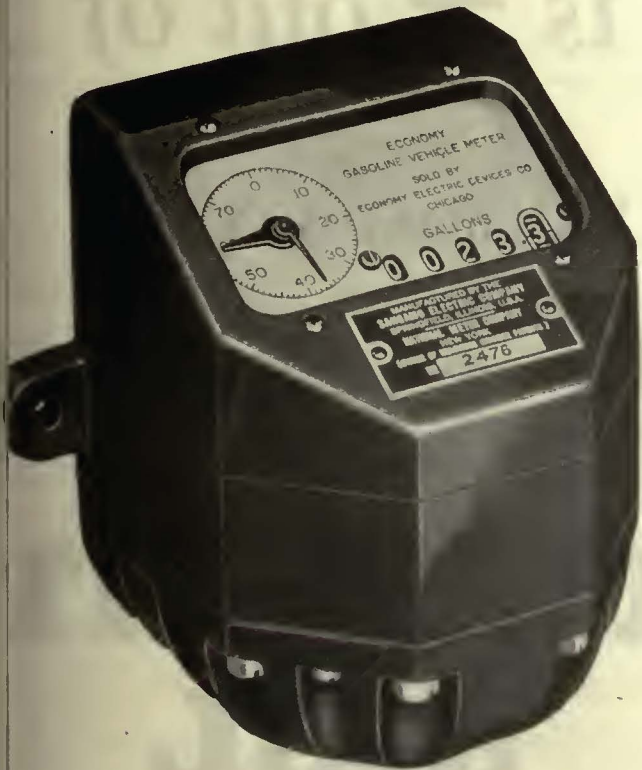
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Reduces Costs



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GENERAL ELECTRIC

Electric Railway Journal

Consolidation of *Street Railway Journal* and *Electric Railway Review*

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The Significance of the Cleveland Convention

FROM the moment the exhibits were thrown open in Cleveland, last Saturday at noon, until the final meeting, conference and luncheon was over yesterday, the 4th annual convention of the American Electric Railway Association was permeated with an intangible something that the industry has not experienced in many years. One finds difficulty in naming it. Nevertheless every one in Cleveland was conscious of its presence. Maybe "an air of confidence" would be the proper term to apply. Perhaps "conviction" would be a better word; confidence in the industry's stability and conviction as to the opportunity which lies at hand. Every man who seriously attended the Cleveland convention came away with a better outlook on the industry and on his job.

Cleveland crystallized the thinking which has been developing in the industry for several years. Cleveland furnished concrete evidence of the progress that has been made. Cleveland threw a brilliant spotlight on the future and literally dazzled that vast multitude of transportation men, who came not only from every corner of America but from foreign lands as well, with the vision it revealed of the opportunities that lie ahead. The convention proved that progress is being made, because it showed concrete advance in the exhibits, talked progress in the meetings and testified to progress in the conferences. It opened up a vista of new opportunities of which the industry has for many years scarcely dared to dream. Every one seemed at last definitely to have grasped the idea that the local transportation industry is moving forward and that opportunity lies just ahead for every man who is willing to grasp it. That, in a nutshell, is the significance of Cleveland.

An Exhibit in Superlatives

ANY attempt to characterize and interpret the exhibits at the Cleveland convention leads to the use of superlatives. It was the largest exhibit in terms of the square feet of space sold and the greatest exhibit in the extent of the developments shown. Many delegates declared that it was as much beyond the 1926 Cleveland exhibit as was that great show an advance over the previous year in Atlantic City. In cars and in buses, in track and in overhead line, in electrical equipment and in shop facilities; in fact, in every department of the transportation business new ideas and improved facilities were abundantly offered.

Five distinct radical departures from conventional construction of street car trucks were shown by as many different manufacturers. For the first time in more than twenty years there was this direct effort, by fundamental changes from conventional practice in street car trucks, to meet the insistent demand for decreased noise, easier coupling and reduced weight. Car bodies showed a similar

metamorphosis. The ugly duckling showed great promise of developing into a swan.

The bus gave no indications of standing still. The models shown reflected a better understanding of the automotive vehicle's sphere of operation and of the conditions under which such service can be successfully rendered. There was evidence in the designs offered of a broader understanding of the economic and merchandising aspects of this comparatively new transportation tool. There was evidence of less reliance by the bus designer on the overworked "rubber urge" as the basis for the application of his vehicle. The idea that the bus depends for its future on the decadence and replacement of railways seems to be giving way in favor of the view that the bus has an even greater future through its development as a distinctive transportation agency in its own right.

And so one could go on indefinitely. The track manufacturers are grasping the idea of applying construction production methods to the laying and maintenance of railway track. Overhead line equipment shows progress in the direction of increasing reliability and life and decreasing ultimate rather than first cost. Shop equipment and accessory manufacturers have taken new interest in the development and application of their products to the needs of the local transportation industry. Every manufacturer seems to have grasped with renewed energy his opportunity for helping to sell more and better public transportation miles. With this spirit and this point of view almost anything seems possible.

American Program Reflects Trends of the Industry

PROMINENT among the many innovations of the American Association program at the convention just ended was a series of five-minute talks by executives on a wide range of topics, the underlying theme of which was the explanation of some progressive accomplishment. Subjects all the way from rehabilitating a broken-down electric railway property to prevention of trolley wire breaks were covered. It is only a pity that the time available prevented more talks of this sort, as they carried the conviction of men who have fought their battles and won.

Another feature was the entire absence of formal committee reports. The position was taken by the program committee that these reports have been printed in advance and are available for the entire membership. Usually the time allotted for discussion on the floor of the convention is so short that only an incomplete evaluation of the work of the committee can be made.

The time saved by elimination of committee reports was used to good advantage for the presentation of a number of notable addresses by speakers from outside the industry. It is significant that all of these speakers

took an optimistic view with respect to the industry and the forward steps it is making along many lines.

It is quite significant that the arguments of a few years ago regarding the place of the bus in the transportation scheme were absent. The bus has been accepted and the affiliated associations are now discussing the exact uses to which it is best adapted, as well as the detail of how best to provide facilities for it and the technique of handling it.

Don't Wait for Costly Money

FINANCE as a subject occupied a large part in the program at Cleveland. It was dealt with by several speakers and was the topic at one of the round-table conferences. There was very little mincing of words about the matter. It is pretty well known where President Stevens stands on the importance of revamping the structures of railway companies. Some of the speakers as well, particularly Mr. Frazer and Mr. Sisson, pointed out specifically what could best be done under certain circumstances to approach the improvement which the committee on finance had in mind when it made its report two years ago.

Advantage has not been taken of the suggestions made by that very able committee after several months of study. This is particularly regrettable because the ensuing period has been one of easy money which may or may not continue. Of course, it is well known that a voluntary readjustment of financial structures is a process not easy of accomplishment. But it is far easier during a period of low money cost than it will be if action is postponed until money rates become higher. The only alternative which any company carrying a topheavy and cumbersome financial structure may hope for is a gradual improvement of its condition through the process of plowing back surplus earnings. That, at best, is a slow method. If earnings are not sufficient to keep the property abreast of developments, then it is best both for security holders and car riders to make a change in structure that will make the company's securities more salable to the public. In view of the present money situation, it seems unwise for many companies to delay changes that ultimately may prove inevitable.

After all, the basis of credit is character. Character in an electric railway means progressiveness of personnel. As Mr. Sisson said, despite the soundness of the railway business from the standpoint of its economic necessity, many properties are hard pressed for credit because of unsatisfactory franchise or contractual relationships and topheavy indebtedness, with its accompanying overload of fixed charges. The relief from improper franchises lies in proper public relations. During the past few years there have been many examples of a complete reversal of franchise conditions through the medium of giving the public a better understanding of the situation as it affects its own interest. Similarly, then, the road to financial improvement lies in the direction of better investor relations. This can be brought about only by a management which adequately appreciates the importance of the financial problem, and undertakes seriously to convince its security holders of the need for readjustment. To come back physically often means to come back first financially. It is impossible to do that unless the railway securities which are offered to the banker, and through him to the public, will stand the closest scrutiny in comparison with those of other industries.

Luncheon Conferences an Innovation

NO CHANGE made in the convention program during recent years has aroused so much enthusiasm as the series of luncheon conferences. Fourteen topics were discussed on three different days and the range of subjects was so wide that there was something of interest for every delegate. In addition to these luncheons sponsored by the American Association, several other groups met similarly to discuss common problems. Such groups were organized by leaders among the affiliated associations and provided the opportunity to consider topics on which information was desired.

Because of the smallness of the groups and the informal nature of the discussion, many members took part who never have been heard on the convention floor. Modest though they were, they all had something to contribute to the discussion. It was quite noticeable that no attempt was made by the speakers to use the time in idle talk, but each one who took part had a real story to tell. In large measure the experiences of the speaker was the subject dwelt on. Often a series of rapid-fire questions brought out details that were needed to amplify the original story until the listeners understood fully the points made. By concentrating on a single subject it was possible to cover it more thoroughly than is usual on the convention floor.

Subjects considered at the meeting were well chosen by the committee in charge. All were well attended, though some were so popular that many were unable to gain admission. The interest, however, was in no way measured by the attendance, as some of the most enthusiastic discussion was evidenced in the smaller groups. In fact these small groups on account of their size were the least formal, and on that account lent themselves to the most open statements of opinion.

Men Who Reveal the Facts

LIKE the Rosetta Stone which became the key to the long lost tongue of Egypt, so does the accountant, interpreter of countless masses of figures, unlock the secrets that lie buried deep in the intricacies of business routine. That he takes his duties seriously in the railway business was apparent during the meetings of the Accountants' Association at the Cleveland convention. There ran throughout the sessions an underlying note of earnestness, studying and thought given to the problems which arise in the accounting departments.

Even a casual visitor to the sessions of this body would have become quickly aware that these men are not limited in vision by the rules on the stationery they use. Their effort is being spent in reaching out for improved methods of gathering, presenting and standardizing accounts in a way that will facilitate analysis of operating efficiency. They are trying to improve their own performance as real interpreters of the industry.

"Dry as dust" is now a misnomer for figures. Under the skillful hand of the accountant they become deep, interesting and vitally significant. On chart and page they are made to live, and they tell a vivid story that may be either one of inspiration or of tragedy. The Accountants' Association is making real progress in improving the work of its members. They are coming to be appreciated in a new way throughout the industry by these men of facts.

The Claims Association Is Making History

HOW can a claim agent best fit himself for his job, keep his mind fresh and alert; keep up with the times?"

So was the question asked by President Proctor in his annual address. It was answered satisfactorily through the three days of meetings at Cleveland, at the Wednesday Claims lunch and in many groups of claims men—old friends meeting again and joining in helpful discussion of new problems and situations. Traffic regulation, for example, so needed as a means of accident and claim reduction, came in for both formal and informal conferences. It occupied much of the opening day's program and was taken up again to be considered from a different viewpoint at the joint meeting of the Claims and the Transportation and Traffic Associations.

It was felt unanimously that the chaos of conflicting traffic rules in cities and states constitutes a potent breeder of automobile collisions with each other, with pedestrians and with street cars, and from this thought and discussion came definite action—i.e., arrangements for the appointment of a committee to convey to the parent association the feeling of the Claims Association that the Hoover code should be fostered and stimulated so that its traffic control provisions may be incorporated into the laws of every state.

No claims man can fail to be interested in the proceedings of the closing day, with its symposium on claims subjects. It included an account of what happened in Milwaukee, where three Circuit judges sat for many weeks on an inquisition into ambulance chasing personal injury lawyers and how the city was purged of their pernicious activities; also the last word on social conditions in Montreal, Cincinnati, Pittsburgh and other cities.

There were new faces, and younger men as well as practically all of the "regulars," at the meetings this year. No executive can afford not to have at least one of his claims men at next year's convention.

Engineering Committee Activities Bring Tangible Results

REPORTS presented this year by the various committees of the Engineering Association were notable for the number of definite recommendations contained. In most instances these committees investigated specific subjects and accomplished tangible results. They dug out the facts, examined them carefully, and stated without equivocation the logical conclusions deduced therefrom.

A good example of this method of working is furnished by the report of the committee on light-section rail. Comprehensive data were secured on the use of 7-in. grooved girder rails of various weights. From the figures obtained, it appeared that there was a considerable demand for a 7-in. rail lighter than the A.E.R.A. standard. The committee therefore recommended the adoption of a new standard, and submitted a design for a 7-in. grooved girder rail weighing 103 lb. per yard. The work of this committee was performed with the neatness of a mathematical exercise which begins with a hypothesis and proceeds through the demonstration to a definite conclusion.

Obviously, it is not possible to handle every subject in just this way. In the main, however, the reports

made by the engineering committees were presented with commendable brevity and clarity. No one could read them without getting a very clear idea of the problems and the committees' ideas of what to do about them.

Unfortunately, the same cannot be said for the reports of all the other associations. Granting that their problems are not all susceptible of the precise treatment given by the engineers to their problems, there remains, nevertheless, much opportunity for improvement. This can best be accomplished by narrowing the scope of activity of the individual committees and studying specific subjects more intensively.

Increased Speed Is a Vital Necessity

AGREEMENT among members of the Transportation and Traffic Association present at the convention was practically unanimous that increasing the speed of car operation is one of the most important problems before the industry today. Opinions differed, however, as to how this desirable result could best be obtained.

In the discussion revolving around the subject of bus operation, it was pointed out that a combination of buses to handle the local traffic and cars operated on a high-speed express schedule with infrequent stops is a possible solution of the problem. Another method of attaining a somewhat similar result is by the operation of the buses in high-speed de luxe service, while the cars carry the local riding. In Detroit the first mentioned of these plans was said to be working well, while the second has met with marked success in Pittsburgh and elsewhere.

That traffic regulation has an important bearing on the speed of car operation was emphasized at another meeting. It was the general opinion that electric railway managements should take the lead in having transportation surveys made in the cities where they operate. Only after this has been done can effective traffic regulations be formulated. Regulations based on guesswork or simply borrowed from some other city are likely to do more harm than good. It was clearly brought out that the foundation of all effective traffic regulation is exact knowledge concerning traffic flow.

Speed was considered the first and most important element in service betterment by the committee studying this subject. The necessity of improving the character of electric railway rolling stock was by no means overlooked by the members of this committee or the delegates participating in the discussion, but it was felt strongly that faster service is of even more importance than better cars. Several transportation men mentioned the desirability of using street loading platforms. This results in speeding up not only the car service but also the movement of other vehicles. The need for quicker acceleration and braking was brought out, although it was emphasized that this should not be done in such a way as to cause discomfort to passengers.

It was admitted that the average street car today is far behind the times in the matter of speed. On the other hand, it was pointed out by one of the engineers present during this discussion that there is no physical reason why the street car should not be the fastest accelerating and braking vehicle on the streets. Judging by the keen interest displayed in this matter of speed by all members of the T. & T. Association present, the electric car of tomorrow will be a faster as well as a better vehicle than the car of today.

R. P. Stevens

Newly Elected President
of A.E.R.A

R P. STEVENS, president Penn-Ohio Edison Company, was elected president of the American Electric Railway Association Oct. 4.

In Mr. Stevens the industry has a fit leader for its present-day problems and opportunities. The field of his past activities extends from Maine to Washington; the range of his abilities from practical house-wiring to broad-scale interstate development.

As recently as 1926 Mr. Stevens' Pennsylvania-Ohio Electric Company was honored with the Coffin award for most distinguished achievements in the electric railway and motor coach field. De luxe interurban cars and de luxe express coaches have ceased to be a novelty, but when R. P. Stevens put the final financial "O.K." on orders for such equipment some five to six years ago he knew he was taking something more than a sporting chance.

Here was a property of small towns and short interurbans shot to pieces from war-time hangovers and competition, with the management faced by an overwhelming propaganda to tear up the tracks and run on rubber only. But there was no weakening. Instead, there was developed the first real co-ordination of rail and coach. Side by side, the company modernized its railways and installed a higher-rate, special-stop motor coach service. When 1926 rolled around, it had completed the full depreciation on its automotive equipment and could prove that its scheme of unification had made good.

With such pioneering by its own president, the American Electric Railway Association can look forward with confidence to the coming year, with its ever-speeding trend toward finer equipment with higher standards of service for an auto-acustomed public. Having made good on his own property, anything that he has to say before fellow-workers or the general public will be greeted with redoubled respect.

On looking back over the past years, one finds that responsibilities came early to Ray P. Stevens. Born in Eastport, Maine, in 1877, his boyhood and youth knew the training of New England effort and frugality. As he made his way through high school and the University of Maine, he built up a house and hotel wiring business



to earn the wherewithal. Even his later work at the Massachusetts Institute of Technology went in tandem with jobs from the Bell Telephone Company and the General Electric Company.

After he built some lighting plants in the South for the General Electric Company, Mr. Stevens found himself at Everett, Wash., at the beginning of the century, where he practically built an entirely new system from power house and track through to cars and general organization. Returning East, he held a number of operating positions until 1907, when he achieved the presidency of the important Lehigh Valley Transit Company at the age of 30. In short order, a deficit was turned into a surplus.

Following six years successful work on what became known as the "Liberty Bell Route" through Mr. Stevens' pioneer work in ride salesmanship, he was called in October, 1913, to the presidency of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, a corporation which has since expanded into a great interstate group of power and transportation

interests. With the expansion of these interests, Mr. Stevens found it necessary to make his headquarters in New York. There he also founded the engineering firm of Stevens & Wood.

Throughout the greater part of his career Mr. Stevens has gladly given his time and knowledge to association activities. While in Pennsylvania he was twice elected president of the Pennsylvania Street Railway Association. He is a past-president of the American Electric Railway Transportation and Traffic Association and now he has attained the highest personal honor within the gift of the industry, the presidency of the American Electric Railway Association.

Those who know R. P. Stevens appreciate his genial character as well as his broad views. If a man's character is best displayed among employees rather than equals, that of Mr. Stevens can well stand inspection. Throughout fourteen years on the Youngstown properties, labor relations, particularly in the difficult field of transportation, have been exceptionally harmonious.

Second Cleveland Convention Eclipses Last Year's

More and better exhibits, improved arrangements, and an augmented program all contribute to the most successful convention in the history of the association



Rush hour at the registration desk

FOR the second time in two years a convention of the American Electric Railway Association has been held at Cleveland, Ohio. This year, the 46th in which a convention of the association has taken place, another record has been made. More railway men registered than last year. Figures for total registration are not available, so it is not possible at this time to say whether the record in this respect will be broken. More exhibit space was used than ever before, and the exhibits were more carefully chosen.

Changes from last year's program were numerous. Committee reports were conspicuous by their absence. None but the essential routine reports were made in the American Association. The Engineering Association, which handles the greatest share of the standardization work, naturally must consider many reports of its technical committees. Even here only one afternoon was devoted to this phase of the work, the meeting being split into parallel sessions that were attended by those who were most vitally interested. The other afternoons were taken up with addresses by men from within or without the industry, who are experts on the subjects they discussed.

For the first time in the history of the association the exhibits were all in place and the doors thrown open Saturday noon, Oct. 1. The registration on Saturday and Sunday showed that many persons took the oppor-

tunity of gaining time to inspect the exhibits beforehand rather than waiting until exhibit day, as in past years. Some rearrangements in the booths made access easier, so that there was not the congestion around some of the booths as in past years. Except for a shower on Saturday afternoon the weather was fair throughout the convention, so that many more persons inspected the outdoor car exhibits than saw those on display last year.

An earnest desire on the part of all the officers of the association to hold meetings on time was noticeable throughout. Discussion was limited, so that unless the speaker really had something to say he made way for the next one without waste of time. By this means the sessions were put through on schedule and closed earlier than has been customary.

The formal opening of the convention took place on Monday morning in the Auditorium. The Cleveland Railway Male Chorus and the Pittsburgh Railways Band alternated in providing an excellent musical program. At the appointed time President Willits H. Sawyer introduced City Manager W. R. Hopkins of Cleveland, who welcomed the delegates. Headed by the band, the assemblage marched to the West Wing, where Mr. Hopkins made the formal address of welcome.

President Sawyer talked earnestly to the delegates in his annual address, stressing the opportunity to give service. Following Mr. Sawyer came a succession of

excellent addresses by men prominent in the business and political worlds. Each left an impression on his hearers.

On Tuesday, Wednesday and Thursday a series of fourteen luncheon round-table conferences was held. The subjects on Tuesday were traffic regulation, taxes, the motor bus, the trend in franchises, developing the sales instinct in platform employees and advertising. On Wednesday, cars, financing, public relations, bringing city service up to date, valuation, fares, and employee relations were the topics. On Thursday there was a single luncheon, devoted to the subject of opportunities and prospects for the interurban.

No program of the association would be complete without an address by E. F. Wickwire. This year his talk sparkled just as much as ever, and he, as in former years, made as many points that drove home.

With all its serious topics the convention was not without its moments in lighter vein. Golf was confined to Sunday. Monday evening the president's reception was held. Tuesday evening's session, sponsored by the Advisory Council, had as its entertainment feature a number of solos by Miss Anna Case, prima donna of the Metropolitan Opera Company. On Wednesday evening one of the local theaters was completely reserved for the delegates and a special show was put on with features for the members. Thursday evening the grand ball was held in the Auditorium.

The Pittsburgh Railways Band gave concerts each afternoon during the convention, and the Cleveland Railway Male Chorus also gave a series of concerts for the delegates. These features added greatly to the success of the convention.

Regulation and Traffic Control Discussed

At Monday's session of the American Association street traffic control and regulation of public utilities were the subjects of addresses by prominent speakers. Revisions of the constitution and by-laws adopted broaden the scope of the association

BRIEF exercises in the Auditorium opened the 46th convention of the American Electric Railway Association at Cleveland on Monday, Oct. 3. A concert was given by the Cleveland Railway Male Chorus and the Pittsburgh Railways Band. President W. H. Sawyer introduced City Manager W. R. Hopkins of Cleveland, who formally opened the sessions. Headed by the band the audience then marched to the meeting room in the West Wing, and the business of the day began.

In his address of welcome Mr. Hopkins paid tribute to John Stanley, late president of the Cleveland Railway, who passed away at the opening of the convention last year. He said that the work of leading and modernizing the Cleveland Railway so ably begun has been carried on successfully by Col. J. H. Alexander. The virility of the transportation industry is shown, he said, by the way it is attacking the problems of the day with energy and intelligence.

The excellent state of the finances of the association was indicated in a brief report by the treasurer, Barron Collier.

The morning was devoted to two addresses. The first by Dr. Miller McClintock, director of the Erskine Bureau for Street Traffic Research of Harvard University, and the second by Hon. W. W. Potter, Attorney-General of Michigan.

Dr. McClintock spoke on street traffic control and electric railway operation, calling attention to a number of the vital points that are essential to betterment of present conditions. It is not possible in the ordinary narrow streets, he said, to give an exclusive right-of-way to street cars. It is, however, within the limits of reason to require vehicles to leave the tracks on the approach of a car so that it can proceed.

Loading zones are essential to safety and dispatch in the handling of street car traffic, he believes, and raised platforms should be installed. Parking should not be eliminated, but it should be controlled. Double-line parking should be prohibited.

The only reason for the use of signals for traffic control, Dr. McClintock believes, is to reduce delays. At least 50 per cent of the automatic signals in use today are worse than useless. The electric railway men should see to it that the installations are made only where they can do some good.

Progressive signaling, where the lights are so changed that vehicles can progress from one end of the control zone to the other without the necessity for a stop, is the best method that has yet been devised. This reduces the unnecessary standing time and speeds all movements.

A telegram of congratulation from President Coolidge was read by the president. This appears elsewhere.

Mr. Potter, speaking on the regulation of public utilities, traced the change from unbridled competition to regulated monopoly, showing the excellent results obtained. The demands of the public have changed, but the railways have not met them, he said. The methods must be modernized accordingly and the rates needed to support them will come, as the public in the long run is appreciative. Payment for paving in the railway area is archaic, he holds. It is unfair, as the community in general is using an investment made by the railway as a result of legislation dating back to the horse car days. The general taxes of the railway are the same as those for other corporations, but the proceeds are often used to provide a right-of-way for a competitor who is attempting to take business away from the railway.

Important changes in the constitution and by-laws of the association were adopted. In brief, these will broaden the statement of the objects of the association, and will make it possible for the executive committee to admit to membership, with proper restrictions, companies operating any form of urban or interurban transportation. Other changes will provide a class of membership for the various state and sectional associations to form an effective tie with their work, and to provide for plural voting in recognition of the difference in size of the various electric railways. This is particularly important in voting on standards. The schedule of dues was revised so that the finances of the Advisory Council would be consolidated with those of the main association.

American Association Elects Officers

Ray P. Stevens is chosen as president. Association listens on Tuesday to budgets. Conditions in the industry and how the public may be pleased

FOUR outstanding addresses featured Tuesday morning's session of the American Association. The subjects were budgeting for the future, improved conditions in the industry, the changing demands of American business, and methods by which the railways may please the public.

Before the first address, Past-President J. N. Shannahan presented the report of the nominating committee. The entire ticket, headed by Ray P. Stevens for president, was elected unanimously.

George E. Fraser of the firm of Fraser & Torbet, certified public accountants, spoke on the ten-year budget. An abstract is published on another page of this issue.

M. H. Aylesworth, president National Broadcasting company, chose as his subject "Smile and the World Smiles with You—Weep and You Weep Alone." He said that he had originally decided to use as his title "Don't Imitate the Undertaker — He Serves Only the Dead," but that after a survey of the situation he had decided the former title would be more appropriate. He paid tribute to the way the electric railway industry has weathered the storm of the past few years and has profited greatly by the experience. A spirit of optimism and confidence, he said, is necessary if the transportation industry is to con-



C. R. Ellicott and E. D. Kilburn

vince others it is a public service essential in character.

Merle Thorpe, editor of the *Nation's Business*, forcefully told the audience of the present orgy of law-making, which is in large measure aimed at American business. Some 92,000 bills were introduced in the last session of Congress, but practically none of the old laws was repealed. The administration of these many laws is burdensome and unduly expensive. One family out of every eleven now is employed in the administration of the laws. It is Mr. Thorpe's opinion that no government can operate a business as efficiently as can a private individual. Business is not a lower type of activity than the professions, said the speaker; it is in itself a profession with just as high standards and ideals. The industrial system of America has created three times the wealth that existed previously.

We still suffer from an old-fashioned idea of a secular order as distinguished from religion, held the Rev. Dr. A. W. Wishart, pastor of the First Baptist Church of Grand Rapids. It is not possible to separate the two, for a civilization or a business or a government cannot be built on falsehood. Men who make products such as those featured in the exhibits shown at this convention cannot do it without having character. He called attention to the beauty of the modern designs, holding that utilities may be pleasing as well as useful. This is a new era. The old era of corruption, political chicanery and trickery is fundamentally wrong and is immoral. Fortunately it is passing. The old way of doing business was secretive, he continued. Now when a good piece of work has been done, instead of keeping it to himself the author can scarcely wait until the next convention to tell about it and so make it useful to others in the industry.

On motion of Mr. Shannahan a vote was passed thanking the speakers for their addresses and the program committee for having secured them.

Grand Rapids Railway Wins Coffin Award

Small property in city of 160,000 awarded 1927 prize at Advisory Council meeting. B. C. Cobb, chairman, points out industry's pressing needs. Hon. George B. Cortelyou discusses the relation between utilities and government

IN RECOGNITION of accomplishments which have had a widespread influence on the entire industry and have done much to awaken the present almost universal interest in the improvement of electric railway service, the Grand Rapids Railroad Company, Grand Rapids, Mich., was awarded the Charles A. Coffin Medal for 1927. President W. H. Sawyer, chairman of the Coffin Award Committee, who made the presentation during the Advisory Council meeting at the Cleveland convention, read the report of the committee setting forth the accomplishments of this property.

The report itself epitomized these accomplishments. With limited facilities, on its initiative and largely with its own resources, this comparatively small railway property, which was scarcely known outside of its own city a few years ago, undertook to demonstrate to the world the process of popularizing electric railways by the improvement of equipment and service. So radical were its methods, the report points out, that when it filed a brief in the competition two years ago, there was considerable doubt as to the outcome of its experiment. The present awakened interest in the improvement of cars, which has permeated to all the manufacturers and to almost every operating property in the country, received a strong impetus by the pioneering of this comparatively small company.

Its accomplishments were not all in the direction of spectacular innovations and showmanship. Combined with this there was a consistent program of increasing operating efficiency and reducing costs. With no change in the rate of fare, revenues in 1926 showed an increase of 1.04 per cent over 1925, and in 1927, when the average figures for properties of its size showed a heavy decrease, it held its revenue slightly above what it had been in 1926, despite a reduction in the activity of the basic industry in its city. For the year ended May 31, 1927, there was a reduction of 9.88 per cent in operating expenses and an increase of 20.83 per cent in net revenue in comparison with the year 1926. After charging off depreciation amounting to approximately 10 per cent of its gross, there was available after taxes a balance equal to 6.4 per cent of its rate base of \$6,000,000. This was an increase for the year ended May 31, 1927, of 41.68 per cent over the corresponding period of 1926. There had likewise been an increase in this figure for 1926 over 1925 of 15.63 per cent.

TWELVE CONTESTANTS IN 1927 COMPETITION

There were twelve contestants for the 1927 award. The committee reported grave difficulty in making a selection because of the excellence of the presentations and felt that each of the briefs was entitled to recognition



B. C. Cobb

by the industry because of the accomplishments shown by these twelve properties—namely, Birmingham Electric Company; Chicago, South Shore & South Bend Railroad; Chicago Surface Lines; Durham Public Service Company; El Paso Electric Company; Georgia Power Company; Grand Rapids Railroad Company; Little Rock Street Railway; Northern Texas Traction Company; Southern

Colorado Power Company; United Railways of St. Louis, and Virginia Electric & Power Company. Of these contestants the Northern Texas Traction Company won the award in 1924 and has continued to be a contender each year, having submitted this year its fifth consecutive brief. Two other of the above companies submitted briefs in previous years, Grand Rapids in 1925 and El Paso in 1923, 1925 and 1926.

Several of the contestants showed evidence of major accomplishments which were considered by the committee to be ample basis for granting them the award had not the prize been so closely contested by the presentation of impressive accomplishments on the part of a number of other properties.

Gross and net revenues were increased by the Birmingham Electric Company, which also effected substantial operating economies and increased riding on its cars by rerouting, new cars and frank publicity.

The Chicago, South Shore & South Bend Railroad doubled its earnings in a period of two years by a program of complete rehabilitation and by the provision of comfortable and luxurious cars designed to win the patronage of former automobile drivers. By arranging to operate its cars over the electrified tracks of the Illinois Central Railroad, an entrance to the heart of downtown Chicago was obtained, thus increasing the usefulness of the road to the territory which it serves.

Despite increased ownership of automobiles in Chicago, the Chicago Surface Lines increased its rides per capita by the improvement of service. Gross earnings were increased and greater operating efficiency was obtained by a determined program of improvement undertaken in the shadow of a receivership and in the face of an expiring franchise. Participation by the railway management in the program of reducing traffic congestion



1. Fred W. Olds
 2. George Kerwin
 3. R. Retan
 4. J. W. Knecht
 5. W. E. Livingston
 6. J. Winks

7. Paul Rust
 8. E. Lunda
 9. S. Dubee
 10. F. Heath
 11. Simon Glerum
 12. Ray Poteracki
 13. L. J. De Lamarter

Officers and key men on prize-winning property

In the downtown district, combined with demonstrated public interest and leadership, won for it the co-operation of its community in bringing about traffic improvement. A major rerouting plan was put into effect without a serious hitch, and resulted in material speeding up of service with important operating economies. A record of efficiency was made during the Christmas holidays, by the operation of 100 per cent of all its equipment.

Continuation of a major program of rehabilitation and improvement over a number of years in the face of losses in revenue and despite those losses finally brought an upturn in the revenue curve for the Georgia Power Company. This improvement program was maintained in the face of a discouraging showing in pursuance of a policy of winning public recognition and support by the sheer weight of performance and demonstrated good faith. This property also succeeded in putting 100 per cent of its equipment in service during the holiday period.

The Little Rock Street Railway equipped its property with new and attractive cars and buses. It showed a reduction in the number and cost of accidents accompanying a change to one-man operation. One hundred per cent of the company's employees are owners of its stock.

Both gross and net revenue were increased by the Northern Texas Traction Company through the modernization of car equipment and the adoption of a scientific fare schedule.

Scientific co-ordination of street-car and bus service by the Durham Public Service Company resulted in a steady and large increase in gross and net revenue. The property shows a remarkably low record of accident costs.

The El Paso Electric Company shows increased average speeds and increased earnings with a steady betterment in its accident record.

The Southern Colorado Power Company rehabilitated its cars, increased operating speed, improved its operating and maintenance methods and succeeded in selling its securities to a large number of local stockholders.

Accomplishments by the United Railways of St. Louis, a company in receivership, include an increase in the number of passengers and in gross earnings, together with a decrease in the deficit after depreciation, taxes and interest charges. Speed was increased and improvement in power and distribution efficiency was shown by the use of a large proportion of automatic and portable substations. Accidents also showed a large decrease.

In the period of only slightly more than a year the Virginia Electric & Power Company completely reversed the opinion and attitude toward the company of the public in the communities it serves. New franchises were obtained, bus and car service was co-ordinated, large increases were made in gross and net revenue and the railway department was put on a self-supporting basis. A heavy program of rehabilitation was undertaken, exten-

sive rerouting was carried out and new fare schedules put into effect.

One of the features of the evening meeting of the Advisory Council was the annual report by B. C. Cobb, its chairman, which is abstracted elsewhere in this issue. He expressed conservative optimism regarding the outlook for the industry, pointing out that there has been no appreciable change in the number of passengers carried by electric railways and their allied motor bus lines during the past three years. The figure has remained almost stationary at sixteen billion passengers despite rapid increases in the number of automobiles owned.

Still another outstanding feature of the Advisory Council program was an address by George B. Cortelyou, chairman of the Joint Committee of National Utility Associations. Mr. Cortelyou's address is also abstracted elsewhere in this issue. Representing as it does the gas, electric and local transportation industries of the country, this committee speaks as the representative of an investment of capital approximating seventeen billion five hundred million dollars. To illustrate further the extent of the utility enterprises in this country and the widespread public interest which they represent, the speaker pointed out that the savings of approximately 5,000,000 people are represented by the investment in the utilities. He voiced the creed of this vast industry in the words, "We do not consider our job measurably complete until the public is well satisfied because well served."

An Experience Meeting of Operators Held

In five-minute talks prominent electric railway men tell how they are solving their problems.

Addresses are presented on finance and progressive methods

FOLLOWING out the general plan of devoting the meetings to formal papers, the greater portion of Thursday morning's session was taken up with addresses by E. F. Wickwire, vice-president Ohio Brass Company, and F. H. Sisson, vice-president Guaranty Trust Company. Mr. Wickwire gave one of his inimitable talks.

Mr. Sisson spoke on the financial situation. The present situation is more reassuring, he said. The public education campaigns are admirable and are producing results and the industry is becoming stabilized.

A feature of the session was a series of five-minute talks on operating problems. The first was by J. L. Alexander, Galveston-Houston Electric Company, who told of the methods used to inspire his men to greater efficiency and loyalty. In order to get the ideas over, the employees have been organized into classes.

R. H. Pinkley, Milwaukee Electric Railway & Light Company, said the methods used to meet the transportation requirements in Milwaukee include improvements in service, higher schedule speeds, and keeping the cars on schedule. Buses are used for special service, and are co-ordinated with the cars.

C. H. Jones, Chicago, South Shore & South Bend Railroad, gave some of the details of how he has developed a 300 per cent increase in business. The property was run down and about ready for the undertaker when it was taken over. The new owners had faith in the electric railway business and so were willing to incur

the expense necessary for rehabilitation. Several things in particular have been done that have improved conditions: (1) An adequate entrance into the heart of Chicago was obtained; (2) at first the company furnished service far in excess of the requirements; (3) the best possible use was made of a parallel motor coach line; (4) a campaign for freight business was begun, both carload and less-than-carload shipments being solicited; (5) a new business department was formed to solicit passenger traffic; (6) a recreation bureau learns of the attractions of the territory served and sells the idea to the general public. There is only a small amount of attention paid to solicitation of passengers, as it is felt that if the territory is built up the riders will come to the line naturally.

There has been an increase in passenger revenue during the first part of this year of 175 per cent over 1920 while the maximum increase in one month was 200 per cent.

The freight business is running at the rate of 150 per cent over 1920 while the maximum month shows a 175 per cent gain. This is a testimony, he said, that the public wants good transportation service.

Col. H. V. Alden, Tinke Detroit Axle Company, spoke of the policy of his company regarding experimental work in connection with street car drives. The type of drive that was chosen, he said



R. P. Stevens

was one that had shown itself to have the longest life.

D. W. Pontius, Pacific Electric Railway, mentioned the loss of passenger traffic due to automobile competition. Though there has been a considerable increase in population in the territory served by his lines, there has been little growth in the passenger business. The freight business is growing at a rapid pace, he said, and the Pacific Electric Railway is now the third largest freight carrier in California, being exceeded only by two steam railroads.

The electric railways in his territory are modernizing and going after business, he said. He outlined the improvements being made in Los Angeles. Lines are being double tracked where needed, and other means are being used to increase the capacity.

A. F. Townsend, Northern Texas Traction Company, Fort Worth, attributed the success in his city largely to the substitution of light-weight Birney cars operated by one man, for heavy two-man cars. Schedule speeds also were increased. In 1914 the operating costs were 10 cents per car-mile, and by 1920 they had jumped to

cents. Introduction of the new cars caused a recession to 16 cents per car-mile in 1926, though the trainmen's wages are increased 180 per cent over what they were in 1914.

H. T. Connelly, Washington, Baltimore & Annapolis Electric Railroad, told of automobile and bus competition along the 40-mile route between the terminal cities. To meet this the old two car trains have been replaced by modern articulated cars, saving 44,000 lb. in weight, and one man out of the three formerly needed. While the cars have not been in service long enough to get comparable figures, there has been a gain in traffic since their introduction.

Adrian Hughes, Jr., United Railways & Electric Company, Baltimore, said that there has been a reduction in trolley wire breaks from more than 100 per month to one in 50 days. This has been accomplished with a reduction in cost of the line department from \$100,000 a year to \$60,000 a year. The change in method was introduced in December, 1920. Previously the line crew waited until a failure occurred; now by careful inspection failures are anticipated. There also has been an improvement in material used, it being appreciated that the best is the cheapest in the long run.

The *Electric Traction* speed trophy, awarded to the Chicago, North Shore & Milwaukee Railroad, was accepted by General Manager Harley A. Johnson, who told of the methods adopted for increasing the schedule speed without raising the maximum speed.

Installation of the new officers was the closing formality of the convention, following the report of the resolutions committee.

Discussions at the Lunch Table

Specific topics considered at fourteen round-table conferences prove of interest to many of the delegates

A SERIES of round-table luncheons was a feature of the Cleveland convention. Fourteen were held under the auspices of the American Association in addition to the several luncheons conducted at the noon hour by the several affiliated associations. Of the American Association luncheons, six were held on Tuesday, seven on Wednesday, one on Thursday and one on Friday. A brief account of those held on the first three days follows:

No. 1 was devoted to traffic regulation.

It was brought out that there is a marked tendency to install traffic control lights without regard for the conditions under which they are to operate. The bad results of this practice in various cities were mentioned by a number of speakers. Others emphasized the importance of railways assuming leadership in solving traffic problems.

Taxes were considered at luncheon No. 2. Most of the information developed at the meeting related to the taxing practice of different states on public utility properties, particularly electric railways. While no attempt was made to obtain any general consensus of opinion, the thought was expressed by several of the speakers that a gross or gross-net tax was simpler to determine and had the advantage usually of requiring a smaller number of tax boards.

Luncheon No. 3 was on the motor bus and was largely

an experience meeting in which representatives from Louisville, Youngstown, Los Angeles and other cities gave their experiences.

The subject discussed at luncheon No. 4 was trend in franchises. One company said its difficulties on a new franchise were solved when it induced a group of representative citizens to investigate its situation and make recommendations.

At luncheon No. 5, on developing sales instinct in platform employees, the possibilities in this direction were brought out by the experience of several companies.

Luncheon No. 6, on advertising, was attended by more than 100 delegates and there was an exchange of ideas on the best means of selling car and bus rides.

The popularity of the round-table luncheons at the Cleveland convention assures their retention as a feature next year. On Wednesday the American Association held six more of these informal meetings at which delegates were able to exchange experiences without loss of time. So many registrations were received for some of these luncheons that two rooms instead of one had to be engaged. When the discussion took place, however, all of the diners came together in one room.

This was the case with luncheon No. 7, on the subject of cars. In it the actual experience testimony of men who have carried out car improvement programs piled up convincing evidence of the growing acceptance by the industry of the importance of improved cars as the key stone of the entire service improvement program for electric railways. Several examples were cited of properties which had first started on a small scale with the remodeling of older equipment and had gradually expanded its program to the purchase of new cars of the most modern types available. Representatives of several large properties at the luncheon said that they were only awaiting demonstration of the proper types of equipment to be used before entering upon extensive replacement programs. There seemed to be no question in any one's mind but that the present car exhibit had demonstrated in no uncertain way the possibilities in developing cars that can compete successfully with the private automobile under modern traffic conditions.

Methods of new financing and refinancing of electric railway properties was the subject of luncheon No. 8. It was presided over by President-Elect Stevens. He opened the meeting by calling attention to the report of the advisory committee on electric railway finance, presented to the association in 1925. In this report it was recommended that where necessary to revise the financial structure, arrangements should be made to do it voluntarily without the necessity for a receivership. There are some properties, he explained, that cannot be made successful. The sooner this is admitted and they are eliminated, the better the general railway situation will be. L. S. Storrs pointed out that the better the earnings the lower the interest rate that can be obtained. Some question was raised as to why the senior security holders should be made to suffer rather than the junior. It was brought out that the junior holders will suffer in any event where a reorganization of the capital structure is necessary.

"Get your house in order," "sell your employees before you try to sell your public"—such were the rallying cries of the public relations luncheon (No. 9). Thomas Fitzgerald of Pittsburgh in opening this discussion mentioned briefly the policy of his company not to punish employees and not to allow any hint of compulsion to



Leaders at the Luncheon Conferences



- 1. L. R. Nash
- 2. B. I. Budd
- 3. L. J. Delamar
- 4. L. H. Palmer
- 5. H. B. Flowers
- 6. W. E. Wood
- 7. G. H. Clifford
- 8. T. Fitzgerald
- 9. T. Conway, Jr.
- 10. Edward Dana
- 11. F. W. Doolittle
- 13. Leslie Vickers



enter the company's dealings with the public. Careful employee education and a fair attitude toward the city and the riding public are held by him to be more effective policies than would be heavy-handed methods. R. B. Stearns of Boston outlined briefly the "home rule committee" plan which the Eastern Massachusetts street railway evolved for improving public relations in the various communities which it serves. Fred Cummings of the same company expressed the belief that every company should have a good newspaper man in charge of its public relations, a man with courage enough to stand up to the railway executives and tell them when he believes their attitude to be wrong, even at the risk of sacrificing his own head. John Davies of Philadelphia spoke of the comprehensive plan of employee-employer co-operation which has been worked out in Philadelphia, resulting in a company sales force numbering 12,000 enthusiastic individuals. Adrian Hughes, Jr., of Baltimore mentioned the fact that his company has one employee for every 200 citizens in Baltimore, the obvious inference being that when each employee takes upon himself a responsibility for the company's public relations splendid city-wide coverage results. Other speakers told of good results in Houston and Fort Worth, Tex. The problem of interurban public relations was discussed by Mr. Allenson. He described the experience of his own company with the interurban line between Fort Worth

and Dallas and pointed out that first-class equipment and service will do more for good public relations than anything else within the power of the company to accomplish.

More than 100 attended luncheon No. 10, on city service, many telling how the replacement of old cars with new or modernized cars, increased speed and additional comforts had resulted in increased patronage and great friendship for the utility on the part of the public. Chicago improved service has been obtained in speeding up street cars by co-operation with municipal authorities and other affected interests through a successful plan for street traffic control. This has enabled the speed of the street cars in Chicago to be increased to an average of 11.02 m.p.h. Other experiences along somewhat similar lines from Atlanta, Detroit, Kansas City and St. Louis were cited.

At the valuation luncheon, No. 11, the discussion centered particularly on the fundamental difference between historical value and cost of reproduction value. One of the intangibles that seemed to bother all representatives present was going value. Courts have ruled that some allowance must be made for this, but no rule for arriving at it have been given. The problems of each utility seemed to require separate solution so that a method used on one property is not applicable to another.

At luncheon No. 12 it was declared that the trend of fares was still upward despite the difficulty in securing increases, the dangers of making fares too high and the effect of changing fare rates on public opinion. Many interesting facts on various types of fare were mentioned, and means of attracting off-peak traffic at reduced rates and educating the public as to the need of higher fares with better service received considerable attention.

Luncheon No. 13 was devoted to employee relations, and accounts were given of the practice in discipline, pensions, benefit associations, etc. It developed that the benefit association in Milwaukee, composed of more than 500 employees, handles its own life, health and accident insurance, operates a building, savings and loan association and handles matters of safety, service and every other feature affecting its membership. The association has more than \$500,000 invested in good securities, and its members have more than \$9,000,000 invested in their own building and loan stock. Through this association 3,500 employees have been able to purchase or build their own homes.

Under the sponsorship of Dr. Thomas Conway, Jr., president of the Cincinnati, Hamilton & Dayton Railway, the luncheon meeting on Thursday, devoted to the general subject of interurban railways, provoked a spirited discussion of many phases of the intercity problem. B. J. Flon, speaking for the group of Insull owned high-speed electric lines radiating out of Chicago, declared that the large increase in the travel habit between cities offers interurbans a greater prospect for business, provided that the proper kind of service and selling initiative can be developed. As an example he cited the experience of the Chicago, South Shore & South Bend Railroad, which has shown an increase of 150 per cent in its business following an extensive program of rehabilitation and intensive merchandising.

D. W. Pontius said that the Pacific Electric Railway is about to spend more than \$1,000,000 for improved cars and better facilities for its passengers in the effort to compete more successfully with the privately owned automobile. W. H. Burke testified to the effectiveness of higher speeds and remodeled cars by citing the experience of the Galveston-Houston Electric Company in successfully competing for business.

Freight revenue was held by many of the executives present to afford opportunity for the development of additional business. Freight earnings by the Interstate Public Service Company, according to L. M. Brown, have more than offset the decrease experienced in passenger business. H. A. Nicholl expressed the opinion, based on the experience of the Union Traction Company of Indiana, that interurbans must ultimately go to pick up and delivery of freight in one form or another to meet truck competition. J. M. Bamberger announced that the Bamberger Electric Railway had just started a pick up and delivery service at each end of its line, at regular trucking rates in that territory. He considered delivery of even more importance than pick up in the eyes of shippers.

A discussion of the proper type and size of passenger equipment for interurban service led to differences of opinion which occupied attention during the balance of the meeting. This discussion revolved around the relative advantages and safety of heavy and light equipment in high speed service. Dr. Conway summarized the situation by suggesting that interurban equipment divides

itself into various classes depending upon the nature and characteristics of the line and service.

In addition to these luncheons, similar gatherings were held by the Accountants, Claims and Engineering Associations on Wednesday. References to them will be found on other pages of this issue.

Maintenance in the Limelight at Cleveland

Journal prizes awarded at dinner during convention. Prominent executives emphasize importance of maintenance men's part in popularizing electric railway service



W. T. Rossell
Who spoke at the Maintenance Dinner in Cleveland on Oct. 2

"SPEED, convenience, comfort, safety, economy—these are what the times demand. No inconsiderable part in the achievement of these things rests upon the maintenance man. He finds himself always between two opposing forces, improvement and economy. One without the other is easy; together, they test him. The balance that creates the greatest use is the end sought."

With these words, W. T. Rossell, general manager Pittsburgh Railways, characterized the problem of the maintenance man at a dinner held at the Hollenden Hotel on the evening of Oct. 2, when the four annual prizes awarded in the ELECTRIC RAILWAY JOURNAL'S maintenance contest were presented to the winners.

Three of these winners were able to be present. They were James A. Duffy, superintendent of equipment Monongahela West Penn Public Service Company, who received the first prize of \$200; Joseph Mercier, general foreman track service division, Montreal Tramways, who received the second prize of \$100, and E. M. Miley, estimating engineer Chicago Surface Lines, who received the fourth prize of \$25. The winner of the third prize, \$50, Charles Hermes, general foreman San Diego Electric Railway, was not able to be present, but the prize and a certificate of award were handed later to representatives of his company who were at the convention, for transmission to Mr. Hermes.

100 MEN INTERESTED IN MAINTENANCE PRESENT

Besides the prize winners and judges in the contest, those in attendance at the dinner included about 100 other representative delegates to the convention who are especially interested in maintenance problems. Those at the head table, besides Charles Gordon, editor of ELECTRIC RAILWAY JOURNAL, who acted as the chairman, were President W. H. Sawyer and Managing Director L. S. Storrs of the American Electric Railway Association; Daniel Durie and R. H. Dalgleish, the retiring president and the incoming president of the Engineering Association; W. H. McAloney, president Association of Equipment Men, Southern Properties; P. V. C. See, past-president Central Electric Railway Master Me-

A Message to the Association

THE WHITE HOUSE
WASHINGTON, D. C., SEPT. 30, 1927

WILLIAMS H. SAWYER,
American Electric Railway Association,
Cleveland, Ohio.

I hope your convention will be most successful in furthering the cause of transportation so vital to the welfare of our people. Any progress in solving the real problems presented by modern conditions is a service to all. Please present my greetings and best wishes to your members and your guests.

Calvin Coolidge.

chanics Association; W. T. Rossell, general manager Pittsburgh Railways; A. T. Clark, superintendent of rolling stock and shops United Railways & Electric Company, Baltimore, and chairman of the committee of judges in the contest. The other members of the committee of judges, F. McVittie, electrical engineer New York State Railways; Howard H. George, assistant to chief engineer Public Service Production Company, and G. C. Hecker, special engineer American Electric Railway Association, were present as were also prominent railway and manufacturing executives.

The prizes were presented individually by Mr. Clark, chairman of the committee of judges, who declared that the purpose of the contest was to bring about a greater interchange of ideas between maintenance men and thus to raise the level of maintenance practice in the industry. In referring to these contests, he said:

"Since the men who are responsible for keeping cars, tracks and lines in efficient operating condition are inclined to be overmodest and reticent in taking the initiative toward publishing the improvements which they have found effective in saving labor or cost, this plan of posting prizes for such items was a very desirable and helpful one. The unusual publicity given to those items which were awarded prizes should also tend to break down the tendency on the part of maintenance men not to utilize in their own work an idea developed by the fellow on another property. In at least one instance a maintenance idea which was awarded one of the monthly prizes was quickly adopted by a large truck manufacturer and made a part of his standard equipment."

Mr. Clark explained that the members of the committee of Judges had been appointed by President Durie of the Engineering Association to represent different departments of maintenance work. He also explained the care used by the judges in naming the prize winners. In conclusion, he said:

"The board of judges desires to commend the action of the ELECTRIC RAILWAY JOURNAL for establishing these interesting contests. It is their belief that excellent benefit to the electric railway industry will result from the broadcasting through the railways of these various items and will stimulate those who would ordinarily give little thought to publishing their wrinkles to produce items of even greater benefit and more use to the many interested in electric railway companies."

Mr. Gordon, acting as chairman, pointed out that while the purpose of the meeting primarily was to award the prizes, the JOURNAL hoped thereby also to inspire in the

maintenance men of the industry a broader vision of the part they play in popularizing electric railway service, to stimulate more interest in maintenance on the part of the railway executives and to encourage further developments of equipment and machinery through the introduction of these new devices to the manufacturers.

PROMINENT EXECUTIVES SPEAK

The railway executives who spoke at the dinner included Messrs. Sawyers, Storrs, Rossell, McAloney and See. All emphasized, though from different angles, the important part played by the maintenance man in popularizing electric railway service. Mr. McAloney said: "The street car is the show window of the industry, and unless the car is well maintained, clean, attractively painted and mechanically capable of operating with a minimum of failures, all the other efforts to popularize the service will fail."

Mr. Rossell, in addition to the remarks contained in the first paragraph of this article, said, in part:

"To me the significance of this maintenance contest is not the mere improvement in method in connection with a few operations. It is far deeper than that. It shows the alertness of mind, the enthusiasm and adaptability of the individuals. Formerly an attitude of mind seemed to exist based on the axiom, 'Never explain anything, your friends don't need it and your enemies won't believe it.' This attitude is breaking down. Everywhere men are traveling about to find out what others are doing. Everywhere men are explaining and showing their most cherished plans and methods. There is no property on which the visitor cannot learn something worth while. The harvest is waiting for the sickle."

Clarence W. Squier of the ELECTRIC RAILWAY JOURNAL staff, also spoke and showed slides of the apparatus which won the prizes. He explained the purpose and advantage of these devices. He also showed slides of other equipment entered in the annual and monthly maintenance contests.

Educational Conference Held Friday

THE final event on the program of the Cleveland convention was the educational luncheon and conference, held Friday at the Hollenden Hotel. Edward Dana, Boston, chairman of the American committee on education, was sponsor for the conference, and it was held under the leadership of Arthur J. Rowland, Milwaukee.

The principal subject discussed was systems for training platform men and bus operators. Experience quoted at the meeting was that following an extended course of this kind on one road, there had been a 70 per cent reduction in accidents, 10 per cent in labor turnover and 20 per cent in claims cases. The course is divided into three general divisions, i.e.: (1) The school training, (2) road training and (3) instruction in equipment details.

It was found that all the roads represented at the conference give special attention to the instruction of one-man operators, and they considered that freight operation adds many problems to the operating course.

The difficulty of modernizing the ideas of some of the older employees was mentioned as a considerable problem by some of those present. Many excellent methods used to select members of the supervisory force were also brought out at the meeting.

Improved Methods and Equipment Needed, Say Engineers

Ways of producing economical maintenance discussed. Power economies result from use of automatic substations. Motor coach design an added problem. Commercial aviation a new field. Committee reports show progress made

ECONOMY was the general subject of papers and discussions at the first day's session of the Engineering Association. That these problems are receiving much attention was evident. The general impression given was that improved methods and better equipment provide the surest road to ultimate maintenance economies and that although costs at the start may appear high, the ultimate results are the important ones to be considered. Improvements to railway cars, trucks, overhead and power supply are entirely up to the engineers and maintenance forces. That these problems are receiving much attention was evident.

In his address as retiring president of the Engineering Association, Daniel Durie stated that many changes have taken place in our industry during the past decade. Greater design, weight reduction, one-man operation, higher accelerating and braking rates, higher speeds, reduction of noise, improved appearance of car bodies, scientific lighting and increased comforts and conveniences for passengers are among the important developments.

In the power field, the automatic substation is a development which has influenced greatly the design and operation of substations. Now comes the mercury arc rectifier, which may have a marked influence on present practices in power conversion and distribution.

All of you are familiar with the developments that have taken place in the construction and maintenance of tracks. The use of labor-saving machinery and modern methods of track construction and maintenance, together with the application of welding to rail joints, has brought great changes in this branch of our work.

The motor bus brings an entirely new set of engineering problems to be solved, and aerial transportation is being talked of. Perhaps our next set of problems will come in connection with the design, operation and maintenance of airplanes. The significant aspect of all these developments is the changed status of the electric railway business. The obligation to furnish any and all kinds of public transportation in our communities falls squarely upon the shoulders of the established transportation industry. This was held to broaden the field of activity for the electric railway engineer, and to open up greater opportunities ahead for those who can measure up to the job.

The association has been active through its committees and its staff at headquarters in gathering and disseminating information, in establishing good practices and in developing standards for use by the industry. Research work in several fields has been carried on under committee supervision to develop data for the advance of the art and to effect economies. The association is the agency through which the industry expresses its views



J. G. Barry and W. B. Potter

and safeguards its interests in national standardization and in joint studies and investigations with other national groups.

The activities of the association have been expanding due to changed conditions and to the impetus given to national standardization and simplification through the work of the American Engineering Standards Committee and the Division of Simplified Practice of the Department of Commerce. This has necessitated a complete change of the association's committee structure in order that more men might be enlisted in the study of the ever-increasing engineering problems and in the development of improved practices and better standards. The new committee system will be completed during the next year. It appears to possess many advantages over the old system, but the executive committee is not yet entirely satisfied with the results and is striving constantly to improve the plan.

In recent years there has been too little time for the presentation and discussion of committee reports and there has been no time at all for papers and discussions of general interest. A new plan is being tried this year which the officers believe will greatly enhance the value of the meetings. This plan provides for group meetings to be held simultaneously, one for the rolling stock division, one for the way and structures division, one for the power division and one for the purchases and stores division. All committee reports will be presented and discussed at those group meetings and all necessary committee business transacted.

Another matter to which the executive committee has given considerable thought is that of promoting wider

use of the association's standards and recommendations. Obviously the maximum benefits and economies of standardization can be realized only when such standards become generally accepted. Some of our present standards are quite widely accepted today. Others, however, are not used very extensively and the executive committee is seeking the reason for this in the hope that our entire program of standardization can be made of greater value to the industry. Committee members can help in this problem by using our standards and recommendations and by urging others to use them.

Track, Cars and Power

A paper on each of these subjects was presented at the Monday afternoon session

IN A paper on track construction and maintenance economies, F. B. Walker, chief engineer Eastern Massachusetts Street Railway, showed charts to indicate the amounts of track reconstructed, progress by years, derailments and costs in a rehabilitation program of his company. He also described a base plate joint construction used on his system. This paper is published in abstract elsewhere in this issue.

W. H. Sawyer, president of the American Association, spoke briefly and emphasized the need for recognizing the human element in all engineering work, instead of insisting that things be mechanically perfect. He said that the convention speaks for itself; it is the biggest and best ever held, but what are we going to do about it? Everyone is sure to go home with a thrill and with new pride in the work that they are doing and with the fact that they are electric railway men. Mr. Sawyer emphasized, however, that the job is just beginning. Engineers must work out the foundation on which to build for a better future.

"Economies Obtained with Modern Cars" was the title of a paper presented by W. R. McRae, superintendent rolling stocks and shops Toronto Transportation Commission. This paper brought out the thought that attractive cars are not sufficient. Maintenance methods must be improved and as a result costs will decrease. Mr. McRae described the modernization program as carried out by his company and spoke of maintenance improvements, cars, shops, track, line, record systems and new tools used. Results showed that this elaborate program has paid far beyond expectations and that modernization, if properly carried out, will convert a deficit into a surplus. A more extended abstract will be found on another page of this issue.

Discussion of this paper brought out that increased attention to the modernization of all maintenance departments eventually results in economies and also a reduced attention to service and creates a better feeling toward the railway by its patronage. Two of the speakers indicated that managements of some railways appear to be forcing maintenance departments to give too great attention to the reduction of costs instead of insisting on improved maintenance methods and use of better and more modern equipment for the work. If railways are to continue to exist, this attitude must change.

The concluding paper of the first session was on "Automatic Substation Economies," by W. E. Bryan, superintendent of power United Railways of St. Louis. This described how automatic substations are constructed

in St. Louis and showed that a large saving has resulted over operation with manual stations. This paper is also abstracted elsewhere in this issue.

Committee Reports Presented Way and Structures, Rolling Stock, and Power Divisions Hold Separate Meetings

THE second day's meetings of the Engineering Association were devoted to committee reports. To facilitate presentation of these three simultaneous sessions were held. The first was devoted to reports of the way and structures division, the second to the rolling stock committee reports and the third to power reports.

WAY AND STRUCTURES DIVISION

Evidence of the extent to which track and roadway officials are studying the problems of their department of electric railway service was given in the quality and variety of reports presented at the meeting of the way and structures division of the A.E.R.E.A. on Tuesday. H. H. George, chairman of the committee and assistant to the chief engineer Public Service Production Company, Newark, N. J., presided and presented the report of the main committee. W. W. Wysor, chief engineer of the United Railways & Electric Company of Baltimore, was sponsor of the meeting. The interest of the members in the work of the division was shown by an attendance of 150 engineers and construction men.

In addition to the technical reports and discussions, a brief talk was made by Lucius S. Storrs, managing director of the A.E.R.E.A., in which he pointed out the important part good track construction and maintenance plays in good transportation.

"The best and cheapest investment a railway can make is good track. Smooth tracks are a necessity in this day, when the automobile with its pneumatic tires has taught the public to demand comfortable, easy-riding transportation," Mr. Storrs said.

In addition to the report of the committee on way and structures by Chairman George, two other regular committees reported. C. A. Smith, superintendent of roadway, Georgia Power Company, Atlanta, as chairman of the committee on road preservation filed the committee's report recommending several changes in the manual. He stated that the committee considered the major part of its work had been completed and recommended that it be discontinued as an independent committee, the industry to be kept advised of new developments in the future by a special committee of the division. A more extended abstract of this report will be found elsewhere in this issue. E. M. T. Ryder, way engineer Third Avenue Railway System, New York City, made a brief verbal report telling of the studies being made under the direction of the committee on welded rail joints.

Reports also were filed by a number of special committees. The report of the committee on rail corrugation was made by D. D. Ewing, professor of electric railway engineering, Purdue University. The variety of problems involved in this subject was indicated when Professor Ewing stated that "everything between the trolley wire and 10 ft. under the track" might be a contributing factor in this mysterious cause of damage to rail. Further particulars of this report appear on another page.



Left, A. T. Clark and W. W. Wisor; right, Terence Scullen

An interesting paper on corrugation was presented by E. O. Ackerman, maintenance of way engineer Columbus (Ohio) Railway, Power & Light Company. Mr. Ackerman told of his studies over a period of years and advanced the theory that corrugation was caused by synchronization of pulsating flow of power with tort vibration of axle and wheels, these vibrations becoming cumulative at certain speeds of the vehicle and causing corrugation.

W. R. Dunham, Jr., executive engineer Department of Street Railways, Detroit, made the report of the special committee on review of Manual. He suggested that in the section of the Manual W. 108-23 Rivets there should be a revision of paragraph 503 to read as follows:

"Rivets shall be of full diameter called for on plans, and rivet holes shall not be more than $\frac{1}{8}$ in. greater in diameter. When not otherwise called for by plans or specifications, rivets shall have standard button or cone heads of uniform size for the same size rivet. Countersunk rivets shall be flush with the surface and fill the countersink except that the rivets through base and tie plates may have a crown of not more than $\frac{1}{8}$ in. below the surface of the plate."

E. M. T. Ryder, Third Avenue Railway, read the report of the committee on special track work. It referred particularly to switch tongues and hard centers and is given in abstract elsewhere in this issue.

Arc-welding processes and welding rod specifications were reported on by C. F. Gailor, of New York, chairman of this special committee. This report was based on a very thorough study, and the committee says it believes the report represents the most reliable and up-to-date information possible to secure at the present time. It contained a set of rules to be observed in arc welding, a set of welding rule specifications, both contained in appendices which the committee recommended should be published for general distribution. The committee also recommended that further study be made of the subject, particularly of the cost of welding rods, comparison of welding rods and use of special alloy rods.

A. T. Spencer, general superintendent of construction and maintenance Montreal Tramways Company, gave the report on alloy steels other than manganese for special trackwork, and light section girder rails were reported on by C. A. Alden, chief engineer of the frog and switch division of the Bethlehem Steel Company. Further discussion of rails was contained in the report of the special committee on relative advantages of 7- and 9-in. girder rails, which was given by H. F. Merker, chief engineer way and structures Brooklyn City Railroad.

A. E. Harvey, superintendent construction department Kansas City Public Service Company, reported on the effect of modern vehicular traffic on paving in the track area, giving special attention to the effect of increasing loads carried by rubber-tired vehicles in breaking down paving subgrade.

Other track matters were discussed in the report on track ballast and drainage delivered by S. C. Baker, engineer maintenance of way East St. Louis Railway Company, and on track construction specifications by C. L. Hawkins, engineer maintenance of way United Railways of St. Louis. C. H. Clark, engineer maintenance of way Cleveland Railway Company, offered in lieu of a written report on track checking gage two gages designed for this purpose by his committee.

J. R. McKay, chief engineer Indiana Public Service Corporation, Fort Wayne, gave the report on bus garage design and told of work that has been done in co-operation with the National Fire Protection Association in an effort to arrive at acceptable construction specifications.

H. E. Bachman, of Newark, chairman of the special committee on car house and shop construction and wiring regulations, was unable to attend the meeting and no formal report was made. Chairman George stated that the committee on joint railway and bus terminals had been inactive during the year and announced the appointment of E. D. Eckroad, engineer maintenance of way northern Ohio Power & Light Company, Akron, as chairman for the coming year.

ROLLING STOCK DIVISION

Assuming that the amount of discussion is an indication of relative interest, it appears that modern cars, car lighting and noise reduction are the live subjects in the rolling stock division. Thirteen special reports and three general reports were presented at the session, abstracts of which appear elsewhere in this issue. In the progress report on suction strainers for air compressors J. C. McCunè, chairman, urged that greater attention be given to suction strainer maintenance. The report contained descriptions of some late type designs.

The committee on sidewear of motor brushes reported progress and recommended a continuation of its study. The special committee on gearing reported that no conclusions could be arrived at regarding relative merits of helical and spur gears.

The committee on overhead current collecting devices presented two sets of graphs, one plotted from information secured by previous committees and the other from data obtained from this year's committee. These graphs showed companies arranged in order of their wheel life, and the outside diameter of the wheel used and trolley pole tension were plotted for these companies. The graphs were very similar in wheel life, but the 1927 data show a wide variation in trolley wheel pressure against the wire. They also show a more uniform diameter for wheels used.

POWER DIVISION

At the meeting of the power division of the Engineering Association held Tuesday, Oct. 4, two important committee reports were read and discussed.

The first, on power transmission and distribution, was read by Chairman F. McVittie, electrical engineer New York State Railways, Rochester, N. Y. The particular subjects covered in this report were specifications for catenary construction and materials, trolley wire wear, improving specifications for bronze trolley wire, radio

interference, inductive co-ordination and design of distribution layout for automatic substations. The advisability of establishing a standard for comparing methods of operating and maintaining overhead lines and the standardization of trolley wire reels were also treated. A design of suspension for contact car and a specification for standard bronze trolley wire were reported as having been adopted by the standards committee. Further details of this report are published on another page.

The committee on power generation and conversion, W. E. Bryan, superintendent of power, the United Railways of St. Louis, chairman, had three specific subjects to report on: The ventilation of automatic substations, mercury arc rectifiers and economical trolley potential for congested districts of urban systems. The ventilation report included the results of an intensive three-year study on this subject. Other valuable information was given by W. E. Peters, C. A. Butcher and Pierre Blommers. The mercury arc rectifier report stated that no method of rating had as yet been agreed upon. Data on some rectifier installations were given by O. K. Marti. Results of tests on trolley potentials for congested districts were given. The economies effected by the use of certain voltages under various conditions were included in the report, of which further details are given on another page.

General Meeting Thursday

Motor coach engineering, overhead line maintenance, and aviation discussed

MOTOR coach design, overhead line maintenance and commercial aviation formed a varied program for the third and concluding session of the Engineering Association. The paper by H. D. Church, director of engineering White Motor Company, on trends in motor coach engineering brought out discussion as to developments that will provide greater accessibility of parts so that maintenance operations can be carried out cheaper and with less trouble. Light-weight construction through the use of aluminum or other light-weight materials appears as one development that will be watched closely. In answer to a question "Why Use Four Speed Gearing?" discussion showed that the speed steps of gearing for buses is determined usually by the worst conditions encountered.

New developments were referred to by Carl Stocks, editor of *Bus Transportation*. "An interesting feature," he said, "is the tendency toward automotive street cars on rubber tires. In the early days the automobile note was predominant in bus service. Engine location, lines of body, position of driver, all had to copy the private automobile as far as could be done with the much larger vehicle, or, at least, so it was thought. Now comes a new movement worthy of close study. Is the public concerned merely with getting somewhere as soon as possible regardless of the appearance of the vehicle, or has past favoring of the automobile type of vehicle had anything to do with the popularity of the bus?"

Maintenance of a large overhead system was discussed in a paper by M. W. Cook, superintendent of power and inclines Pittsburgh Railways, in which stress was laid on the great value of efficient overhead maintenance. Discussion brought out that proper organization to reduce detentions is most vital. Various speakers described things they are doing along this line.

The latest form of transportation, that by airplanes, was discussed in a paper, "General Aspects of Commercial Aviation," by R. H. Horton, former vice-president Philadelphia Rapid Transit Air Service. Mr. Horton traced the development of commercial air services since the war. Much of the progress has been in the mail service. He pointed out the dependability of this, and suggested that a method of payment be adopted that will more equitably compensate the carriers for the service rendered. Passenger air transport he holds to be one of the most important fields for development, although it has been sadly neglected.

The closing business of the session included the installation of newly-elected officers and the presentation of a past-president's badge to Daniel Durie, retiring president.

Conference on Welded Rail Joints

EXTENSIVE investigations by scientists and practical engineers conducted during the past year under the direction of the committee on welded rail joints of the Engineering Association were described at a meeting of the committee on the lower floor of the Auditorium Wednesday morning.

E. M. T. Ryder, way engineer Third Avenue Railway System, New York City, and vice-chairman of the committee, presided. Mr. Ryder stated that the committee which is a joint committee of the A.E.R.A. and of the American Bureau of Welding, a research department of the American Welding Society, had outlined a series of investigations to determine the best type, size, shape and seam of welded joints, the effects of preheating and post-heating, the comparative advantages of use and non-use of base plates and the advantages of contact or compression of the joint. One hundred and fifty joints will be made up for these tests, and Mr. Ryder stated that approximately one-fourth of this number had been made up during the past year and turned over to scientific investigators.

Prof. H. L. Whittemore, chief of the division of mechanics, U. S. Bureau of Standards, Washington, described and presented charts showing the results of tele meter investigations into the effects of impact loads and static loads. O. S. Peters, also of the Bureau of Standards and an associate of Professor Whittemore in these studies, was scheduled also to speak but was unable to be present.

"Strain gage" investigations to determine the strain on seam-welded rails resulting only from the process of welding were described by Prof. L. H. Crook, of the department of mechanics, Catholic University, Washington. Studies along a similar line have been made during the year by Prof. Thomas R. Lawson, of Rensselaer Polytechnic Institute, Troy, N. Y., who told the committee about them.

W. W. Wysor, chief engineer United Railways & Electric Company of Baltimore, was in charge of a third series of experiments on the effect of "Impact on Joint Without Fishing Contact," and these were described by R. B. Fehr, of the Una Welding & Bonding Company Cleveland, under whose direction the tests were conducted.

J. Wolfe, assistant superintendent of track and road way Chicago Surface Lines, was elected a member of the executive committee, succeeding E. J. McIlraith, station engineer of the same company, resigned.

Standard Tongue Switch Indorsed

AT THE Engineering round-table luncheon on Wednesday emphatic approval of the new proposed standard solid manganese steel tongue switch was voiced by way engineers from all sections of the country. Drawings of the suggested design were distributed by E. M. T. Ryder, who sponsored the meeting and called for expressions of opinion. It was generally agreed that many advantages can be had by standardization of switches and that the proposed design meets the needs of the situation. Some doubt was expressed as to whether a 6-in. riser was sufficiently long. This matter will receive further consideration by the committee.

Representatives of special trackwork manufacturers stated that the standard switch could be supplied at the same cost as designs now used. Practically every engineer who was present agreed to install one or more of the new switches during the next year for experimental purposes.

Better Buying and Storekeeping May Help Industry's Finances

PURCHASING agents and storekeepers who attended the meeting of the purchasing and stores division on the afternoon of Tuesday, Oct. 4, were not left in any doubt concerning their rôle in the present-day transportation drama. They were told in no uncertain terms by President W. H. Sawyer, Lucius Storrs and B. J. Yungbluth, president of the International Railway Company, Buffalo, N. Y., that they were the "watch-dogs of the money drawer"; that the financial stability of the electric railway industry depends, in large measure, upon their increasing efforts to wipe out waste expenditures.

SHOULD WIDEN THEIR SCOPE

Time after time the thought was advanced by the various speakers that purchasing agents and storekeepers, far from being mere routine cogs in an organization, should ever be widening their scope and becoming familiar with the activities of all departments in their respective companies. In this way these men become competent to assume a large share of the responsibility for coordinating more completely the work of their depart-

ments with that of the remainder of the organization. By reducing the investment in materials on hand, more money is released in the "cash drawer" of the industry.

Greeted cordially by Daniel Durie, president of the American Electric Railway Engineering Association, and presided over by J. Fleming, assistant secretary and purchasing agent of the Capital Traction Company, Washington, D. C., and chairman of the committee on purchases and stores, those in attendance were unanimous in their feeling that the afternoon was a most profitable one.

J. G. Barry, vice-president of the General Electric Company, discussed the possibilities of further standardization of equipment and urged that operating companies improve their own financial condition by adopting, as far as is consistently possible, the standards that have been established by manufacturers and by the American Electric Railway Engineering Association. This would make quantity production possible to a much greater degree than is now the case and would benefit materially both operating companies and manufacturers.

Mr. Barry also suggested that a real source of saving would be found in a reduction of the number of separate orders sent to manufacturers by railway purchasing departments. A number of small orders consolidated on one sheet will cut down amazingly the amount of "paper work" by both buyer and seller. This reduction will mean savings, not of hundreds but of thousands of dollars a year to the railways, in the opinion of Mr. Barry.

Mr. Yungbluth, in emphasizing his point that the investment in materials on hand be kept as low as possible, cited the "horrible example" of one large company about two years ago which had more than \$100,000 worth of special work on hand which had never been used and for which there was no immediate likelihood of a demand. At the time, the financial condition of this company was very dubious and it could ill afford this needless tying up of capital.

"Some Phases of Stores Practice" was the title of a talk by W. E. Scott, superintendent of supplies for the Philadelphia Rapid Transit Company. Mr. Scott has been active in the work of the committee on purchases and stores since its establishment in 1923, and he outlined in interesting fashion some of the accomplishments of this group since that time, mentioning particularly the effectiveness of the stock-book plan, adopted in the year 1923.

MR. FLEMING READS REPORT

The report of the committee on purchases and stores for 1927 was read by Mr. Fleming and was adopted in its entirety by the members of the division. An abstract appears elsewhere in this issue. Particular attention was called to the simplified invoice form mentioned on page 12 of the report, and the division voted favorably on the committee's recommendation that this simplified invoice form be indorsed by the American Electric Railway Association.

An added note of interest in the meeting was given by the unexpected attendance of both Mr. Sawyer and Mr. Storrs. These men spoke from their own experience as operating executives in stressing the importance of purchasing agents and storekeepers in the progressive forward movement of the transportation industry. In other words, these jobs are as big as the men that fill them.



Ed Meissner receives Anna Case in the St. Louis car exhibit

Newly Elected Officers
of the
American Electric
Railway Association



J. P. BARNES
First
Vice-President



C. E. MORGAN
Fourth
Vice-President



PAUL SHOUP
Second
Vice-President



J. H. HANNA
Third
Vice-President



R. P. STEVENS
President



BARRON COLLIER
Treasurer



J. W. WELSH
General Secretary

New Members of the Executive Committee



J. H. ALEXANDER



D. W. SNYDER, JR.



J. G. BARRY



W. F. CUTLER

T.&T. Plans for Increased Speed

Need for faster service emphasized at all meetings. Economies of bus operation and adoption of a uniform classification of accidents also discussed.

Edward Dana becomes new president

METHODS of increasing the speed of car operation constituted the theme of greatest interest at the meetings of the Transportation and Traffic Association. The first session was devoted to a discussion of bus operation and it was brought out that buses can often be used to advantage in conjunction with cars to provide more rapid service. Much of the work done by the committee on traffic and safety, whose report was considered at the second meeting, was in the direction of speeding up service. Again at the third meeting the same thought was emphasized in the discussion of service betterment.

Careful study of the recommendations of the various committees was urged by J. V. Sullivan, retiring president of the Transportation and Traffic Association, at the opening session. He said that the statement in the report of the committee on bus operation that 80 per cent of the railways studied feel that bus operation is justified, even though a much smaller percentage were able to report revenue sufficient to pay a return on their investment, is evidence of real courage and a determination to cry out what these operators feel is an obligation to give their communities. An outstanding feature of the report of the committee on traffic and safety to which he called particular attention is a suggested outline of subjects to be studied in making a traffic survey. Latest developments in traffic signal control are also ably presented, he said. The only way to sell our product, according to Mr. Sullivan, is through service betterment which involves comfort, convenience and speed of transportation. It involves also making transportation vehicles more attractive in design as well as in color.

In conclusion, he urged men of the operating departments to engage more actively in association work. Engaging seriously and studiously in committee work means getting a more intimate knowledge of its important problems.

Views on Bus Operation

Report of committee provokes discussion as to whether buses can be run at a profit

WHETHER or not bus operation is profitable was the subject of lively discussion at the Monday afternoon session. R. N. Graham, chairman, briefly summarized the report of the committee on bus operation. Commenting on the report, L. V. Tighe urged that study be made to discover means of operating buses more cheaply so as to furnish mass transportation at lower cost. A. J. Bosseau said he had never heard of a profitable A.E.R.A. bus operation, but this, he believes, is because the value of bus operation has not been correctly appraised. B. C. Cobb differed from this opinion. He stated, however, that bus transportation is essential and that it can be made profitable by proper adjustment of

service and fares. Garrett T. Seeley spoke of the indirect advantages of bus operation, such as smaller losses than would result from car operation under the same conditions. Combination bus and car service now being tried on Jefferson Avenue in Detroit was described by N. J. Shorn.

Experience in Cleveland with gas-electric and mechanical drive was discussed by M. W. Rew. He said that the gas-electric was more expensive, but possessed certain advantages in other ways. In the opinion of H. H. Hile it is desirable to keep the bus-operating personnel independent of the railway personnel, even though the services are co-ordinated. He emphasized also the importance of keeping bus weights down to a minimum. Care of tires was discussed by L. G. Fairbanks. A demonstration of the school of the Northern Ohio Power & Light Company for training bus operators was introduced by A. C. Blinn.

Lively Interest in Safety Work

Tuesday's joint session with Claims Association brings out need for careful analysis of accidents and their causes

PREVENTION of accidents was the subject of principal interest at the joint session of the T. & T. and Claims Associations on Tuesday afternoon. C. H. Even-son, co-chairman with H. K. Bennett, presented an outline of the work done during the year by the joint committee on traffic and safety.

Referring to the section of the report dealing with accidents N. W. Funk said that separation into chargeable and non-chargeable groups encourages trainmen to make greater efforts in safety work and explained the methods followed in Louisville. A similar opinion was voiced by William Paache, who stated that this separation had reduced accidents on the Chicago Surface Lines. Various changes were suggested by G. J. Kerwin in the present classification. George B. Anderson spoke of the desirability of adopting a uniform classification of accidents to permit comparison of what is being done on different railways. Lucius S. Storrs addressed the meeting briefly and emphasized the same point. D. L. Fennell said that recommendations for standardization had been made regularly and that the time had now come to take active steps to secure it. C. T. Boynton concurred in this opinion. J. V. Sullivan, presiding at the meeting, assured the members present that this matter would be taken up by the Claims Association. More attention should be given to the human element in safety work, according to A. J. Sarre. The need for whole-souled co-operation between management and men was stressed by J. P. Brown. The viewpoint of the Amalgamated Association of Street and Electric Railway Employees was presented by P. J. McGrath.

The report of the committee on bonus and award system was presented by G. T. Hellmuth. H. V. Drown explained the bonus system used by Public Service Railway.

Discussing traffic S. E. Emmons said that enough consideration is not being given by traffic regulatory authorities to the relative number of people carried by various vehicles. The tendency is to consider a street car and a private automobile as equally important from the traffic standpoint, whereas the car is really carrying many times more passengers. Making a traffic survey is not enough, in the opinion of M. R. Boylan. The real job is to secure the adoption of effective regulations. It is doubtful, he thought, whether it is desirable for the railways to take the lead in this matter. J. B. Stewart, Jr., said that traffic regulation is not a job for amateurs, but should be attempted only by experts after careful study.

Speed Essential for Service Betterment

Higher schedule speeds can be obtained by attention to details of operation. New officers installed at closing session

METHODS of speeding up electric railway service constituted the theme of the discussion at the Thursday afternoon session of the Transportation and Traffic Association. S. E. Emmons presented a brief résumé of the report of the committee on service betterment. He emphasized the fact that increasing the speed of car operation is the greatest need today.

Mr. Emmons also said that since the report of the committee had been printed a question had arisen concerning the definition of average speed as given therein. This was defined as being the figure obtained by dividing the total passenger car-miles by the total passenger car-hours, including lay-over time. Because some members objected to this definition, he suggested that the figure so obtained might be called operating efficiency rather than average speed. He stressed the point that such figures formed a better basis of comparison between companies than figures derived without including lay-over time.

C. H. Evenson stated that lay-over time should not be included in speed calculations. He expressed doubt concerning the desirability of making more frequent stops during the middle of the day than during the rush hour, as advocated in the report of the committee.

The dictionary states that speed is a rate of movement, according to E. J. McIlraith, and the committee cannot create a new meaning where speed is determined by the length of rest taken after the trip is over. However, it is quite possible and highly desirable to create a standard practice among members in determining speed.

The standard practice should be to class operating speed as the average rate of travel while operating. It can be obtained as a comparable figure from any company that pays proper attention to its scheduling.

Much damage is being done, he said, by misunderstandings as to street railway speed. For example, in Chicago it has been customary to report to the state commission crew pay-hours as car-hours for certain standard statistics, even though more than 11 per cent of the pay time is for time allowances outside of platform and terminal time. As a result the Chicago Surface Lines has been frequently represented as operating at a speed of less than

9 m.p.h. Bus operating and manufacturing officials have stated at commission hearings, before the City Council and in publications, that the street railway speed is below 9 m.p.h. They obtained that figure by dividing car-miles operated by crew pay-hours, which is no different in principle, Mr. McIlraith said, from what the committee proposes. Such tactics may some day be used against each railway operator, and unless he has a clean record of speed of operation that truly represents the meaning of speed, it may prove very embarrassing.

A contrary opinion concerning the value of speed was expressed by L. W. Heath, who thought that the average car rider is not so much interested in speed as in frequency and regularity of service. The attention which is now being paid to betterment of service marks a new era in the electric railway transportation industry, according to F. L. Butler. Speed is of paramount importance, he said. In Atlanta increased speed has not resulted in any increase in the number of accidents.

Increasing the rates of acceleration and braking is an effective way of increasing speed, according to J. C. Thirlwall. Use of track brakes and automotive type braking equipment are possible ways of accomplishing quicker retardation. He said that from an engineering point of view there was no reason why the street car should not excel all other vehicles in rapidity of acceleration and braking. An opposing opinion was expressed by E. J. McIlraith, who pointed out that the necessity of carrying standing passengers makes it impossible to accelerate and brake street cars as rapidly as automobiles. In his opinion, much time is now lost between the movement of the motorman's brake handle and the effective application of the brakes to the wheels. Design should be improved to correct this situation, he thought.

George L. Kippenberger suggested that the best way for the electric railway industry to secure betterment of service would be for it to follow the example of Henry Ford and purchase modern equipment, even though this involved scrapping much expensive equipment that is not yet entirely worn out. W. T. Rossell mentioned the use of loading platforms as an effective means of increasing the speed of cars. These also tend to increase the speed of other vehicles using the streets.

Other phases of service betterment were brought out by A. J. Manson and J. J. Moran. Mr. Manson said that courtesy and tact on the part of trainmen are nearly as vital as speed. Mr. Moran suggested that trainmen be instructed to tell passengers the reason for delays.

After the discussion of service betterment, the report of the committee on resolutions was received and adopted. This included an appreciation for the work done by the officers of the association and the manufacturers in making the convention a success and an expression of the grief felt by the association on account of the death of E. M. Walker during the past year.

Edward Dana, the incoming president of the T. & T. Association, was escorted to the chair and made a brief address. He said that a meeting of the new executive committee had already been held and work of the association for the coming year would get under way within ten days. The meeting concluded with presentation of the past-president's badge to J. V. Sullivan.

Other new officers of the T. & T. Association for the coming year are W. H. Boyce, first vice-president; Samuel Riddle, second vice-president, and Paul Wilson, third vice-president. Members of the executive committee will be George B. Anderson, R. N. Graham, F. L. Butler and Richard Meriwether.

Accountants Bend Efforts to Solve Problems in Their Field

Reports and discussion show their earnest contribution to the advancement of accountancy in the industry. Referred to as the foundation stone of their organization. Bus accounting a subject of importance. T. B. MacRae was elected president

IN THE meetings of the American Electric Railway Accountants' Association at the Cleveland convention there was an impressive note that reflected the thought and earnestness that the accountants are devoting to a subject of vital importance to the electric railway and bus industry—accountancy. This body of men, referred to at one of the meetings as the foundation stone of their organization, are contributing to the science of railway accounting and endeavoring to solve the problems that arise in their field of work. A study of the reports of the various committees indicates not only the analytical student which the accountant of today is, but shows that he must have an essential grasp of all the details of the operations of his organization.

Bus accounting was the uppermost subject apparently in the minds of a number of the members of the association, although it was for the most part informally discussed. Many interesting and informative points were evolved.

At the meeting of the executive committee on Oct. 2, President L. E. Lippitt of the association, with the approval of the committee appointed E. H. Reed, third vice-president of the association and auditor of the Brooklyn City Railroad, the association's representative on the national joint committee on taxation.

The opening session was called to order on Monday afternoon in Accountants' Hall, Cleveland Auditorium, by President Lippitt and was followed immediately by his address. In this he reviewed some of the matters that had engaged the attention of the association during the past year, first calling attention to the committees that were appointed.

"Bus operation," he stated, "is playing a very important part in the transportation field. During the past year we have been working with some of the state commissions with the view in mind of having our classification adopted as a standard, and of course have met with some opposition. Nothing, however, was very serious, and we have hopes that, generally speaking, our standard classification will be used by the principal operators."

He expressed the belief that a national standard was highly important. Touching upon the subject of co-operation, Mr. Lippitt said: "Our association cannot



T. B. MacRae and Mrs. MacRae

fully measure up to its responsibilities without the co-operation of all of its company members and a real personal interest must be taken by them in the association's affairs." A communication from Past-President J. J. Duck was read expressing his regret at not being able to be present.

The report of the committee representing the Accountants' Association at the annual convention of the National Association of Railroad and Utilities Commissioners, W. L. Davis chairman, was read by O. H. Bernd, and received. It gave an account of this meeting.

Prior to the reading of the report of the committee on bus accounting by M. W. Glover, the president expressed his belief that this committee was one of the most important and that bus accounting seemed to be one of the foremost subjects before the association at present. The report is presented in abstract on another page. An

informal discussion followed on the best method for bringing the classification before the various state commissions, after which the report was adopted.

Mr. Glover also read the report of the committee on standard classification of account. This report, which is abstracted on another page, was approved. Tribute to the splendid work of Mr. Glover in the association was paid him by Mr. Heberle, in which President Lippitt joined. Announcement was made that a get-together luncheon would be held at the Cleveland Athletic Club on Wednesday at 1 o'clock.

The address of the afternoon was delivered by Harry Boggs of Herdrich & Boggs, certified public accountants, Indianapolis, who took for his topic "Evolution of Regulation and Accounting." This made a marked impression on the association, so much so that he was the recipient of a rising vote of thanks from the members in addition to the thanks of the chair.

Announcement was made by Mr. Lippitt of the presence in the meeting of President Willits H. Sawyer of the American Electric Railway Association. Stirring, impressional and short, sum up the characteristics of President Sawyer's talk. He told the members that he wanted them to know that he was really interested in their association. Anent the subject of why more accountants did not attend the meetings of the association, he told them that in the final analysis they were the men to whom executives must come for facts. He called their

attention to the time when a man was only a bookkeeper and pointed out the respect in which the accountant of today was held.

The following committees were appointed by the chair: On nominations, T. Kilfoyle, Cleveland; F. E. Wilkins, Youngstown, and W. A. Blasing, Glens Falls, N. Y.; on resolutions, C. E. Yost, Wilmington, Del.; J. P. Hudson, Montreal, and Walter Shroyer, Anderson, Ind.

Buses and Fares Discussed

Reports of committees received and commented on at Tuesday session. W. L. Barnhart speaks on methods for combating embezzlement

THAT bus accounting is a subject to the forefront in the minds of a number of the members of the American Electric Railway Accountants' Association was again evident at the second session of this association. Although discussed informally, it is perhaps safe to say that more interest has centered around it than any other subject during the convention. Many interesting points were brought out and reflected the clear thinking and study of men who are devoting their best efforts to an analysis of the numerous phases the question presents. That it is a subject of national import was evident. Particular attention was paid to the angle of depreciation in bus accounting.

The report of the committee to review the proceedings of the Accountants' Association was first on the program. J. E. Heberle, chairman, advised that the committee had no report to make. Attention of members was directed to the value of the bound volumes of the printed proceedings of the association and particularly the use of the index, to which ready reference could be had to find out whether a study had been made of a special subject.

E. A. Tuson stated that the committee on fare collection had no formal report to make and indicated that it

was the feeling of the committee that the subject did not require an annual report but needed to be kept up to date. He suggested that the members look at the exhibits of the machines pertinent to their line of work.

An interesting discussion followed on the use and advantage of certain types of machines, in which T. H. MacRae, President Lippitt, M. W. Glover and others took part. Another interesting and informative discussion ensued on the subject of a clearing house for tokens.

The speaker of the afternoon, W. L. Barnhart, took for his subject "Combating the Present-Day Criminal," reference to which will be found elsewhere in this issue, which he illustrated with exhibits. At its conclusion President Lippitt thanked him on behalf of the association.

An informal discussion followed on bus accounting, after which the meeting was adjourned.

Graphs an Aid to Accounting

Economies effected by their use illustrated with charts at Thursday session. Resolutions adopted and officers elected

FOLLOWING the opening of the final meeting on Thursday afternoon by President Lippitt, a brief oral report was made for the committee on graphs by C. R. Mahan, chairman, comptroller Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., explaining that most of the work had been done by correspondence. J. F. Egolf, general manager Chicago, North Shore & Milwaukee Railroad, who was present at the meeting and was on the program for "Economies Effected by Use of Graphs" had appointed A. Christesen, general manager's engineer, to act in his stead. Four graphs were then shown and an analysis of them made by Mr. Christesen.

Among them was one comparing passenger car-miles by months with last year and comparison of passenger revenue obtained by months with last year and another



Welcoming Miss Anna Case to the car exhibit

merchandise dispatch station labor summarized chart showing the cost of handling per ton by months, also M. D. car-miles tonnage and train labor. Mr. Christesen also enumerated other charts which they made.

The report of the committee on stores accounting, abstracted elsewhere in the JOURNAL, was presented by R. A. Weston, chairman, special accountant of the Connecticut Company, which was followed by the address of the afternoon, "Passenger Revenue Handling," by Horace L. Howell, consulting engineer Meyer & Wenthe, Chicago, Ill., an abstract of which appears elsewhere in this issue. Mr. Howell did not read his report verbatim, deeming it unnecessary as copies of the pamphlet had been distributed prior to the meeting, but instead he took excerpts from it, which he amplified. He also analyzed some of the average fare charts which appear in the back of the pamphlet.

This was followed by the report of the committee on nominations by T. P. Kilfoyle, chairman which recommended: For president, T. B. MacRae, general auditor Chicago Rapid Transit Company, Chicago, Ill.; first vice-president, O. H. Bernd, secretary Des Moines City Railway, Des Moines, Ia.; second vice-president, Edwin H. Reed, auditor the Brooklyn City Railroad, Brooklyn, N. Y.; third vice-president, C. E. Yost, assistant secretary-treasurer Wilmington & Philadelphia Traction Company, Wilmington, Del.; secretary-treasurer, J. W. Welsh, executive secretary American Electric Railway Association, New York. Members at large: J. E. Heberle, assistant to president the Capital Traction Company, Washington, D. C.; Edward A. Tuson, general auditor Public Service Railway, Newark, N. J.; C. R. Mahan, comptroller Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.; L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

Officers were duly elected and Lucius S. Storrs, managing director of the American Electric Railway Association, stopped in for a few minutes and expressed his pleasure at being with them.

The installation of officers followed and Mr. MacRae, the incoming president, after taking the chair, advised the members that he had always been a great believer in constructive criticism and that he would be more than glad to receive suggestions or criticisms on matters that might be done.

Get-Together Luncheon Held by Accountants

INTERSPERSING pleasure with business, the members of the Accountants' Association held a get-together luncheon at the Cleveland Athletic Club Wednesday afternoon, with 34 members present. An informal discussion took place of subjects that were of much interest and thought to the members, reflected by the responsiveness with which they participated. "Fare collections," "lost and found department" and classifications were the principal themes.

The meeting of the new executive committee was called to order by President L. E. Lippitt immediately after the luncheon. On motion of C. E. Yost, the meeting was turned over to T. B. MacRae, first vice-president. Committee chairmen were then appointed as given in the following:

Bus accounting, E. A. Tuson; standard classification of accounts, M. W. Glover; stores accounting, R. A. Weston; freight accounting, W. Shroyer; review of the proceedings of the Accountants' Association, J. E. Heberle; program, E. H. Reed; fare collections, E. A. Tuson; joint committee on engineering-accounting, L. T. Hixson; committee representing the Accountants' Association at the annual convention of the National Association of Railroad and Utilities Commissioners, W. L. Davis.

Preceding adjournment of the accountants a suggestion was made that a joint session of the purchasing agents and storekeepers and accountants be held next year.



Attractive designs featured the car exhibit on the outdoor tracks



R. H. Dalgleish

T. B. MacRae

Heads Accountants' Association

THE auditor of the Chicago Rapid Transit Company, T. B. MacRae, will serve as president of the Accountants' Association during the coming year. Mr. MacRae has been in the electric railway field since 1882.

His first position was with the Chicago & Northwestern Railroad in its local freight office in Cedar Rapids, Ia. Here he remained with the company about three years, when he entered the freight auditor's office of the Burlington, Cedar Rapids & Northern Railroad. After two years in this department he was appointed traveling auditor and subsequently chief accountant in the general auditor's office. In June, 1902, this company was taken over by the Chicago, Rock Island & Pacific Railway and he was transferred to Chicago to close the books and accounts of the absorbed company. He remained with the Rock Island Lines until March, 1905, when he was elected auditor of the Metropolitan West Side Elevated Railroad, at that time an independent corporation.

In September, 1911, the four elevated railroads operating in Chicago were brought under a unified management and Mr. MacRae was elected auditor of the individual companies. These four companies were consolidated on Jan. 1, 1924, under the corporate name of Chicago Rapid Transit Company and he was elected auditor of the consolidated company.

With this background of experience in electric railway accounting in its every phase, and with many years of fruitful activity with the American Electric Railway Accountants' Association, Mr. MacRae brings to his new task a combination of talents that is unusual.

Mr. MacRae was born in Jackson, La. He was educated in private schools and at the United States Military Academy.

R. H. Dalgleish

New President of Engineering Association

THE Engineering Association at its meeting on Oct. 10, elected R. H. Dalgleish, a popular electric railway engineer, its president.

Mr. Dalgleish is chief engineer of the Capital Traction Company, Washington, D. C., which company he joined in 1892. Step by step he advanced until in 1919 he became chief engineer. A special honor was conferred upon him in 1922 when he was elected president of the Washington Society of Engineers, comprising in its membership most of the prominent engineers in all branches who make their headquarters at the capital.

His service with the Engineering Association has been noteworthy for his active committee work. In 1921 he served as chairman of the committee on equipment. He had previously been a member of this committee. The following year he was chairman of the committee on specification for a tank, a line of work requiring expert engineering knowledge. His enthusiasm for company section work in the association led to his election, in 1916, as president of the Capital Traction Company section. He has also served as chairman of the Washington section, A.I.E.E.

He is a graduate of the Cochran Scientific School, now part of the George Washington University.



T. B. MacRae

Edward Dana

New President Transportation & Traffic Association

EDWARD DANA, the new president of the Transportation & Traffic Association, has for many years rendered valuable assistance to that association, and has, at various times, been a member of the committee on standards, rules and schedule in addition to the executive committee.

Mr. Dana's first position in the electric railway field was in July, 1907, with the Boston Elevated Railway, where he spent four years in an apprenticeship course, starting as a conductor. He then became an inspector of service conditions, assistant to superintendent of transportation, superintendent of traffic, transportation manager, and in August, 1919, was called to fill his present position of general manager. He was born July 28, 1886, at Bernardston, Mass., and was graduated from Harvard University with an A.B. degree in 1908.

Mr. Dana's interest in education, particularly of electric railway employees, is known throughout the world. He believes every employee should have all of the education that he or she can absorb. On the Boston Elevated property all educational courses are voluntary, unless the course is put in as a means of instruction in specific duties. Every opportunity is given to employees to know what the educational program is, but beyond that it is up to the employee.

Mr. Dana is ever on the alert for new ideas, and when one comes along he asks first, does this new idea have any application on the Boston Elevated Railway? Then, what is its significance to the industry as a whole?

Mr. Dana likes to see all of the railway data tabulated and if possible put into graphical form. One of his hobbies is the little leaflet "Co-operation" which goes to all employees monthly and to a constantly enlarging mailing list.

While a strict disciplinarian, Mr. Dana never forgets his duties toward the employees as human beings.



Edward Dana

Joseph S. Kubu

President Claims Association

THE new president of the American Electric Railway Claims Association for the coming year is Joseph S. Kubu. Mr. Kubu is superintendent of the accident department of the Cleveland Railway and his election is a graceful gesture to the city which has played host to the American Electric Railway Association for two years.

Back in 1909 Mr. Kubu joined the forces of the Cleveland Railway as an investigator-adjuster and assistant claim agent. Perhaps feeling that, like a prophet, an electric railway claims man is "without honor in his own country," Mr. Kubu left Cleveland for the Empire State in 1912 and became claim agent for the Utica Lines of the New York State Railways. His work with this property was of an order which attracted the attention of many railway executives of the East and Mr. Kubu's services were sought by several of them. He refused all offers, however, until in 1921 the Cleveland Railway called him. Then he left Utica for home fields.

Mr. Kubu's long experience in claims work, his wide acquaintance with men in this department of public utility service and his active participation in the work of the Claims Association eminently fit him to direct the important work of this group during the coming year.



J. S. Kubu

Claims Men Discuss Traffic Regulation

Uniform traffic laws strongly recommended as a means for reducing accidents. Co-operation in enactment of Hoover code urged

THE opening meeting of the Claims Association was called to order on Monday by President Proctor and at his request the names and companies of all the delegates in attendance were given. A good-sized room had been provided and it was comfortably filled throughout the meetings, which were characterized by close interest.

Mr. Proctor observed, in his annual address, that the work and responsibility of claims men increase greatly year by year. He said that new and more difficult problems are continually presenting themselves. Therefore the question arises, "How can a claims agent best fit himself for his job; keep his mind fresh and alert; keep up with the times?" This cannot be done by living within oneself. The claim agent must study, read and confer with his fellows, who are tackling the same problem as the claims men.

It has been the endeavor of the Claims Association to increase the interest in the work of that body by injecting new features into the meeting. The progressive, wide-awake claims agent in the past few years has largely improved his standing with the public at large as well as with his own management.

The address of Russell A. Sears on proposed uniform traffic regulation and the Hoover conference recommendations is abstracted elsewhere in this issue. It was followed by formal discussion by John J. K. Caskie, Hubert A. Smith for Frank J. Gatrell and F. R. Cogswell for Burton W. Marsh. Mr. Caskie made the point that progress in traffic control should be aided by the claims department only in co-operation with the transportation department. He said that as the older cities of today became the newer cities of the future the opportunity is presented to direct this development so that traffic movements would be facilitated. He recommended creation of a committee including representatives from principal cities, to accumulate data on traffic legislation for the purpose of bringing about uniform regulation in conformity with the Hoover code.

Herbert A. Smith said that the public must be awakened in order to obtain proper legislation and enactment of the Hoover code regulating motor vehicle operations. He felt that the parent association should put forth its best efforts to aid in making the code effective throughout the country and advocated the adoption of a resolution so providing.

Mr. Barnes gave a most interesting talk covering his experiences in the work of the Hoover conference on street and highway safety.

In the general discussion that followed and on the motion of Wallace Muir provision was made for the presentation of resolutions addressed to the parent asso-

ciation and emphasizing the interest of the association in the traffic control provisions of the Hoover code.

At this point President Sawyer addressed the meeting and stated that he thought there was no single group of men in the industry that has more completely adapted itself to changing conditions than have the claims men. He spoke of their fair treatment of the public and of their care in preventing payment of fraudulent claims.

Mr. Hardin's paper was received with much interest and appears in abstract on another page. In the discussion that followed there was general agreement touching the necessity for all members reporting to their index bureaus so that fraudulent claimants and "repeaters" could be detected.

Tuesday's session of the Claims Association was held jointly with the Transportation and Traffic Association to consider questions of traffic and safety. A report of this meeting will be found in the account in this issue of the meetings of the Transportation and Traffic Association.

At 1 p.m. on Wednesday the great majority of all the claims men gathered at a strictly informal luncheon at the Hollenden Hotel.



C. B. PROCTOR

Claims Symposium Arouses Interest

Various views on live claims topics presented by active claims men at the Thursday afternoon session

THURSDAY'S session of the Claims Association was given up partly to a symposium on claim subjects, partly to the papers secured by the medical and surgical committee and partly to the election of officers and other closing exercises.

The "symposium" comprised discussions on a great variety of topics, all having a very practical bearing on claims work. Some of the speakers had prepared extensive papers; others contented themselves with shorter presentations. Among the former, one by P. W. Klambunde on a recent campaign conducted by representative lawyers in Milwaukee against unfair legal tactics of some attorneys there, and one by J. C. Desautels of

Montreal on a card index system he had developed are published in abstract elsewhere in this issue.

On the other topics considered, Walter E. Robinson, Cincinnati, took the position that publicity is not a proper activity of the Claims Department. The matters requiring the attention of this department are more or less of confidential character. He thought that ambulance chasers had thrived on publicity in regard to accidents and claims. While heartily in favor of safety in its broadest sense, he believed that slogans could not be substituted for discipline, nor the responsibility for the safe operation of a railway property left to any one except the responsible operating official. Safety work is an obligation on all departments and should be performed without publicity campaigns, the payment of premiums for discharging a plain duty, or the effort to stampede the public and employees by cheap and ineffectual methods of advertising.

the person whom the company has injured. He thereby creates a fertile field from which the "friendly enemy" reaps a bountiful harvest. The home becomes the opportunity when the claims man takes proper relief there, for he has then proved the company worthy the confidence of its community.

The symposium on claims subjects was followed by that portion of the program devoted to the medical and surgical committee. There were nine doctors present who participated in the discussion.

Dr. H. M. Bascom, chief surgeon Illinois Traction System, submitted a paper, "Should All Accidents Have Medical Investigation, and If So, What Information Is Helpful to the Adjuster"? He took the position that all cases of injury should be looked at from a surgical as well as from a medical standpoint. He felt that there should be at all times a state of complete co-operation



Augustus Baker



J. C. Desautels



P. W. Klabunde



J. W. Giltner



W. E. Robinson

ing. Finally, he protested against the demands for affiliation with outside organizations. He considered the topics discussed by them often to be not closely related to claims work.

Augustus Baker, adjustment department, Pittsburgh Railways, spoke on "Corrective Management and Its Effect on the Accident Records," and referred particularly to the Better Traffic Committee organized in Pittsburgh to deal with street traffic congestion. It had conducted an essay contest for children on accident prevention, had dealt with automobile parkings and had assisted in the enactment of traffic laws. He also mentioned the monthly management conferences on the Pittsburgh Railways' property to bring about better operation and maintenance. Each employee is made to feel he is an integral part of the organization, and this policy has been followed by a notable decrease in "pull-ins" and accidents. Safety measures include a central safety committee, trainmen's safety meetings and competition between carhouses for low accident records.

"Friendly enemies" was the title of the talk by J. W. Gerner, Akron, Ohio, referring to the attorneys for the plaintiff in damage suits. With the reputable lawyer in such a case, the speaker said, the claims men could have no quarrel. He believes that all men are animated largely by the same motives, and with these attorneys, the claim agent gets back largely what he gives. The only fault that can be found is with the so-called ambulance-chasing attorney. The speaker then pointed out that the plaintiff's home was the company's greatest hazard and greatest opportunity. The home becomes the hazard when the claim agent fails to take proper care of

between the physician representing the company and the patient's family doctor.

Abstracts of papers presented at the medical and surgical sessions by Doctors Fisher, Miller, Sibley and Leeming appear, in abstract, elsewhere in this issue.

In the discussion following the medical reports Mr. Boynton of Portland, Ore., said it would be of great help to all claims men if the doctors would make their reports in plain English. He said that he had many times found it necessary to refer to the dictionary in order to see what was wrong with the patient only to find that the case was merely one of bruises or slight skin abrasions.

President Proctor announced the appointment of a committee on resolutions on uniform traffic regulations as follows: John J. K. Caskie, Wallace Muir, John J. Reynolds, W. F. Weh and S. W. Baldwin.

The report of the nominating committee was made by Mr. Reynolds, its chairman, as follows:

For president, Joseph S. Kubu, Cleveland Railway; for first vice-president, L. F. Wynne, Georgia Power Company, Atlanta, Ga.; for second vice-president, Walter E. Robinson, the Cincinnati Street Railway; for third vice-president, C. E. Redfern, United Electric Railways, Providence, R. I. Executive committee: W. E. Foley, Third Avenue Railway, New York; B. F. Boynton, Portland Electric Power Company; S. J. Herrell, Knoxville Power & Light Company, and L. H. Butterworth, Boston Elevated Railway; convention secretary, G. T. Hellmuth.

Mr. Reynolds presented to President Proctor a past-president's badge and accompanied it with a splendid address outlining Mr. Proctor's unselfish services to the association.

Milwaukee's Ambulance Chasing Quiz*

By P. W. KLABUNDE
General Claims Agent

Milwaukee Electric Railway & Light Company

OVER a period of years the activities of ambulance chasers in Milwaukee and its neighboring cities grew to the point where approximately 90 per cent of personal injury litigation was in the hands of but five or six law firms. There was evidence that runners worked openly and had developed a tip-off system through newspaper reporters and others. They frequently learned of accidents and reached the homes of injured persons before their families heard about them. Contracts were frequently procured in hospitals before the injured had recovered from the first shock. Chasers were ready to remove the injured from the hospitals, sometimes before the doctors could make their examinations. The evil was discussed by the Bar Association at times, but no definite action was taken.

Several years ago an independent organization of attorneys was formed, under the name of "Lawyers' Club," one of the objectives of which was to rid the bar of this evil. This club worked quietly until March, 1927, when a committee of its directors and officers petitioned the Circuit Court to conduct a hearing or inquisition and to take such action as the facts might warrant.

The petition was presented to a judge of the Circuit Court, there being eight branches of this court, and he decided that the petitions should be heard. Two other judges of the same court joined in the hearing, the three judges sitting *en banc*.

The matter was handled entirely by the Lawyers' Club. There was no assistance from public utilities or insurance companies, either financial or by way of providing information from which to develop the facts. The Lawyers' Club caused a study to be made of cases pending in the Circuit Courts and in the Civil Courts (the jurisdiction of the latter is limited to \$2,000); plaintiffs in pending cases were evidently interviewed beforehand and then subpoenaed. Lawyers and ambulance chasers, their clients and representatives of public utilities and insurance companies were also called into court.

The testimony developed instances of champertous contracts, suits filed without the knowledge or consent of claimants and suits filed between members of the same family, where, so far as the parties to the actions were concerned, the same law firm represented both sides. It also developed instances where claimants were fleeced by their attorneys not only of exorbitant fees on a percentage basis but of practically the entire proceeds of the settlement. It also was revealed that solicitation was practiced in other than personal injury matters.

In the early stages of the inquisition efforts were made on behalf of the ambulance chasers to stop the proceedings, but the Supreme Court of the state denied an application for a writ of prohibition. One individual attempted to stop the proceedings, temporarily at least, by starting an action against the committee members. He served notices for examination on them under our

discovery statute, the notices being accompanied by an affidavit alleging that the entire proceeding was in the nature of a conspiracy for the purpose of destroying his good name and reputation and that it was an attempt to perpetrate a fraud upon the court.

This attorney came into court and was requested by the judges to testify under oath as to the facts relative to his charges of fraud. He refused to be sworn and was sentenced to serve a term of 30 days in the county jail for contempt. The judge of another branch of the Circuit Court issued a stay, but the Supreme Court vacated this order; however, the Supreme Court then called for the entire record of the inquisition and the matter is still under consideration.

The inquisition has not been completed, but thus far it has accomplished these results: the complete cessation, so far as we can discover, of ambulance chasing by runners from lawyers' offices; an injunction restraining all ambulance chasers and attorneys in "tainted" suits from making any disposition of cases then in their hands where evidence of improper contracts was disclosed, attorneys have been required to relinquish their claims and the claimants authorized to engage other counsel or to handle their claims in any other manner they choose even where the claimants expressed a desire to retain the same attorney, the court has refused in most instances to permit them to do so.

Another result is that people who have had claims handled by attorneys are now making inquiry as to how their claims were disposed of. It has been rather interesting to learn how the proceeds of settlements were divided. For example, one claimant, who signed a release for \$50, was given \$175 as his share, whereas two other claimants, having claims arising from the same accident and who each signed releases for \$200, received \$20 each.

A still further result of the inquisition is found in personal injury cases going to lawyers who never before handled such cases. They could not get them because the runners worked too fast.

Our legislature was in session during the inquisition and the Lawyers' Club and the judges were instrumental in introducing several bills for its consideration. Briefly these bills provide:

First, that all investigators and adjusters should be licensed.

Second, that no settlement of a personal injury claim should be valid if made within ten days of the happening of the accident and that any settlement should be subject to review upon petition of the injured person to the Circuit Court within 90 days.

Third, that upon demand of either party upon the other the names and addresses of all witnesses must be produced; this bill did not limit the names of witnesses to those that would probably be produced on trial, but included all that the adverse party knew of or discovered prior to trial.

Fourth, that there should be no solicitation in any manner, that there should be no payment, direct or indirect, to any person for bringing a case to an attorney, and that no attorney should "split" fees with others than attorneys.

The legislature acted upon these bills and the first three were defeated; the fourth, however, was passed and is now in effect.

The members of the Lawyers' Club who were active in the conduct of the inquisition devoted many days to this work, without hope of reward other than the cleaning of the bar. Not one of these active participants, so far as our records show, has been retained in a case against us since the inquisition started.

As stated earlier, there was no active participation by public utilities or insurance companies in the entire matter. Of course, representatives of the various companies

*Abstract of a paper presented at the annual convention of the American Electric Railway Claims Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

who were subpoenaed supplied the information asked for an examination, but it was the general feeling that the companies could not take an active part without creating the impression in the public mind that the corporations were trying out a new way to reduce accident costs.

When the entire inquisition is completed, it is believed that the solicitation of personal injury cases will have been very effectually curbed, and it is not unlikely that several members of the bar will devote their time to their employment.

Cost Reducing and Simplifying Claims Office Work*

By J. C. DESAUTELS

Acting Claims Agent Montreal Tramways

MADE a survey recently of the many details attached to the office end of the work. We had seven books of different kinds, large and small, some easy to handle, others quite cumbersome, but all needing several unnecessary movements—entries which I thought could be eliminated.

My first attempt to reach a solution was the cards shown herewith. One was devised to show accidents only, the other to show incidents. I thought of combining the main points of the history of a claim or incident on one card as well as a foolproof follow-up to show at a glance the movements of the file and its exact location. The principle that I had in mind and wanted in practice was "one place, one movement to get the file," and

*Abstract of a paper presented at the annual convention of the American Electric Railway Claims Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

as it is human to follow the line of least resistance, the card was arranged in the exact sequence that the work progresses from inception to finish.

To avoid mistakes, it was decided that all files, documents, etc., must go first and always to the clerk having the sole and full charge of distribution.

ARRANGEMENT OF CARD

The name and address are at the top and bottom, so that when card is taken off the filing system, becoming what is called "dead records," the card can be filed vertically. The top part is then the guide to the card. The abbreviations used are as follows:

Emp. Record. A tick here shows that proper information has been entered in the employee's claim record.

Inv. No. Means by whom investigated.

List. A tick here shows that the crew of the car or train have been seen by investigator.

Steno. (Stenographers), Abeyance, Ready. A tick in the space reserved for any of these would show in whose hands the file is.

Same as. To show that other claims have been made for the same accident.

Train. To classify or differentiate from the next abbreviation—namely, O.M.C. (One-Man Car).

Bus. For all bus accidents.

T. For accidents at terminals.

O. C. This space is reserved for a conventional sign or mark to help in summing up or valuation of O.C. (Outstanding Claims).

The rest of the card needs no explanation. Arranged in this way, the moment a claim is filed the first entry is at the top of the card and so on until the case has passed through the courts, judgment rendered and cost entered, if any.

I do not claim to have discovered the 100 per cent per-

NAME IN FULL		ADDRESS					CLAIM NO.					
DATE OF ACCIDENT		NATURE OF ACCIDENT					ACCIDENT NO.					
PLACE OF ACCIDENT					DATE CLAIM ENTERED		EMP. RECORD		DATE CLAIM STARTED			
INV. NO.	INVESTIGATION FINISHED	LIST	STENO.	ABEY.	READY	SAME AS		TRAIN	O.M.C.	BUS.	T.	O.C.
DECISIONS OF CLAIM'S COMMITTEE												
AMOUNT OF CLAIM		DECISION		DATE		DECISION		DATE		SETTLEMENTS EXCEPT THOSE OUT OF COURT OR BY JUDGEMENTS		
										AMOUNT DATE		
WRITS—SUITS—ACTIONS—OR NOTICES OF ACTIONS										SUIT No.		
DATE OF NOTICE		DATE OF WRIT		COMPENSATION ACT		PLAINTIFF'S LAWYERS						
AMOUNT		AMOUNT		IN FORM A PAUPER IS		DEPENDANT'S LAWYERS						
SETTLEMENTS OUT OF COURT AND JUDGMENTS												
								OUR COSTS		TOTAL AMOUNT		
OCCUPATION				AGE		ADDRESS				CLAIM NO.		
NAME IN FULL												

Report No. 193, on a card 5x8 in., has proved most useful in indexing claims records

fect card or handling classification and follow-up of a claim, but I do pretend that this system resulted in the following:

1. Cost of printing, binding, etc., of seven books eliminated.
2. An electroplate has been made which will save cost of printing when other cards are needed.
3. Going from one book to another and constant handling of them eliminated.
4. One movement and to only one place, always.
5. Nothing left to memory and checking reduced to the minimum. It is necessary simply to follow the lines and fill in as the work progresses.
6. Duplicating and sometimes triplicating of entries eliminated.
7. Records conserved clean, orderly, visible and readily accessible.

The only book used is the 60-subdivision-numerical index.

By actual stop-watch test, from 60 to as much as 200 per cent of time is saved.

All investigations outside of claims are handled in the same way but on the second card shown, so as to eliminate further unnecessary hunting up of the file.

With this system, inaugurated Jan. 1, 1927, not one of the papers and numerous files has been mislaid so far. I also believe that an appreciable amount of red tape is avoided and the equivalent time saved thus applied to constructive instead of detail work.

Possible questions will be raised in advance and answered:

Why is another numerical index necessary?

If claims were handled alphabetically, direct from the visible index, we should have to run through names on claims which have been disposed of years ago, whereas, by the present system, we have live records only to

handle. Moreover, cost is reduced to minimum by using three visible index cabinets only. When they are filled the first one will contain only records which are dead or nearly so. We then transfer the cards into a vertical position in ordinary drawers. This explains why the name and address, etc., appear at the top as well as at the bottom of the card. In the visible index, only the lower section of the card shows, but as this part is at the bottom when filed vertically, the top part is needed for a future guide.

The use of numerals has several advantages over the alphabet, for when compiling statistics of all kinds, you have at a glance the number of claims made during any particular year, and taking out the cards for that year they follow numerically, and therefore daily, monthly, etc. If, for instance, you want to figure out the number of train, one-man-car or bus accidents for a particular year, it becomes a simple addition. If they had been filed alphabetically, it would be necessary to keep other records showing those for the year 1926, etc., and sort them out. The same applies to every item shown in proper sequence on the card. Whatever statistics are required, and usually they are needed on short notice, the operation is simplicity itself, and the work of compiling can be entrusted to the least experienced clerk you have. The way I use the system I have an instant check on the progress of current claims or the past history of them, and, as the card shows, I can tell when a claim was filed, the investigator who has it, and how long.

How many cards are used per day?

Divide the number of claims received in a year by the number of days the office is open for business and you have the answer.

How is a no-report case located?

We call them blind cases. If for a claim, we give claim number, etc., following the same order as shown

						TO NUMBER			
FOLDER NO.	DATE OF ACCI.	CAR NO.	PLACE OF ACCIDENT	NAME					
ACCIDENT NO.	INCIDENT NO.	ADDRESS		INV. STARTED	BY NO.	INV. FINISHED			
REMARKS						LIST	STENO.	CLAIM AGENT	FILED AWAY
FOLDER NO.	DATE OF ACCI.	CAR NO.	PLACE OF ACCIDENT	NAME					
ACCIDENT NO.	INCIDENT NO.	ADDRESS		INV. STARTED	BY NO.	INV. FINISHED			
REMARKS						LIST	STENO.	CLAIM AGENT	FILED AWAY
FOLDER NO.	DATE OF ACCI.	CAR NO.	PLACE OF ACCIDENT	NAME					
ACCIDENT NO.	INCIDENT NO.	ADDRESS		INV. STARTED	BY NO.	INV. FINISHED			
REMARKS						LIST	STENO.	CLAIM AGENT	FILED AWAY
FOLDER NO.	DATE OF ACCI.	CAR NO.	PLACE OF ACCIDENT	NAME					
ACCIDENT NO.	INCIDENT NO.	ADDRESS		INV. STARTED	BY NO.	INV. FINISHED			
REMARKS						LIST	STENO.	CLAIM AGENT	FILED AWAY
FOLDER NO.	DATE OF ACCI.	CAR NO.	PLACE OF ACCIDENT	NAME					
ACCIDENT NO.	INCIDENT NO.	ADDRESS		INV. STARTED	BY NO.	INV. FINISHED			
REMARKS						LIST	STENO.	CLAIM AGENT	FILED AWAY
						TO NUMBER			

Report No. 194, on card 5x8 in., has also proved useful in indexing claims records

of the card. Wherever possible, I interview the claimant personally at my office and retracing his movements minutely, I take a written version accordingly. If the party is unable to come, I send an investigator to secure the information. With this information, together with a full description of the car or crew, we locate cars for about 30 minutes before and after the time given. We then begin a systematic sifting or elimination until we narrow down the search to a few, and these men are then interviewed. With this procedure we rarely miss our objective. Once the crew has been located, versions are taken and we build up on the claim with whatever information we have, as in the ordinary claims.

If you have the date and location of an accident, but no name, how could you locate the report?

An accident book is kept containing enough pages to last a year (previously it was for six months). Each accident report is numbered and the salient facts as given on the report are entered in the book. The numbers start from 1 at the beginning of each month. As many pages as needed are reserved for all accidents happening on that particular date. If we have the date, which is the quickest way to locate the report, with any other particular detail such as car number, location, name of conductor or motorman, or kind of accident, etc., all we have to do is open the accident book at the date mentioned and when one of the details just mentioned, the report is found at once by its number. Each report, being of foolscap size, is folded in four and filed upright in suitable steel filing cabinets and the number is seen at the top as in a card system. We also have "incident" books, arranged in the same way as for an accident book.

How is Form 194 (the incident card) used?

Four divisions will be noted on this form. As this form does not need as much information as the other card, I show four different cases on one card. The use of the divisions on the card, in their order, is as follows: "Folder No." This is for employees injured on duty. A folder or docket, large enough to hold a foolscap-size file, is prepared for each employee injured. On the face of the folder appears in condensed form all important details contained in the folder. "Date of acci." "Car No.," etc. do not need explanation, as the same scheme or follow-up is followed as with the claims card. It follows that Form 194 is used for anything not a claim. The argument may be advanced that, having four different cases on one card, the top or bottom one only would show in a filing cabinet. True, but it will be found in practice that incidents are of a temporary nature only, and once dealt with, it is necessary to refer to them again only on extremely rare occasions. Then we take the incident book and from it easily locate the card needed, since they are dated.

Form 193 carries two numbers. Is it first given an accident number and later a claim number?

No. I have just described the way in which the accident report book is kept. When a claim is filed against us, the card receives a claim number and the accident report being then taken out of its numerical place in the steel filing cabinet and an appropriate card being put in its place, the number of the report is entered on Form 193 at the same time as claim number. Other details which can be taken from the accident report are added.

What distinction is made between "date claim started" and "date claim entered"?

The claim entered means when or on what date the claim was filed by claimant. The other date is that when the investigator began his work on that claim.

Fifty Foremen Attend Conference

Course given twice a day during convention week. Representatives from companies in many parts of the country attend

AWAY from the rush and bustle of the main sessions of the convention, a group of men met for study in a room on the mezzanine floor of the Auditorium. They were the members of the Foreman Conference Leaders group, who were fitting themselves in the special course offered by the association committee on education to spread the lessons of better employee leadership to all parts of the country.

Intense interest was displayed by the men, according to H. H. Norris, educational adviser Boston Elevated Railway, one of those in charge of the course. Associated with Professor Norris were A. J. Sarre, superintendent of industrial relations New Orleans Public Service, Inc., and Frank Cushman, who is connected with the Federal Board for Vocational Education, Washington.

Registration for the course was limited to 50, and it was necessary to reject a number of applications so many companies wished to have representatives enrolled for the class. For the most part those taking the course were officials having under their supervision large groups of trainmen and other employees and directly in contact with personnel problems.

The class was divided into two groups, one meeting each morning and the other in the afternoons. The classes were open to the public on Friday, but the rest of the week the classes were secluded as if on a college campus, rather than within a few steps of the manifold activities of the convention.

The purpose of the course was to train the officials attending in the best methods of conducting conferences of their foremen, so as most effectively to transmit to them approved methods for training their men. The idea back of it all is that the trainmen and other workers are, in the last analysis, largely responsible for the success or failure of a company's efforts to give good service and to operate efficiently. To enable the workers to do their part, they must have the leadership of a capable supervisory force, and this supervisory force, or the foremen, must have real leaders among the executives directly over them. The course was designed to train the executives in order that they might conduct conferences of their foremen or supervisors in a way that would accomplish the results desired.

Not only did the officials receive many new ideas from those conducting the course and from each other but one of the most important elements of the training was the actual experience they had in conducting conferences. A part of each day's session was devoted to practice of this sort in which one or another of the officials conducted a conference and then received the benefit of the criticism of the others and of the instructors.

The wide interest in this new educational activity was shown also by the fact that a number of companies supplied literature for use in the course. This included instruction manuals, educational booklets, job analysis studies, etc., supplied by the Westinghouse Electric & Manufacturing Company, Boston Elevated Railway, New Orleans Public Service, Inc., Chicago, North Shore & Milwaukee Railroad, Milwaukee Electric Railway & Light Company and others.

We Must and Will Go Forward

The lessons of the past and present are being well learned, and the electric railway industry has profited by them. The electric railway man has reason to be proud of his job and can look to the future with confidence

By W. H. Sawyer

President American Electric Railway Association
President East St. Louis & Suburban Railway

SOME of you may not have had the occasion that I have had during this year to think in terms of the industry instead of in terms of a single property or even a group of properties. Out of that experience I have had a thrill, growing in magnitude and reaching a climax here today. I have gone over this exhibit during the past few days. If you haven't, don't miss the inspiration that it will give you. You will get a new viewpoint on your own industry. You will feel thoroughly, as I feel at this minute, the romance of transportation.

What a myriad of changes have taken place during the past 46 years! I shall not attempt to review them. But despite all of these changes and all of the difficulties which we have encountered, we are not a dead or decadent industry! We are demonstrating our ability to meet the changed conditions brought about by the advent of the private automobile. We are proving our assertion that our industry is still a most essential industry—necessary for civic advancement and prosperity. For generations it has been a major contributing factor in our wonderful national growth and advancement. It will continue as such. Public transportation must and will go forward.

We are making progress in the program of modernizing our cars and equipment to meet the demands of this luxury-loving, fast-spending age. It needs but an inspection of this car exhibit to testify most eloquently to the truth of this statement. But we are carrying forward more than merely a program of modernizing our cars. We are carrying forward a program of modernizing our thought and our methods.



W. H. Sawyer

We have every right to be proud of what we have accomplished. But I say to you—and mark well the words—we have but taken a forward step. Our job is far from complete. There never was a time in the history of the industry when there was a greater demand for skill, energy and ability to carry out the task which we have only well started.

Who is there among us that has exhausted the possibilities for giving better service? I do not mean "give" in the sense of a donation. I mean it in the sense of improvement designed to bring a return, both in the form of increased patronage and the form of public good which I mean it in the sense of service which a far-sighted progressive merchant gives the customer with whom he does business. I mean it in the sense of service which is good business.

I am, of course, fully aware that some of our electric railway lines that are now operating will eventually be scrapped. One of our immediate problems is to determine which lines do not have the potential earning possibilities to justify rehabilitation. Those that can be made profitable must in the very nature of things be abandoned. I fully realize our duty to our community to continue service, but we also have a duty to our investors, and, moreover, unprofitable service will eventually be a liability instead of an asset to the community. The lines which are to survive must be modernized. It requires rare courage and foresight to determine just which lines are to be eliminated. But the decision must be made, and made quickly; otherwise the entire program will continue to degenerate at a cumulative rate. The program of rehabilitating those lines which are economically justified is far from complete. There is no room left for a discussion of the necessity of clean cars and prompt and courteous trainmen. There is no longer room

*Abstract of presidential address at the annual convention of the American Electric Railway Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

discussion regarding the need for advertising as a medium for giving our communities the facts of our business.

All this, however, is not enough. I believe that we are on the verge of fundamental and basic changes in the character of our service and of the equipment with which it is given. I have referred before to the quantity and quality of our exhibits, but this year as never before we have concrete examples of unmistakable advances in the art. I refer particularly to some six or eight exhibits among the modernized cars on the outdoor track. Some of these developments are largely experimental, in that they represent radical departures from established practice. But I believe that these changes are only forerunners of a definite trend of new developments out of which will come improved facilities that are essential to us in rendering a character of service that will meet the conditions which exist today.

Let me bring to your mind another thought here. Development such as is represented by these particular exhibits costs real money. Somebody believes in us. Somebody has faith in the electric railway industry. Somebody is willing from a lord-headed business viewpoint to spend money to demonstrate that the street car is still the most efficient passenger-carrying vehicle on the streets and can provide a class of service which will meet the tastes of an automobile-educated public. I take my hat off to those manufacturers and operators whose equipment is out there on display today. I feel confident that only a few years from now we shall look back on them as real pioneers who started us on a new period and a new era.

Even now I am willing to prophesy that the year 1927 will stand out as a year in which officially we took notice of another changed condition, and so revised our constitution as to bring it up to date. We shall still retain the name American Electric Railway Association; that is probably justified, because the electric railway still remains and will remain the backbone, the foundation stone, if you please, of the local transportation business. We shall, however, by the changes proposed in the constitution of this association, rightfully identify ourselves, not as electric railway men only, not as bus men, but as transportation men qualified to serve our communities in whatever form of transportation best fits its needs in each special situation.

There has come about in 1927 not only additional progress in the co-ordination of the bus and the electric railway car but further and more definite co-operation between the bus manufacturers and the industry. We have not yet taken full advantage of the bus and have by no means fully co-ordinated it with the electric car.

The day of the bus as a fad is gone. Some of the buses now in operation are unnecessary. The bus cannot and must not compete for the same business in the same territory with the electric car. That is inefficient and is a waste of the rider's money. High-pressure methods of salesmanship and overenthusiastic statements of fact

have been detrimental to the sound development of the bus as a responsible transportation agency. But I see new developments ahead in the application of the bus as a transportation vehicle, whereby it will expand its present usefulness.

The relations which exist at any particular time between our companies and our communities are a measure of the condition of the transportation business. On the relations which exist between them and on their ability to understand each other's viewpoint and problems depend the success of the partnership which is thus effected. Two factors are directly influenced by the nature of the relations which exist between these two principal interested parties—namely, the character of the service which it is possible to maintain and the cost of giving that service.

During the last few years there has been a marked change in public opinion regarding the relative importance of these two factors. Although the memory of the old 5-cent fare which was exploited so many years by politicians still remains in some cities, much more consideration is being given today to the matter of service and less to the maintenance of a fixed or lower fare.

WE ARE carrying forward more than merely a program of modernizing our cars. We are carrying forward a program of modernizing our thought and our methods.

Our record entitles us to ask for and to receive the co-operation of the communities we serve. We are making progress, but we could move faster if our communities better understood our problems.

Nothing has been found to take the place of the electrically-propelled rail-borne car for moving masses of people rapidly and efficiently.

EXCERPTS FROM MR. SAWYER'S ADDRESS

There is an ever-increasing appreciation of the fact that if desirable service is to be maintained, the company must be permitted to develop a financially healthy condition. Our industry is making an honest and determined effort to give better service at the lowest practicable price consistent with such service. I am confident that no community wishes to deprive itself of the advantage of such improvement to save an additional cent or two, particularly when the cost of the street-car ride is compared with that of its principal competitor, the privately owned machine.

The automobile has provided pleasure and recreation to millions of people. Its manufacture has become one of our largest industries and has contributed materially to the prosperity of the country. The automobile is, in part at least, responsible for the prosperous conditions of today. But I wonder how many of our city officials really appreciate the comparative transportation economies of the automobile and the street car. Many traffic checks in various cities have shown that the average passenger load in automobiles is less than 1.8 passengers per vehicle. The average street car carries ten or more times that number. The street car is a conserver of expensive street space, while the increased use of automobiles is dependent on making available additional street capacity at the expense of the community. In solving their traffic problems many cities are taking cognizance of these facts and are assisting in increasing the speed of the electric cars by giving them the right of way wherever practicable, thus catering to the majority without detriment to the minority.

The changed conditions of today do not admit of our industry carrying the burdens of the past. We can no longer be used as tax gatherers. Many progressive communities have eliminated the unjust and unfair paving

tax, and rightfully so for the benefit of the community. There is an increasing appreciation that it is unfair to ask the car rider, who in the last analysis pays the cost, to have any considerable part of his carfare represent a tax levied by the community. Electric railways have in the past paid an unfair property tax. Capital invested in a utility is turned over very slowly in comparison with many manufacturing or commercial enterprises, which frequently turn their capital several times a year. Nevertheless the tax rate on transportation property is maintained at rates very much out of proportion to this situation.

The continued improvement of public transportation service is dependent on permitting the investor in these properties to make a fair return on a fair value. There are but few electric railway companies doing that today, and that is why we must have even greater co-operation on the part of our public to discharge more effectively our full responsibility as public servants. We are no longer asking for sympathy. We believe that our record entitles us to ask for and to receive the co-operation of the communities that we serve. We are making progress, but we could move faster if our communities better understood our problems.

Frankness compels the statement that there is always a minority who do not want to understand the facts of the transportation problem and whose selfish interests are served best by trying to make the American public think it can get something for nothing by squeezing the life out of the transportation companies. The fable of the goose that laid the golden egg has a direct application in the transportation situation. The fact that the public is beginning to understand the truth today is largely attributable to the frank and effective way in which many companies have told their story through local newspaper and other advertising. I do not believe there is a man or a company in the industry who is doing too much in this direction. There is still room for an even better and more effective job.

And so, to summarize, conditions of today are different from those under which we built and learned to operate electric railways. The methods of the past are no longer effective. The solution of our many problems requires experts—specialists.

With the coming of this new day, our eyes are turned to the front and there is courage and hope in our hearts. Despite all of our difficulties, one incontrovertible fact stands out above everything else: The very life and progress of modern communities require adequate and efficient public transportation. In the foundation-shaking test to which present transportation agencies have been subjected, nothing has been found to take the place of the electrically propelled rail-borne car for moving masses of people rapidly and efficiently.

Transportation is a vital community requirement. The roots of our industry are buried deep in the foundation of community prosperity and growth. We have cause to be proud of our jobs and have every reason for throwing our spirit and our energy into the work of keeping abreast with the march of progress. Conditions are changing—yes, changing, not yearly or monthly, but daily. We are public servants in the true sense of the term. By dedicating ourselves to the community's interests, we aspire to that greatest of achievements—the service of mankind. The electric railway industry must and will go forward!

Getting the Most Out of Public Utility Regulation*

By W. W. Potter

Attorney-General State of Michigan, Lansing, Mich.



W. W. Potter

The author traces the development of utility regulation and shows that it can be of great benefit to the utility. The electric railway, by giving the right kind of service, will have little difficulty with regulatory bodies

WHEN the balance of power and population in the United States passed from rural communities to the cities and villages, public utility problems became important. Public utility securities at that time were not regarded as sound investments, and few of them had the confidence of the general public. They were generally local in character, and in dealing with several cities their promoters were confronted with the uncertainty of success, the question of public patronage doubt as to the ultimate growth of the cities themselves, the crudeness of the art and excessive costs of construction.

*Abstract of an address delivered at the annual convention of the American Electric Railway Association, Cleveland, Ohio, November 3 to 7, 1927.

on. As a result of the general lack of scientific knowledge in relation to public utility problems, promoters provided for high franchise rates to be paid by the public in order to insure as far as possible the integrity of their original investment.

When prices fell in the United States during the early '90s, operating methods had been greatly improved and operating costs fell to a much lower level than ever before. Many public utilities insisted upon maintaining their franchise rates and capitalized, through application of water, the difference between the fair return on the fair value of the investment in the utility and the amount of income realized from the franchise rates.

The Granger cases marked the first successful assault by the general public upon what had been regarded as the sacredness of public utility franchise contracts. The rule became firmly established in the jurisprudence of the United States that when property was invested in a business charged with a public interest, it must submit to public regulation. Outside the ranks of the owners and operators of public utilities, thinking men became interested. Reasonable men everywhere recognized that rate-fixing franchises had usually been given to the utilities without consideration.

Some intelligent method was demanded to handle the ever-recurring problems resulting from the conflict of interest between the utilities and the public, and public utility commissions were called into existence as a means by which the solution of these vexatious problems might be solved. Notwithstanding all of the opposition to the creation of public service commissions, they were finally created, and with them in many cases came rate reductions. Simultaneously the conditions of operation radically changed and public utilities rose to a new standard.

With this growth and development of the scope of operation and with state regulation there has grown up a more tolerant spirit toward the regulatory bodies of the state. There always have been and probably always will be divergent views of public utility regulation. On the one hand there are those who believe that the public service commissions should prescribe with great detail the manner in which the business of the public utility corporations should be carried on. On the other hand there are those who believe that the owners of a public utility should have a right to carry on the business with the least possible interference from public authorities.

ATTITUDE OF UTILITIES TO THE PUBLIC

One of the things which public utilities should seek to avoid is being crucified by their own anxiety to obtain rates in excess of a fair return upon the fair value of their used and useful property. *Smythe vs. Ames*, in which the rule was first authoritatively laid down that a public utility was entitled to a fair return upon the fair present value of its property, was argued before the Supreme Court of the United States.

Some courts have held that reproduction cost now constitutes the dominant factor in the determination of the present fair value of property, but this method seems unfair to both the public and the utility investors.

Nothing has weakened the confidence of the investing public in the securities of public utilities in the past more than has watered stock. Non-existent overheads, the cost of hypothetical superintendence of unknown labor, added percentages for imaginary errors and omissions are all methods of adding fictitious value. How

much more satisfactory it would be to all concerned if in rate proceedings, instead of furnishing volumes of testimony about fanciful intangibles, a fair present value could be agreed upon which would be available to the public or to the regulatory body. If the securities of public utility companies have back of them appropriate tangible assets, they will command public confidence.

The public is very apt to oppose any demand for an increase in the rates paid for transportation on street railways, but if the service is bettered, it is willing to pay for it. Subnormal operation never yet was entitled to abnormal rates. The public cares little or nothing for the question of original cost, fair value, reproduction cost new less depreciation, or any other befogging data, but it is interested in good service. If the street railways make an intelligent effort to render better service, it seems that they will receive the aid of the public and the questions of rates and revenues will take care of themselves.

One of the ways the public can help the street car companies is by relieving them of the burden of paving between their tracks, enabling the companies to improve their service.

It is contended by many that the street car is passing. However, a recent investigation revealed that last year the street railways carried more passengers than ever before. It is the most safe and economical means of transportation yet developed.

PUBLIC UTILITY REGULATION HERE TO STAY

"Customer ownership" is one of the things that will make for better public relations. Public utility investments are safe and satisfactory to the customers, and in addition to creating a better public sentiment, substitute co-operation between the customer and the utility. Public utility regulation is here to stay and fighting it is effort poorly spent.

There has been a tendency in the last few years to make public utilities a means whereby a large amount of money might be raised for taxation. The street railway is assessed supposedly at the true cash value of all its real and personal property, the same as other property assessed upon an ad valorem basis. It pays its proper proportion of the highway taxes levied in the several communities in which it is assessed, and it has to stand by and see this money, paid by it through taxation, expended in the construction of hard-surfaced highways paralleling its lines, which tend to build up and strengthen competition to its own business.

The time is not far distant when these utilities which for the past ten or fifteen years have had hard times in many ways will be taken in hand, rehabilitated, their securities rendered more valuable and the revenue made sufficient to pay operating costs and a fair return upon the fair value of their property. Such adjustments may easily be made, and not only will insure the continuity of the service but will also make the service sufficiently attractive to the public actually to increase its riding habit.

If the street car companies admit they are dead, there is no reason why they ought not to be buried. The street railway, like everything else, must keep abreast of the times or fall into the discard. If the service furnished is courteous, rapid and safe, it will be patronized and profitable, and regulatory bodies will not have to spend time wresting with its problems.

Reducing Delays to Street Car Traffic*

By Miller McClintock

Director Albert Russel Erskine Bureau for Street Traffic Research,
Harvard University

CONFLICTS between rail and rubber-tired vehicles in the traffic stream are more apparent than real. The aim of sound traffic control should be the adjustment of these difficulties so that a minimum of conflict will result.

Any approach to the problem of traffic regulation which is predicated on an elimination of either rail or rubber-tired vehicles or which is based on a policy of arbitrary restriction or oppression of either group is predestined to failure. Motorists can gain no advantage on streets where street cars are blocked. Traction operators can find nothing but embarrassment on arteries of travel where restrictive legislation and arbitrary enforcement have resulted in automobile congestion. Both motorists and car riders have the common desire to move and to move with safety and convenience. On

our saturated city streets this common aim can be attained only when each is willing to submit to reasonable control.

In the consideration of any street traffic problem, guesswork and opinion can be of little assistance. When all American cities recognize the street traffic problem as one requiring sound and continuing engineering consideration, much more rapid progress will be made.

A study of street-railway operation in Los Angeles in relation to general traffic conditions was conducted last month. The checks were made covering all of the principal lines operating in the central congested district, approximately one mile square with a daily entering traffic of 9,000 street cars and 200,000 motor vehicles. Results are summarized in an accompanying table. The average speed while in motion was 10.2 m.p.h. but, due to delays, the average over-all speed was reduced to 6.3 m.p.h.

Delays due to vehicular traffic on tracks cause a maximum feeling of irritation to the traction operator. The Los Angeles study indicated that this factor accounts for



Dr. Miller McClintock

street-car tracks along crowded thoroughfares is one which, to my knowledge, has never been successful and has resulted only in irritation and opposition. The motorist inevitably feels that at least between the time when street cars actually utilize the roadway occupied by their tracks the space should remain available for any legitimate traffic purpose. The same objection is not felt where roadways are wide enough to accommodate the full flow of vehicular traffic in addition to the street-car load, but under such conditions there is little need for the prohibition.

The most logical regulation for a relief for the conflicts between street cars and the vehicular traffic stream is to be found in the provision now generally incorporated in city traffic ordinances which provides a right-of-way for street cars along their own tracks. It is expressed in the uniform ordinance for California cities in the following words: "It shall be unlawful for the operator of any vehicle proceeding upon any street-car track in front of a street car to fail to remove said vehicle from said track as soon as practicable after signal from the operator of the street car." This provision, adequate

5.4 per cent of the total delay. This figure is far below that anticipated, and it is believed that similar studies in other cities will indicate more favorable conditions than those estimated through casual observation.

There is obviously no perfect remedy on densely crowded streets for this type of obstruction. Had the present saturation been anticipated, streets would have been so designed as to permit a curbed-in right-of-way for traction lines and thus for an elimination of interference. This is a practice now being followed in many new developments throughout the country and deserves the fullest consideration. It is, of course, a remedy which cannot be contemplated in the crowded streets of central districts.

The attempt that has been made in a number of cities definitely to prohibit the operation of motor cars on

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enforced, protects the street car from unreasonable "ragging" by preceding vehicles.

A further type of vehicular interference is to be found in the standing of vehicles on the track to the left of passenger loading zones while awaiting release at the adjacent intersection. The orthodox solution for this difficulty is to require all vehicles to pass to the right of such zones, on the presumption that this rule will always make it possible for street cars to reach the loading berth over a clear track. This is undoubtedly a desirable rule on streets with a roadway of adequate width to carry the full load of vehicular traffic without the use of track space.

Where vehicular traffic is too heavy to be accommodated in the off-track space available, it should be pointed out that the rule generally has more serious effects upon traction operation than no rule at all. The space to the right of the passenger loading zone is generally less than the traffic space to the midblock. An attempt to crowd a heavy vehicular flow into this bottle neck often makes it impossible for some vehicles to clear the track. The

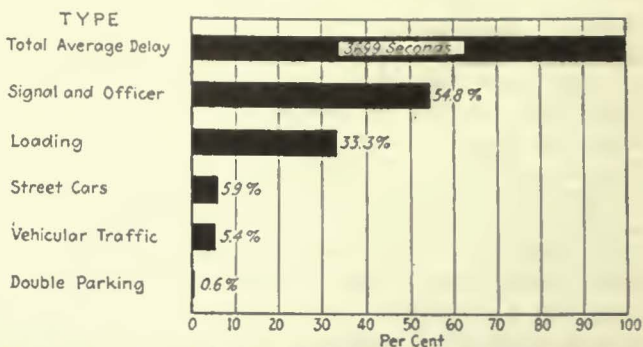
	Per Cent		Per Cent
Signal and officer.....	54.8	Vehicular traffic.....	5.4
Loading.....	33.3	Double parking.....	0.6
Other street cars.....	5.9		
			100.0

result is that obstruction to the street car is merely transferred from a point near the loading berth to a point farther back, where it may be even more serious to operations. Indeed, it is not unusual to see this type of obstruction extend its effect back to the next intersection, interfering with cross traffic at that point.

The traffic condition that is most generally accused of contributing the principal delay to street-car operation is parking. For consideration here, parking may be divided into two types: First, parking along the curb, and second, double-line parking. It is apparent that curb parking has little effect upon street-car operation except on streets with roadways so narrow that automobiles so parked obstruct the overhang of the street car. Under such conditions it is clear that parking, and even the standing of vehicles for loading and unloading, must be entirely abolished, or street-car operation abandoned.

On streets where the roadway is so narrow that there is not room for the operation of a line of automobile traffic between the street car and parked machines, it would at first appear that prohibited parking would immediately result in improved traction operation. Undoubtedly some relief would be obtained, but not to the degree frequently expected. Even with time-limit parking prohibited, provision must still be made for the loading and unloading of passengers and merchandise. Under normal traffic conditions in typical cities, this requirement will generally result in at least one such loading vehicle being found in each block. In other words, the amount of vehicular operation along the car tracks will not be substantially reduced, inasmuch as drivers will not permit themselves to be "boxed" in the line of traffic nearest to the curb.

Such operating advantages as may come from prohibited parking are to be found primarily in the elimination of the necessity for what may be called double-line parking, which, on all streets except those of unusual width, results in a blocking of traction movement. Where time-



Segregation of total average delays observed on twelve street car lines in the central traffic district of Los Angeles by the Traffic Commission of the City and County of Los Angeles

limit parking is prohibited, double-line parking becomes unnecessary, due to the free curb space which is made available for loading and unloading activities. The question naturally arises as to whether it is possible to accommodate loading and unloading operations of vehicles without going to the extent of entirely prohibiting time-limit standing of vehicles. Except in the more congested American cities where a great percentage of the traffic is of a commercial character, it is believed that this end can be obtained by means of a regulation which has come to be known as the loading-zone rule—that is, an ordinance provision which makes possible the reservation of adequate curb space conveniently located in each block, which may be used exclusively by vehicles which are loading or unloading passengers or merchandise. This regulation has proved its effectiveness in eliminating the necessity for double-line standing. Attention is called to the accompanying illustration, indicating that the recent Los Angeles survey revealed that only 0.6 per cent of the total delay time could be attributed to parking which overhung the car clearance line.

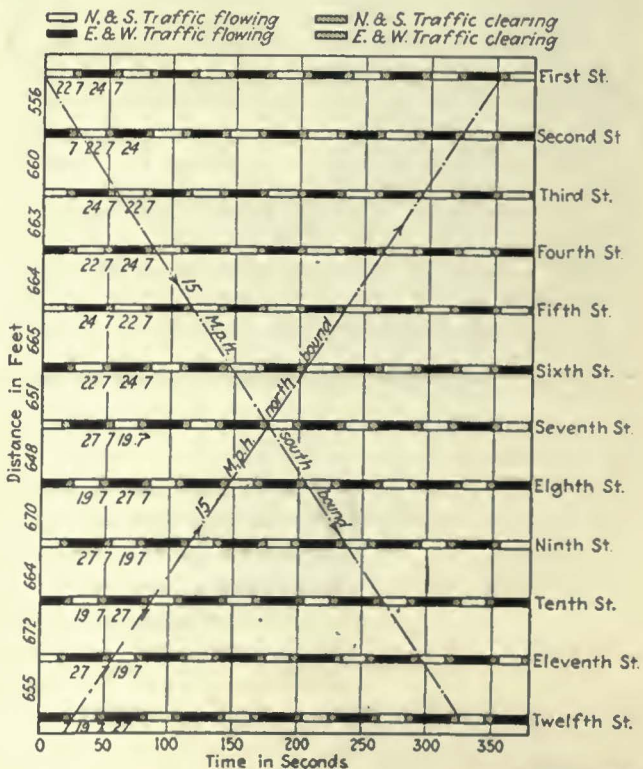


Chart showing operation of recently designed co-ordinated traffic signal system for Los Angeles

Obviously, this delay is so small as to be practically negligible. Yet three years ago a similar study indicated that 10 per cent of all parked vehicles in the central district was standing in double line, causing constant blocks and delays to traction operation. The practical elimination of this delay factor was due to a loading-zone provision incorporated in the traffic ordinance which permits the reservation of as much as 50 per cent of the entire curb space of any block for the use of vehicles during loading and unloading operations. It is needless to say that the regulation has proved of as much benefit to the general motoring public, and especially to the commercial operators of the city, as it has to the street-railway company. A similar provision has been incorporated in the Chicago Traffic Ordinance and the ordinance recently drafted for San Francisco. With double line parking eliminated, the street car operator need have little further consideration regarding parking as a delay factor, except upon streets where curb parking interferes with street car clearance.

DELAY DUE TO OVERLOADED LINES

The delay due to overloaded lines is that which results from street cars offering obstruction to those following, due to overloaded lines or other operating conditions. It is one that does not result from general traffic conditions, but from operating conditions of the lines themselves. Observation leads to the belief that there is in American cities altogether too much of what may be called traditional street-car routing—that is, routes which are followed at the present time primarily because of antiquated habits on the part of the car riders and of merchants located along the lines. Recent routing studies have indicated the possibility of more evenly distributing some of the acute loads which are borne by lines at the present time and at the same time giving more economical and efficient service to the public. Any movement of this sort is a benefit not only to the traction company itself but likewise to the general traffic problem. From the standpoint of traffic relief, special attention should be given, in rerouting studies, to the possibility of eliminating right and left turns at congested intersections.

At Los Angeles 33.3 per cent of the total stopping time was attributed to loading. Methods for reducing loading time are so well known that any discussion of them is needless here. The use of raised platform zones, ground conductors, suitable car design and improved fare collection systems are all important. Observation leads to the belief that in many American cities at present much time could be saved by the use of better methods.

The traction companies owe it not only to themselves but to the operators of vehicular traffic to keep their cars standing for the least possible time consistent with efficient loading. A common view of a street car at a congested intersection with a long queue of passengers boarding laboriously through a single entrance, making change and paying their fare, raises a pertinent question as to whether there is some more effective method of transacting this business. The pay-as-you-leave system as a substitute for prepayment is one which would appear to be a not illogical change under many conditions.

The efficiency of any traffic control system depends largely on its ability to maintain the intersection delay at a minimum. Reference to the Los Angeles table, shown herewith, shows that 54.8 per cent of the total delay can be attributed to waiting for a "go" signal after the loading and unloading business has been completed. This amount of delay seems entirely out of proportion when it is recalled that it exceeds the combined delay resulting from loading and all traffic interferences. Excessive delay from stop and go apparatus will be inevitable in all American cities until the controlling devices are properly co-ordinated and adjusted in timing to meet the traffic loads which the streets carry. What can be accomplished by a properly designed system of co-ordinated control is best illustrated in the Loop district of Chicago, where a co-ordinated system of signals operating under progressive timing has reduced control delay to a minimum and has resulted in a marked improvement in traffic conditions, from the standpoint of both traction and free wheel operation. E. J. McIlraith, staff engineer of the Chicago Surface Lines, is primarily responsible for the excellent design and functioning of this system. As an illustration of what may be accomplished by proper signal co-ordination, an accompanying chart shows the operation of a recently designed system for Los Angeles.

One of the most serious traffic conditions that confront traction operation, and indeed vehicular operation as well, at the present time is what may be called overcontrol. There appears to be a tendency to conclude that a traffic stop and go signal is a panacea for all traffic ills. One sees devices installed at hundreds of intersections in American cities where traffic demands do not warrant control of any type. Traffic signals properly used offer one of the brightest hopes for effective regulation, but misused they can have nothing but serious effects. No signal should be installed at any intersection until a study has indicated that its operation will reduce rather than increase congestion.

WHAT can be accomplished by a properly designed system of co-ordinated control is best illustrated in the Loop district of Chicago, where a co-ordinated system of signals operating under progressive timing has reduced control delay to a minimum and has resulted in a marked improvement in traffic conditions, from the standpoint of both traction and free wheel operation.

The Ten-Year Budget*

*Electric Railways Must
Plan for Years Rather than Months*



By George E. Frazer

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EVERY one of its branches the public utility business is pre-eminently a long-term business. Although certain factors have led to a great emphasis in accounting and reporting by daily and monthly periods, it is well to remind ourselves that we are in a business that of necessity covers long periods.

Every electric railway has on its books a long-term budget expressed in its capitalization. The first problem that confronts the management of an electric railway every morning is the recurring problem of fixed charges on capital. Often such fixed charges are in excess of the net income that can reasonably be estimated. There is the constant temptation before the manager of electric railways so situated to impoverish service and with forced savings from operating necessities build up sums required for interest and dividend payments. It is to the everlasting credit of your industry that this temptation, while daily recurring, is being constantly withstood in order that the public may be served first. Ranking equally in importance with the long-term budget of capital charges is, of course, the long-term budget of capital expenditures. Let me remind you that a budget is a balance. It is a misnomer to speak of a capital expenditure budget if it is nothing but an estimate of the sums that the engineering department of your street railway would like to spend for capital account during each of, say, the next ten years. Opposed to the list of capital expenditures in sub-total and in grand total there must be a statement of proposed capital available out of which the expenditures can be met.

The long-term budget of capital expenditures leads locally to the long-term budget of capital charges. Here, again, it is idle to make a one-sided budget that

merely shows the demand of capital charges that it is estimated will occur each year for a long-term period. Opposite to that demand, and balancing with it, there must be a statement of estimated income available for capital charges. Nor can we break our chain of logic at this point. We must relentlessly set down a third long-term budget. On the one hand we must state the estimate of net income that is required for capital charges and against that estimate we must state the estimated gross revenue, less expenses, that produced the net income. Lest it be said that I am getting into the realm of the higher mysticism at this point I must insist that it is possible to estimate the gross income of an electric railway for a number of years in advance, and it is possible to make this esti-

mate with a reasonable degree of accuracy. Such estimates have been successfully made and can be successfully made, because there are more factors which can be predetermined than there are unknown factors, and because the work of the accountants, statisticians and engineers can be, and should be, tempered by the mature judgment of executives. The priceless ingredient in a long-term budget is the mature judgment of executive leadership that conservatively analyzes the figures and temperately sets down results which are obtainable and in practically all instances will be exceeded. Such figures may be of poor quality if intended for use in selling an electric railway, but should be of exactly the character I have described if they are to be used in planning ahead the successful operation of an electric railway over a term of years.

LONG-TERM BUDGETS SHOULD BE SET UP

Certainly experience has shown that setting up long-term budgets often results in disappointing figures that must be faced if long-term success is to be had. If the capital expenditure budget for the next ten years in

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your company results in a budget of capital charges for the next ten years that demands net income for that long-term period in excess of what the net income can conservatively be estimated, then you have very striking proof of the necessity for long-term thinking. Similarly, a disappointing long-term budget may, and often does, call attention to the necessity for cuts in operating expenses. If the long-term budget shows that present wage rates cannot be maintained, that showing of itself may stiffen the backbone of the management in insisting upon wage rates that can be lived with. It is easy to give in to solutions which make peace for today. In fact, it is altogether too easy to do that in making wage settlements where long-term budgets are not on the desks of the management compelling long-term thinking. And, of course, the long-term budget does play hob with extravagance in overhead expense accounts.

The trilogy of long-term budgets in the case of an electric railway company always emphasizes that present capital charges are so high that it is difficult to add new capital charges made necessary by needed capital expenditures. The temporary solution of some companies has been to forego current capital expenditures, with the result that service has suffered and gross revenues have declined. It is sometimes almost too easy to explain such decline of gross revenues as due to automobile competition. On each successful electric railway in the country the capital expenditures have resulted in improved service and that improved service has resulted in a sufficient increase of gross revenue to meet the capital charges arising out of the capital expenditures. To the degree that this statement is true, it follows in severe logic that the increase in capital charges is more important than the old capital charges, and that the increase in capital charges if necessary must be made, even though the old capital charges are summarily decreased.

The long-term budget tends to bring up the question of recapitalization. To my mind that is the virtue of setting up a long-term budget. Many electric railway companies in the country need recapitalization in order that present capital charges may be reduced to a point where new capital charges can be increased. Without this process the present capital charges themselves are doubtfully secured. Let me add that public financing has demonstrated that the public will buy new securities on an electric railway when satisfied that the old capital charges and new capital charges make a sum total that can be conservatively met.

A long-term budget starts with an estimate of capital expenditures for a period of years. Such an estimate brings into sharp relief the varying degrees of productivity of the properties owned by the electric railway company. If the electric railway company owns power plants and transmission lines which need improvement and betterment, it may be found practicable and desirable for a reorganization of the company to proceed under which such power plants and transmission lines are sold to electric light and power companies which, through more constant use, can better afford to pay for their renewal and expansion. Under this process, the electric railway company can secure power by lease and at the same time avoid capital expenditures which it is not in an economic position to finance.

It must not be understood that the sale of the power plants and transmission lines is indicated in all cases by merely setting up a long-term budget. Quite the con-

trary may result. The long-term budget may show that a great deal of capital must be spent on power plants and transmission lines and that the electric railway company must find an outlet for power in order to justify such a plant program.

The point that I am making is that the long-term budget compels the balancing of capital expenditures with capital charges in the first place, the balancing of capital charges with net income in the second place, and the balancing of net income against predetermined operating conditions in the third place. Where these three judgments are made over a period of ten years in the case of an electric railway property, there is bound to be an intensive study of the revenue-producing qualities of the assets of the electric railway. If the electric railway company owns freight lines or power houses or transmission lines or terminals that it cannot properly finance and develop, then the long-term budget will suggest the sale of these facilities to other public utilities, with advantageous leases back to the electric railway company. On the other hand, if the facilities owned by the electric railway company are capable of expansion where power or service can be sold by it to other utilities, then the long-term budget will suggest that possibility.

What I have desired to do is to call your attention to the following principles:

1. The electric railway business must be planned in units of five years or ten years rather than in units of this day or this month.
2. The electric railway business is a fundamental part of the transportation system of the country and, as such, is bound to grow and develop.
3. Each electric railway company must spend large sums on capital additions or else suffer losses in gross revenue and jeopardize present capital charges.
4. The proper budget of capital expenditures must be balanced against new capital required to make the expenditures.
5. This leads to the second budget of capital charges, both present charges and new capital charges as against probable net income during the life of the capital charges.
6. This consideration of capital charges may lead to a reorganization of present capital structure in order to secure a basis that will support the required capital structure.
7. The second budget of capital charges leads to a third budget of estimated net income as against gross revenues and expenses.
8. This long-term operating budget draws particular and intensive study to revenue-producing capacity of present and proposed assets, possibilities of increasing gross revenue and decreasing expenses through economies in plant betterments and better supervision, long-term consideration of wage levels and long-term consideration of overhead expense accounts.
9. The three long-term budgets taken as one long term program inevitably lead to a study of the advantages of disposing of such power plants, transmission lines, terminal facilities, and the like, as can be used to better advantage by electric light and power companies than they are now being used by the electric railway company; rehabilitation of the electric railway to put it in a position to sell power to steam lines for electrification of their metropolitan services, and use of electric railways themselves in hauling city freight deliveries so as to reduce vehicular traffic congestion in the city streets.

Obtaining Capital for Electric Railways*

By Francis H. Sisson

Vice-President Guaranty Trust Company of New York



Francis H. Sisson

TO ATTRACT capital, any industry must be able to demonstrate its fundamental economic soundness— that is, its capacity to produce the better - than - any - other - agency goods or services for which there is every prospect of continued and enduring demand. From the standpoint of the basic requirement, the electric railway industry, at least insofar as it pertains to transportation in large centers of population, has abundantly proved its right to share in the investment fund of the country. Within the past ten or fifteen years several rival methods of transportation have been developed and tested, but none has proved capable of handling mass passenger traffic as cheaply and as effectively as the street railway. First there came, in the period before the war, the jitney, which, unregulated and irresponsible as it was, soon passed from the scene. During the war the electric railways were weakened by the rapid rise in operating costs, and since its close they have had, in their weakened condition, to face the widespread development of the motor bus as a transportation agency and also the rapid multiplication and diffusion of the private automobile among all classes. Out of the experience derived from this intense struggle for existence of rival means of transportation has come the definite conviction that, for the economic handling of passengers in mass in our cities, nothing has been developed which can take the place of electric cars running on steel rails.

It has become self-evident from the congestion in our streets that the private automobile is incapable of handling the large volumes of traffic which daily flow to and from the business centers of our cities. As the congestion increases, owners find that they cannot by using their automobiles save sufficient time over street car schedules to justify the very substantial additional expense involved. They are also deterred by the vexatious dangers of driving in crowded traffic and the difficulty of finding parking spaces in the vicinity of their destinations. It seems likely that further multiplication

of automobiles will have little adverse effect on the volume of traffic carried by street cars in rush-hour periods in large cities, although there may be some resulting further decrease in riding during off-peak hours and on Sundays.

While the private automobile has not displaced the street car, it has admittedly modified to a profound extent the conditions under which street cars operate. For one thing, the speed of street cars has been reduced by the congestion which the automobile has produced. Another change has been the lowering of average volumes of street railway traffic as compared with peak volumes. Both of these alterations in conditions have made for increased unit operating costs on the railways. These changes, however, are of the technical variety.

Broadly speaking, the most significant modification has been that of the electric railway industry from a monopolistic to a competitive business. No longer can the railways depend on traffic which comes to them as a matter of course; instead, they must adapt their operations and equipment to attract traffic.

These adverse changes in operating conditions for street cars, however, have been counterbalanced by even more adverse changes in the conditions affecting the use of automobiles and consequently have not shaken the conclusion that the electric railway industry in large centers of population is as a business economically sound. As this judgment respecting the permanence of street railways comes to be shared by investors generally, the difficulties in the way of railway financing should become much more easily surmountable.

At present, however, despite the soundness of the railway business as an economic activity, many railway companies are hard pressed to obtain additional capital for their needs. The main reasons for the plight of these companies are unsatisfactory franchises and contractual relations, top-heavy indebtedness and fixed charges, closed or otherwise inflexible mortgages and in some instances competition from other public transportation agencies, unfavorable political conditions, unsatisfactory public relations and lack of alert and efficient management.

*Abstract of an address delivered at the annual convention of the American Electric Railway Association, Cleveland, Ohio, Oct. 3-7, 1927.

Speaking very generally, the inability of these companies to do financing is due to the fact that the essentially sound business which they conduct is not clothed in sound legal and corporate forms. For the most part the existing inadequate forms which retard and prevent financing are not creations of present managements, but are rather legacies from a past in which conditions were utterly different.

Among the most common difficulties encountered in franchises are insufficient term or tenure of life and lack of flexibility in respect to fares. Either one of these conditions makes financing well nigh impossible, and a combination of the two is usually fatal. Fortunately municipal authorities and the public in general have in a number of instances been brought to see the folly of inflexible provisions in these matters, and old iron-clad franchises have been superseded by others having the flexibility that investors demand.

Unless state laws prevent, franchises should be for an unlimited or independent period, or else there should be some provision for the amortization or reduction of debt within the period of the franchise. Several states have commendable indeterminate franchise laws whereby public utilities are assured of the continuing right to operate their properties unless and until the municipalities within which the properties are located elect to purchase them at their fair value. Other states should follow suit and rid their statute books of archaic franchise laws. Where franchises must be for definite terms, the necessity for amortizing debt within the life of the franchise may be obviated if a provision is incorporated obligating the municipality to take over the property at its fair value in case the franchise is not renewed.

FRANCHISES SHOULD PROVIDE FLEXIBLE FARE

Unless the regulations of fares falls within the province of some state-wide agency, there should be machinery within the franchise itself whereby the raising and lowering of fares to meet fluctuating costs is accomplished automatically and without reference to any local political body. A number of admirable "service-at-cost" franchises embodying this principle have been worked out. In such franchises changes in fares usually are regulated by a barometer fund into which go all earnings above expenses and a stipulated return on capital. The only serious criticism which may be made of such franchises—and that mainly from the standpoint of the common stock holders—is that the incentive to the management to accomplish savings in operation is somewhat dulled, since such savings redound wholly or largely to the benefit of the car rider. As a way of avoiding this difficulty, it is suggested that companies which have occasion to work out franchises in the future might give consideration to the possibility of making the raising and lowering of fares dependent upon price index numbers rather than upon barometer funds. Index numbers have proved useful in many ways, and it should not be at all impossible to construct one which would fairly measure

fluctuations in the costs of conducting electric railway operations. Entering into the computation would be wage scales for various general classes of labor and prices for the principal basic commodities and materials used in the operation and maintenance of street railways. The level of the index number prevailing at the time of the adoption of the franchise would be taken as 100, and provision would be made for the increase or decrease of fares by some fraction of a cent for each 5 or 10 per cent increase or decrease in the index number. The regulation of fares in this manner would not impair in any way the incentives for increased operating efficiency.

Another common defect in franchises is the heavy burden of paving charges and taxes which they impose upon the grantee companies. The reasons for the requirements in regard to paving have been obsolete ever since the passing of the horse cars, and ordinarily there is scant justification for any special franchise or excise tax on earnings in addition to the usual property tax. In the

long run the effect of such provisions is to raise the fare which the public must pay and by so doing encourage the use of private automobiles with resulting increase in street congestion.

The only remedy for unsatisfactory franchises is, of course, the securing of better ones, a process in which the confidence and good will of the public are absolutely essential. To obtain such confidence and good will a company must fully and

frankly acquaint its public with its problems and aims. It must also show, not merely by words but also by actions, that it is doing its best to render good service and will make improvements as rapidly as its position will permit. The obtaining and holding of public good will is a task at which the entire staff of a company, not a part, must work, and work continuously. There is hardly ever a case of public mistrust and ill-feeling that will not yield to continued treatment of this very sort. There is in this connection a vicious circle: Additions and improvements cannot be made because of lack of capital, capital cannot be obtained because earnings are poor and earnings are poor because the inability to make additions and renewals results in high operating expenses and loss of traffic. If this circle is to be broken, it is usually by improving the relations of earnings to fixed interest requirements and in this way making possible the sale of additional securities.

WHEN NO MARKET FOR SECURITIES EXISTS

Companies which cannot at present find a market for their securities might adopt one of two courses: either plow back all surplus earnings into their properties for a period of years and by this process gradually effect such an improvement in the relation of earnings to interest charges that bonds will become salable, or else endeavor to effect a readjustment in capital structure. The first procedure should not be followed by a company unless its surplus earnings, together with such funds as it is able to secure from the sale of equipment trust certificates and similar obligations, are entirely sufficient to take care of its needs for new capital, not merely the

WITH favorable conditions in respect to franchises and corporate structure must be coupled the assurance of alert and vigorous management, for not even the best set-up as to franchises and capital issues will atone for visionless and inefficient supervision.

—FRANCIS H. SISSON.

money required to maintain the property in its existing conditions but also that needed to revivify it with new equipment and place it in a condition to attract traffic. If a company's earnings are adequate for this purpose, however, its credit may be restored by this process much more quickly than might at first be thought, as the effect of the reinvested earnings is cumulative.

If, however, earnings are not sufficient to keep the property abreast of developments, then it is best for all concerned, security holders as well as car riders, that an adjustment should be undertaken. In some cases there would be a fair possibility of effecting such a readjustment by voluntary agreement among the holders of the various classes of securities. Almost any street railway property which has been starved for lack of capital will give a handsome return, in the way of increased earnings, and any new money which may be introduced. For this reason it should not be impossible to persuade holders of existing securities to see that their interests are better served by taking junior securities in a situation with good prospects of growth than by preserving a technical priority on a starving property. There will be cases, however, in which voluntary action cannot be secured and where the knife of forced reorganization must be used. Even when this means the wholesale scaling of debt and the levying of assessments on stock, all classes of security holders are likely to find in the course of a few years that, as a result of the improvement in their company's credit, their new securities are worth more than those which they surrendered.

Of course, there may be more than a mere situation in respect to earnings that prevents a company from being able to do financing. In addition to being top-heavy, its funded debt may be complicated by reason of being split up into numerous separate issues and also its principal mortgages may be closed so that it has nothing resembling a first mortgage with which to go into the money market. Even in cases where mortgages are open there may be difficulty because the bonds which may be issued must bear a particular maturity date or coupon rate. Whenever opportunity offers, whether in connection with a readjustment or otherwise, a new financing medium should be set up which will be as nearly as possible a first mortgage, permitting the issuance of bonds in series varying as may be desired in respect to maturity dates, coupon rates and other provisions.

Even when a company has been placed in a position where it can do senior financing satisfactorily, it may still have a problem on its hands to raise its requirements of junior money. Few companies are able to sell stock, and recourse must therefore ordinarily be made to earnings as a source of junior money. Perhaps most companies will have to continue this practice for some time, but at the very first opportunity they should undertake the sale of stock. In preparation for such an opportunity they might, wherever legally possible, change their stock into shares without par value.

With favorable conditions in respect to franchises and corporate structure must be coupled the assurance of alert and vigorous management, for not even the best set-up as to franchises and capital issues will atone for visionless and inefficient supervision. On the other hand, it is really astounding to find how much can be effected by good management alone in the way of reducing operating expenses and working out improvements to attract traffic.

Present Situation Is Encouraging*

By **B. C. Cobb**

Chairman of the Advisory Council
American Electric Railway Association



B. C. Cobb

Despite increasing automobile competition, the electric railway industry is holding its own. Modernization of plant and modernization of thought are instrumental in making it progress

WE ARE again deeply appreciative of the hospitality extended to us by the city of Cleveland and its people. Ours is a great and necessary industry, as the citizens of Cleveland well know. Because of their wise action after some years of experiment, their city has today one of the best-operated and most strongly financed transportation systems in the country. Some other places would do well by emulating this example. New York, where politics and not service to the public is the order of the day, would profit by giving heed to what has been accomplished in this fair City of the Lakes. In our great metropolitan center, votes, not transportation service, seem to be the things uppermost in the

*Abstract of an address delivered at the annual convention of the American Electric Railway Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

minds of the granting and regulating authorities. And yet here is a paradox, for if the people were properly told and understood, it seems certain that they would see that the 5-cent fare will not earn in sufficiency properly to maintain and give adequate service and would therefore vote for something different.

I think I can fairly say, without fear of contradiction, that the transportation service in New York City today is a crying shame. And why? Politics, and the desire to "fool all of the people all of the time." A unified and improved transportation system under private management, with a slightly increased fare and with proper governmental regulation, would solve the problem, and with great benefit to all concerned.

In 1926 there was no appreciable increase or decrease in the number of passengers carried by electric car and allied motor bus lines. The figure has been almost stationary for the past three years—16,000,000,000 revenue and transfer passengers. Perhaps we should feel encouraged because of this. I mean perhaps we should not become discouraged because of lack of increased traffic when we know that our country has increased in population prodigiously during the years just mentioned. I do not think we should become discouraged when we consider the tremendous increase in privately owned and operated automobiles during that time. Somewhere between 10,000,000 and 11,000,000 is the figure.

The independently operated motor bus is not now the menace that it was, for the industry itself has, to a very great extent, taken over that very necessary adjunct of the transportation service. Happily for the industry, for the bus manufacturers and for the people themselves, a better understanding of the bus situation has been arrived at. The financing of independent bus operation by manufacturers in localities already served is largely a thing of the past. This is for the common good, for ruthless competition in a business which should be a regulated monopoly can only work harm for all alike. We of the electric railway industry should not, however, complain if bus or other transportation service is given in territories needing service if we ourselves decline to give it.

IMPROVED SERVICE AND NEW METHODS

No one, if fair minded, can say that the electric railway industry has not in the past few years endeavored to better its service. This is the one thing it has tried to do, not because of altruistic impulse—I think no such claim has ever been made—but because if it was to live and eventually to prosper, it was necessary to renovate its viewpoint and adopt new methods and procedures. This it has very effectively done, not only by adding new and modern railway equipment but by adding motor bus auxiliary service, paying more attention to its personnel, giving the public more complete information as to its needs and necessities, and above and beyond all else, endeavoring to render a service under the most trying circumstances in a gracious and attentive way.

The industry has been courageous in the face of great difficulties. It has steadfastly maintained that it is rendering a necessary service to the people. It has tried frankly to express just what its troubles are and what it needs to make it prosperous and therefore a better servant of the public. Its efforts at salesmanship during the past few years have been noteworthy, with the result that in many instances much good has accrued not only to the industry but to the people as well. It is very gratifying

to report and be able to say that, generally speaking, not only of the communities—there are a few exceptions throughout the country have rallied to the support of the industry and endeavored to help it, not only by increasing rates of fare but in many other ways. This is a good sign, for it means co-operation and team work which in the long run must surely win.

ADVISORY COUNCIL PRINCIPLES

Last year your advisory council laid down some fundamental principles which it was thought would be of benefit not only to the companies but to the employees and the public as well. These principles your council stands for, and it believes if they are followed they can not help but be of benefit to all alike. The most important of these are:

1. The companies must obtain the friendly co-operation of the public.

2. The companies must have their executives always accessible to their employees and the public. They must welcome suggestions made in the interest of the service, grant reasonable requests and have a genuine interest in the welfare and progress of the communities in which they operate.

3. The employees must realize that their interests are those of the company are the same, and make every effort to be useful public servants in an honest endeavor to make friends for themselves and their company.

4. The public must favor a just system of regulation and consent to rates of fare that will make its transportation agent a solvent industry.

5. The public must understand that the best service at the lowest cost can be obtained in a community only through the operation of all public transportation by an efficient organization.

6. The public must realize that 75 per cent of the people use the public transportation service in their daily occupations, and insist that their authorities enact and enforce such effective traffic control that the public vehicles may have a relatively unobstructed use of the streets.

Indiscriminate and unregulated parking of automobiles on business thoroughfares is an evil which still exists and it is evident that only with the passing of time and better acquaintance with the results of such evil will it be stopped. Not only is such practice harmful to the transportation companies but it is also harmful to the merchant whose front door it clogs. It slows down traffic because of so doing becomes a public nuisance. If continued, it can only mean additional and unnecessary taxation because of the cost of widening streets.

GOVERNMENT OWNERSHIP

There are some among us who are favorable to government ownership and operation of public utilities. There are not many, however, for the feeling in America, which is the outgrowth of the thought expressed in the Constitution, is still too strong for private initiative and endeavor. And yet, if the people want to continue to keep electric transportation in city and suburban service I cannot think otherwise—it may be they will be forced in extreme cases, to take over such operation, charged with such deficits as may come about to the taxation bureau. A better thing, and a more likely thing, will be for the people fairly to regulate and compensate their transportation companies so that they will earn a fair return on the fair value of the property used and useful in the public service.

The Autobiography of a Thin Dime*

By E. F. Wickwire

Vice-President Ohio Brass Company, Mansfield, Ohio

This is one of the author's characteristic addresses, containing a wealth of philosophy with a 1928 model dress that is planned to please his auditors, much as he would have them please by dressing up their cars

"I am a *Dime*—Ten Cents
"I am not on speaking terms with the Butcher
"I am too small to even look at a pint of Ice Cream
"I am not large enough to purchase a good Cigar
"I am too small to buy a ticket to a Movie
"I am hardly fit for a Tip
"But, believe me, when it comes to Street Car Fare
"I am considered *Some Money*."



E. F. Wickwire

PERHAPS you've heard the story of the sailor who was visiting his boyhood chum who had become a minister. The sailor had a parrot. The minister also had a parrot. The parrots were hung up side by side. They looked at each other for a minute and each was suspicious of the other. Finally the minister's parrot, in a funeral voice, said:

"What must we do to be saved?"

The sailor's parrot thought that over for a minute and then remarked:

"Pump like h——, or we'll all be lost."

I think the question asked by the minister's parrot strikes a familiar chord in the minds of all of us connected with the electric railway industry. We have been trying to work out the right answer to that question for quite a spell.

Maybe you'll agree that the answer given by the sailor's parrot to the minister's parrot pretty nearly hits the nail on the head.

The next question that perhaps naturally comes to mind is: "Are we steering the 'old boat' in the right direction to reach safe waters?"

And this is a vital question that concerns everybody connected with the industry—whether he be an operating man or a manufacturer.

Recently I noticed a card displayed throughout a manufacturing plant which read something like this:

"Who is your real boss?"

"Is it the president? No."

"Is it the superintendent? No."

"Is it the foreman? No."

"Your Real Boss is the CONSUMER of our Product—the man who buys the article that you are helping to make."

"If he is satisfied with your Product, he will continue to

*Abstract of an address delivered at the annual convention of the American Electric Railway Association, Cleveland, Ohio, Oct. 1 to 7, 1927.

patronize you. If not, you will lose his patronage, perhaps without even hearing a complaint from him.

"Furthermore, the quality of your Product is the yardstick by which he measures the price he is willing to pay for it.

"It is not simply a question of satisfying yourself—you must satisfy him.

"At times you may think he's a 'Crank,' so keep this definition of a Crank before you!

"A CRANK IS A FELLOW WHO INSISTS ON CONVINCING ME, INSTEAD OF LETTING ME CONVINC HIM."

Doesn't this same principle apply to the electric railway industry? Isn't the user of our product—the car rider—the real boss? And isn't it up to us—all of us—to satisfy him in order to progress and prosper?

And if we are really aiming to satisfy this real boss—the consumer—doesn't it stand to reason that we must constantly study his likes and dislikes; find out what appeals to his spending instinct, and do our utmost to develop our product accordingly?

You may say, "That sounds all right, but it's not such a simple matter to read the minds of the fickle public in our case." And I agree with you thoroughly. But I think you agree with me that a determined, intelligent and organized effort on the part of all of us will find ways to accomplish our purpose.

It's a good mark to shoot at—and you know Cleopatra finally "made her Marc."

We might do a lot by establishing scientific research departments. I use the term "scientific" because anything is scientific when we don't quite understand how to accomplish it.

I recently heard a man who has been prominent in so-called scientific research work for improving the automobile make this remark:

"Our constant aim is to find out what appeals to the public; what it will buy, because anything that can be sold can be manufactured."

Isn't that a significant comment, "anything that can be sold can be manufactured?" And wouldn't we do well in our own industry, both operating man and manufacturer, to dig a little deeper into that point?

I doubt if there is any field in which the mechanical and technical problems have been more intelligently, logically or thoroughly worked out than in the electric railway industry. Hampered by low fares and working under that first fundamental law of railroading—"service must be maintained under every condition"—there is no denying that electric railway men have accomplished wonders.

THE AUTOMOTIVE MAN'S PHILOSOPHY

This automotive man whom I have quoted has evidently studied people from this standpoint. To quote him further:

Every trade in the world hates the introduction of a new idea into its routine, if the idea looks new. Therefore, be careful how you wrap it up. They award medals for a new idea only after it becomes old.

So we must study that end of the thing and the business relationships, the common, every-day, work-a-day things, simply to find out whether we do it by force of habit, whether there is any sense to it or whether there isn't.

So the principal way to start research in any organization is to start at your desk. Turn it 180 deg. around and see how much different things look. Just move a few things around. Go to a different restaurant to eat, or do something differently."

[Suppose in our case he might suggest riding to work on a street car.]

That is all that is wrong with us; we get to doing the same thing in the same way every day and all the rest of the world disappears.

So we have to get out of the rut; that is the greatest problem that research has today, to get us mentally out of the rut, and the rest of the things come as a matter of course.

I have taken the time to quote these remarks from a man high up in automobile research work partly because they appeal to me as very much worth while in themselves and also because the development of the automobile has created an entirely new set of conditions in the electric railway industry.

So, whether we like it or not, the automobile seems to be our principal competition. And a little analysis of some of the ways the automobile industry has appealed to the public in motor transportation may emphasize the importance of some points as applied to our case.

For example, we all know that the "appeal of appearance" has been one of the strongest selling factors in the automobile industry.

Knowing, as we do, that the decided changes and improvements in the lines and appearance of the 1928 model motor car, as compared with, say, the 1918 model, have appealed so strongly to the public, is it reasonable to assume that it will not respond to more of the same kind of treatment, applied to the trolley car? There is a question of degree of course, and this doesn't mean that the trolley car has to look like an automobile, but it should look less like the old "5-cent" street car.

The motor car industry has not been able to get motorists to adopt the polecat's motto, "don't hurry—others will," so it has made marked improvements in recent years in the matter of quick acceleration, and you will find it featuring this point in its advertising and in its sales talk.

In the matter of comfort, the motor car manufacturer has made constant improvement, even to the point of providing, in some cases, cushions stuffed with "goofer feathers, or fuzz from peaches."

Here, again, enters the question of degree when considering the trolley car, but it doesn't stand to reason that a man is cheerfully going to transfer his pampered anatomy from a wide, comfortably cushioned automobile seat to a narrow, hard-surfaced trolley car seat.

Automotive engineers will tell you that quietness and power do not naturally go together in a gasoline engine and yet they have spent years trying to make the motor as quiet as possible. And it stands to reason that if his nervous system suffers so much from the squeaks and rattles that develop in the motor car, he also has sensitive ear for the grinds and howls that develop in the trolley car.

Last, but not least, we all know that the trolley car that presents a clean, bright, attractive appearance makes a strong appeal to the public.

The motor car has developed one outstanding characteristic in the American public today, and that is impatience. People won't walk, nor will they wait to ride. In fact, they can scarcely wait for a traffic signal to change.

Like the little Irishman who was hurrying along in his flivver and was stopped by the traffic officer, who said "Wait! Pedestrians are now passing." After waiting impatiently for a minute the little Irishman yelled to the cop, "Say, when kin a Catholic get past here?"

SPEED, BUT FOR WHAT PURPOSE?

A big percentage of the people today are rushing madly around in motor cars, hurrying to get somewhere, and half of them don't know what to do after they get there. Nevertheless, they demand speed in the matter of transportation, and I believe that most of us have decided that we have to face that issue squarely.

There's no use trying to satisfy the car riders with what satisfies us. We must deliver the kind of a product that satisfies them, or it won't work any better than "trying to amend the Constitution without first amending the people to fit it." Their requirements may seem unreasonable, but is it easier to rebuild the public or to rebuild our product?

These truths bear much repetition; they but confirm what the sailor's parrot said about the necessity for keeping on pumping—"pumping" new ideas into the industry to keep pace with changing conditions.

Why will people willingly pay taxes to provide more and more street space for private cars and then begrudge an extra penny or two to ride on street cars, which carry five times the number of people for a given amount of street space?

At the opening of our county fair the other day police estimated that 10,000 automobiles had arrived and only 2,000 people.

One reason for all this "scotching" on street car fares is because shrewd politicians everywhere have rubbed elbows with and studied this "real boss" that we've been talking about—the consumer of our product. And they know that it's not hard to convince him that he shouldn't pay 10 cents to ride in the trolley car that he used to ride in for 5 cents—or one that even looks like the one he used to ride in for 5 cents.

Yet shopkeepers tell us that the workingman nowadays is buying silk shirts. And the working girl is wearing silk stockings—so I've heard. Cotton stockings are "on their last legs," and, by the same token, "cotton" street cars are on their last wheels. And it's a safe bet that the 1928 model shop girl will cheerfully pay 10 cents to curl her 1928 model silk stockings under the seat of

192 "silk stocking" model rail coach if she gets half a chance. And no wise politician would attempt for a minute to tell her that she couldn't afford it.

It most of us realize that modernized equipment alone will not solve our problem successfully. It must go hand in hand with modernized merchandising methods. And it is encouraging to note that the industry as a whole has discovered how to sell its service, instead of simply allowing patrons to buy it, as they did in the old "horse-and-buggy" days.

In this connection, the aim of your committee on cooperation of manufacturers is to inspire manufacturers to make a more intelligent and intensive study of the industry's needs, and so stimulate the creation of more new ideas, together with creative selling effort in presenting these ideas to operators.

Not that the manufacturers have not been making improvements. One look at the excellent car exhibit at this convention will offset any such impression. We've made a good start and will undoubtedly create and adopt improvements much faster from now on, particularly in respect to further changes in the lines and outward appearance of the car.

Lag ago the automobile industry called in the artist to create new body designs, and the artist may have thought a spark plug was a horse. But he went ahead and beautified the lines of the automobile body. Then the production man was called in, and he said, "It can't be built to look like that." But the executive said, "This is not just an artistic picture; it's a commercial proposition—it must be built"—and they found a way to do it.

There is nothing like calling in the right man when you want something done. Like the Scotchman who wanted to put up a brick building—so he called in a Free Mason.

The next subject on the program this morning is entitled "How the Industry Is Progressing," the idea being to present short talks by operating executives relating to accomplishments of the year on properties in various parts of the country.

It has been well said that "the individual today counts for a little in the entire make-up of the industry that only by an exchange of ideas and finding out how little we know, do we go back home and want to learn more. We should all listen to these new ideas and give them our consideration.

We are all pretty much alike as human beings, and every time a new idea is presented we are quite willing to tell what's wrong with it, because it's more fun to throw sticks than to lay them.

But shouldn't we go a step further and say, "Can you overcome that difficulty?" And if you do overcome that one, you may develop another. And if the project is worth while, you can go ahead and solve that difficulty—you don't get tired too quickly.

Conservatism has its place, but progress means pioneering. It's all right to "keep both feet on the ground," but you can't walk far if you do.

So let's not be backward about presenting new ideas at these meetings for fear they may sound radical.

Like the Christian Science testimony meeting that I had about recently. There were many enthusiastic talks acknowledging the inspiration and help received from Mary Baker Eddy, the founder of Christian Science.

Finally, a meek-looking little woman in the audience rose and said, "I'm only a visitor here and never heard of Mary Baker Eddy before, but I just want to tell you that Lydia Pinkham has done for me."

Evolution of Regulation and Accounting*

By Harry Boggs

Herdich & Boggs, Certified Public Accountants,
Indianapolis, Ind.



Harry Boggs

E VOLUTION means the ascent from simplicity to complexity. This is the history of regulation and accounting.

As most of you are connected with an enterprise that is regulated by law, it might be interesting to know that regulation is not a recent invention or a new discovery.

The difference between private enterprise and public calling are the most salient characteristics of the law of business relations. The causes of these differences are more economic than legal.

In public callings the state imposes affirmative duties, but in private enterprise usually the duties or restrictions are negative in character.

The history of the development of this distinction between public business and private calling show clearly the legal and economic basis upon which the modern law rests. [Mr. Boggs then reviewed some of the regulations in medieval times, pointing out the economic basis.]

[After citing certain classes of business that are now usually considered as public utilities Mr. Boggs takes up the question of why they are so classified.]

The question arises, why these classes of business are

*Abstract of a paper presented at the annual convention of the American Electric Railway Accountants' Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

regarded as public utilities and subject to state regulation, when other businesses are not so regulated. The principal reason is economic. It takes comparatively little capital to open a shop or a grocery store, therefore the field of these callings is practically unlimited as to competition, and competition may be expected to regulate service and prices. But the classes of public utilities hereinbefore named require large investments. To attract the capital required for such investment it is considered necessary in most cases for the state to grant a monopoly; that is, to guarantee the company which provides this service that it shall not be subject to competition in its field and that it shall be permitted to earn a reasonable return upon the fair value of its property actually used and useful for the convenience of the public.

In return for that grant, and in order to prevent the monopoly from becoming burdensome on the public—that is, from charging exorbitant rates, or giving inadequate service—the state makes exact and rigid regulations for the conduct of the business. These are affirmative duties. The state says that the business shall be conducted in a certain manner.

Let us take, for the purpose of comparison, an electric railway utility and any typical private enterprise, such as a merchandising or a manufacturing business.

In the first place the character of a public utility corporation is such that in order to furnish adequate service to the public a very large fixed investment is required.

While this may also be true, to a degree, of some manufacturing concerns, in commercial undertakings the capital turnover occurs several times each year and the fixed investment is relatively not large.

A manufacturing plant may operate when and as long as it pleases those in charge of its affairs. Its products usually can be stored until needed. The capacity of the plant can be adjusted to the demand of the market, but the size and capacity of the plant of an electric utility must be sufficient to meet the highest peak demand made upon it, even though that demand continue but for a short time.

A utility furnishing electric current must be in constant operation and production, 24 hours a day. A utility must serve all who apply and must sell its product without discrimination in price. Those who are engaged in manufacturing and commercial enterprises are not so restricted. They may sell or not sell, as they please.

On the other hand there are certain advantages and privileges which accrue to public utilities which are not shared by those engaged in private enterprise. There are certain legislative restrictions upon competition which inure to the benefit of the utility.

So we find that the determining factors with respect to these matters are economic and not legal and it is an inexorable economic law which governs and controls.

ACCOUNTING IS AN IMPORTANT FACTOR

Now that we have briefly traced the development of regulation, let us talk about the accounting department for a few minutes, to see if there has been any developments worth while and to determine, if possible, just how much importance to industry attaches to this fascinating profession.

[Attention was directed by the speaker to the early methods in vogue when trading was first indulged in by human beings and showed how transactions were recorded then.]

In years gone by many merchants viewed the accounting department as a needless expense and a nuisance. The very first thing that transpires after any new company is organized is to call for an accountant to set up a set of records, thereafter to be kept in such a manner as will correctly reflect the true condition of affairs throughout its corporate history.

The owners of a large corporation may have a wonderful institution, but they must depend upon the accounting department to keep them posted on the trend of business and warn them of the leaks.

I am sure that no public utility can properly function without a competent accounting department. The law prescribes just what accounts shall be kept and how often, when periodical reports must be made to the commission and the books must be accurately kept in order that the reports will tell a true story.

We all know that the income tax law has been a very important factor in bringing about a wider recognition of the indispensability of the accountant.

Some of the highest executives in our largest industries have come up through the accounting department.

May I leave with you the thought that the accounting department is rapidly mounting to its proper place in the utility field as well as in the commercial and industrial world and must eventually be recognized as the most important and vital factor in every business organization.



Members of the exhibit committee

An Informed Public Is Fair*

By **George B. Cortelyou**

Chairman Joint Committee of National Utility Associations



George B. Cortelyou

THE Joint Committee of National Utility Associations had its genesis in war conditions. To expedite the placing of their resources at the disposal of the government and to serve as a means of contact with the government on the larger problems created by the war, the utilities formed several joint committees. The end of the war naturally brought an end to these special duties, but it was thought best to continue some form of organization that would function in time of peace and that would facilitate common action on questions of larger import affecting the utilities. The present joint committee was the result.

The national utility associations comprise the following: the American Gas Association, the National Electric Light Association and the American Electric Railway Association.

Despite the fact that the country as a whole has accepted and indorsed the policy of private ownership, operation and management of the utilities, ardent advocates of contrary policies appear from time to time with peculiar plans that would involve the government in vast expenditures, whereas every practical feature of their plan—so far as they have any practical features—could be secured, at infinitely less expense, by the normal extension and development of existing private agencies. We would have us believe that government can carry on its business better than those who have grown up in an industry have made it what it is today, and this in spite of the wrecks that litter the road over which government operation has traveled in the past. Many of these enthusiastic theorists are less concerned with the success of their particular project than with gaining an entering wedge for their paternalistic ideas.

The American people want to be just and fair. Of that there can be no question. They have proved it time and again both in their domestic affairs and in their external relations. Temporarily they may be misled by prejudiced and partial information, they may follow false leads for a time, but in the long run they reach sound conclusions.

The price of liberty is the freedom to make mistakes. While it is true that the people may be trusted to reach sound conclusions in the long run, if the run is too long, irreparable damage may be done before the situation can be corrected. Surely we are justified, then, in attempting to avoid this by pointing out the errors and fallacies involved in many of the proposals affecting the utilities

that are urged from time to time, by disseminating reliable information concerning them and by endeavoring to keep the line of progress as straight and unbroken as possible.

There is neither mystery nor hidden purpose in the program of the joint committee. Its work will be carried on openly and frankly. It seeks no favors; it asks only that its presentation of the utility situation be considered and dealt with on its merits. But that such presentation may be so dealt with, it exercises the common right of all American citizens or organizations to be heard on all matters in which they are interested that become the subject of public debate or decision, and having presented its case it will, with confidence, abide the informed judgment of the people.

We believe that an informed public is a just public. We intend, therefore, to give the public the truth about the utilities, their aims, their hopes, their difficulties, their accomplishments. We shall try, among other things, to demonstrate that the entry of government, whether national, state or local, into this field is constitutionally unsafe, politically unwise, economically unsound and competitively unfair. And this we shall do, not wholly from the selfish standpoint, but because it is the obligation of every good citizen to fight the spread of theories which, if adopted, would undermine the structure upon which our national progress is founded. We believe that we can so present the outstanding merits of utility service under private ownership that an informed public will be unwilling to abandon the solid ground of that system for the quicksands of government ownership.

Although the utilities as a class are rightly regarded as among the most stable of our industries, they are by no means exempt from the effects of changing conditions and the necessity of adapting themselves to them. Periods of readjustment are always difficult and often painful. The dislocations caused by the war, with costs far out-

Abstract of an address delivered at the annual convention of the American Electric Railway Association, Cleveland, Ohio, Oct. 10, 1927.

stripping rates, were a severe trial to the utility interests, but they met the situation with faith and courage. The aftermath of the war brought its problems also, and these too are being met in the same spirit.

Among the ever-present facts of the utility situation is that of competition. In the case of the gas and electric companies, this is largely indirect, except in the great and growing industrial field. Gas, especially, must meet the competition of other fuels such as coal and oil where heat is required in industrial operations. The electric company, in its wholesale department, deals with similar conditions. Of course, both are legal monopolies in the sense that there is usually but one gas company and but one electric company serving a given territory, and to this important extent they are relieved of direct competition.

When we come to the electric railways, we find the competitive situation greatly intensified. The phenomenal increase in the use of the passenger automobile, the bus and the truck reacted with serious consequences upon the electric railways, both urban and interurban. They were faced with grave losses, many were forced into receiverships, and many miles of track was abandoned. Had they outlived their usefulness, were they about to disappear from our streets and highways and take their place among the relics of an age that had passed? To these questions many were prepared to answer in the affirmative and were getting ready to sing the "swan song" of the electric railways, just as in earlier years there were those who doomed the gas industry to extinction when it lost the major part of its lighting load to electricity. But happily in neither the one case nor the other were the prophets of evil justified by the event. Just as gas recovered from its temporary setback and marched on to triumphs undreamed of in that early day, so the electric railways, now that they are getting their "second wind," are gradually working out of their difficulties and are more than holding their own. Public opinion, which at first was inclined to be somewhat apathetic, is now awakening to their value as a means of economical mass transportation.

Much of course remains to be done. Their credit must be restored, which can be accomplished only by larger earnings, and this in turn may call for further revision of fares in some instances; equipment must be modernized, better business and accounting methods must be adopted, service must be improved, discriminatory taxes and other oppressive exactions must be abolished, and so on. All agencies of transportation, whether street railway or bus, must be so co-ordinated that unnecessary duplications of service and facilities will be avoided.

Substantial progress is being made along most of these lines. The important thing is not so much the speed at which we are traveling as the direction in which we are going. The electric railways are headed in the right direction. Their return to the place that is rightfully theirs in our transportation system will be hastened if they are protected from the type of competition that is merely destructive in its effect and that in the end benefits no one, the public least of all.

This does not mean that competition should be done away with, even if that were possible. There is no stronger incentive to effort than competition, actual or potential, and one kind or the other is present in every industry. We of the utilities do not know at what moment our products may be challenged by new discoveries, new inventions, new developments, but we must be prepared to meet the challenge whenever it comes, on

the basis of service and price. If we cannot do so, we must step aside or be pushed aside. We are not passengers in the industrial boat, but working members of the crew. We must "pull our weight" and a little more. We exist to serve the public, and our contribution to the public welfare must be measured by the touchstone of service.

Progress

Is the Achievement of Many
Minds and Many Hands
That Is the Glory of Life*

By Dr. Alfred W. Wishart

Pastor Fountain Street Baptist Church
Grand Rapids, Mich.



Dr. Alfred W. Wishart

IN A RECENT magazine article a writer deplored the practice of inviting ministers to address conventions of business men. He thinks the necessity to increase sales demands high-powered salesmen whose chief asset in trade is emotion. Ministers are assumed to be masters in the art of arousing emotions and so can render aid to salesmen. Then, again, religion, prayers, clerical co-operation lend respectability to business ventures and help to establish confidence in the mind of

*Abstract of an address delivered at the annual convention of the American Electric Railway Association, Cleveland, Ohio, 3 to 7, 1927.

namely public. If that is a true explanation of the presence of ministers on convention platforms, I am out of place here for several reasons.

First, because I believe a religion or a business that has emotion above reason invites disaster. Confidence and good will in business must be rooted in something more substantial than sentiment. People may be swept off their feet temporarily by emotional appeals, but unless religion and business can meet the demands of our intelligence and actual needs, the whirlwind will pass away, leaving ruin in its wake. In the long run we have to be practical.

Secondly, I believe that while prayer has its proper place in life, it has its limitations. It requires something more than prayer to please the public, to deal justly with employees and to make business profitable. Piety is no substitute for hard work, efficient management, enterprise and high intelligence.

And lastly, I must frankly express a sorrowful condemnation for any effort to palm off on the public cheap and shoddy goods, inefficient service of any sort and unsound financial ventures in the name of the Golden Rule or by the aid of advertising sprinkled with pious slogans. The oldest religion in business is downright honesty and square dealing, which means giving a dollar in value or service for every dollar received.

To do this in your business demands a variety of high qualities of intelligence and character. It requires you to keep pace with changing conditions, to meet new needs, to deal efficiently with the many difficult problems that confront modern traction companies. A manager who is too conservative and dull of perception to keep up with invention, new ideas, new methods, is as big a detriment to your business as outworn equipment and machinery. Both belong on the scrap heap.

Obsolete ideas and methods, refusal to change with changing conditions, sticking to old traditions that have lost their meaning and utility are causes of many failures in business and of loss of power and prestige in religion. The disasters that overtook public utilities in the period from which we are beginning to emerge were largely the result of bad policies, corrupt or inefficient methods and stubborn refusal to face the facts of changing social, political and economic conditions. During that unhappy period there were frightful economic losses, embittered relations between the people and public utilities, strikes and corrupt political alliances. The new order of things

which is gaining ground every year is the result of the labors of men of vision, courage, faith and initiative. They are the pioneers of a new era in which the street-car service has been improved and public confidence has been created through judicious appeals to reason. The old methods of protecting public utilities through corrupt political influence are being abandoned. How many are still wandering in the wilderness, unconverted and unconvinced, you know better than I.

Perhaps this is one of the reasons for my being here—to help the progressives convert the unprogressives. Eyes have they, but they will not see; ears have they, but they will not hear. May I humbly suggest that one ground of hope for the unregenerate is that most of the progressives are relatively recent converts? To a great degree the sufferings of public utilities have been brought upon them by those engaged in the business as financiers and executives. Some were the work of demagogues who took advantage of evils that should never have existed. Others were the result of failure to keep up with the march of applied science. And still others were due to a blind refusal to appeal directly, frankly and intelligently to the public.

Patience is indeed a great virtue. Rome was not built in a day. To make matters worse, we no sooner think we have solved our problem than some new idea upsets our theories and requires us to grapple with fresh problems. That is life. This modern world, especially, is no place for skeptics and cowards, the lazy or the stubbornly inefficient. Hence these conventions that inform, inspire, encourage and enlighten! No man, no corporation, no country, is sufficient unto itself alone. We need one another. Progress is the achievement of many minds and many hands. That is the glory of life. Civilization is impossible without co-operation, friendship, patience, courage and mutual confidence. There is no sharp boundary line between religion and business. Your great enterprise, the business of daily transporting millions of people in this broad land of ours, demands moral qualities of a high order as well as engineering skill and executive ability. The reason is that morality is basic to business, for business, after all, is life. Your contacts are not only with machinery but folks. Your problems are not all technical, mechanical, financial. They are problems in human relationships. And I do not see how such problems can be successfully dealt with if we ignore the moral factors of human contacts.

We exist to serve the public, and our contribution to the public welfare must be measured by the touchstone of service.

—GEORGE B. CORTELYOU.

What Makes Good Track?*

By Frank B. Walker

Chief Engineer Eastern Massachusetts Street Railway

WHEN the Eastern Massachusetts Street Railway was reorganized in 1919 several hundred miles of track was in poor physical condition, and it became necessary to carry out an extensive rehabilitation program. New funds were limited, and it was a problem in economics as well as in engineering to carry out the work successfully.

The way and structures department was completely reorganized and decentralized. New track machinery was purchased, an intensive study was made of modern methods in use on other roads and some new ones were devised. A course of training on modern track construction and maintenance methods was given to supervisory and productive forces. Three hundred and ninety miles of track has been completely rehabilitated and welded. Only 10 miles of unpaved and 67 miles of paved track was laid with new rail. Thus it will be seen that 80 per cent of the rehabilitation was carried out by using the old rail. By the use of modern methods of straightening rails, repairing and welding joints, surface welding and grinding, this track has been put in good operating condition at a cost ranging from \$1 to \$2 per lineal foot. The total estimated saving is not less than \$3,000,000.

The condition of the old rail was such that it could not be re-used without the vertical bends being removed and the joints welded. We developed a new bender consisting of a girder beam, on the center of which was a 35-ton jack with heavy yoke passing underneath the rail joint and with adjustable feet for various lengths of bends. On the rehabilitated track 150,000 joints were straightened out with this type of bender at a cost of only a few cents each. In 1921 after about 15,000 joints of various types had been welded, the metallic arc method was adopted and has been standard on this property since. Of the more than 115,000 joints of this type that have been welded, failures have been fewer than with any other method.

It was found that much of the old, lighter rails could be welded by the use of the original angle bars, with



F. B. Walker

the outstanding flange cut off by an acetylene torch. Although this kind of joint had considerably less strength than the rail, many thousands of old plates were used and only a small number failed. This led to the conclusion that the actual strength of the welded joint was of no consequence as much as the quality and kind of welding. This is especially true on 7-in. T-rail and 9-in. girder rail in paved streets. Of our total of more than 130,000 welded joints none has failed by impact. Such few failures that have occurred have been on account of secondary stresses from the welding process or temperature changes, and we believe that properly welded joints will not fail on account of wheel impact. The company has recently developed a new base-plate head-bolt type of rail joint, which is stronger than the fish-plate type and is cheaper. More than 2,000 of these are now in service.

Grinding joints was considered an important part of the program, and 175,000 joints have been ground out of a total of about 200,000 in the entire system. Of these 122,500 were surface welded before they were ground. Corrugations in the head of old rail to the extent of about 640,000 lineal feet, were ground out concurrently with the rehabilitation program. The pounding of cars over rail joints and corrugated rail has been practically eliminated, and noise has been reduced to a minimum.

We are trying to bring our property, and have also succeeded, to the point where there are no bad joints or noisy tracks. We are competing with rubber-tire vehicles, and it is essential that we eliminate track noise and particularly those track noises caused by bad joints, corrugated rails and pounding special work. In this connection it may be of interest to note that we are welding all exterior and interior rail joints of all special work. It is believed that by the elimination of such bolted joints the life of special work will be materially lengthened and the noise from pounding joints eliminated. So far there has been no trouble due to breakage of such welded special work.

Our present standard paved track is similar to that on many other properties, consisting of either 7-in., 91-lb. T-rail or 9-in., 104-lb. girder rail, metallic arc-welded.

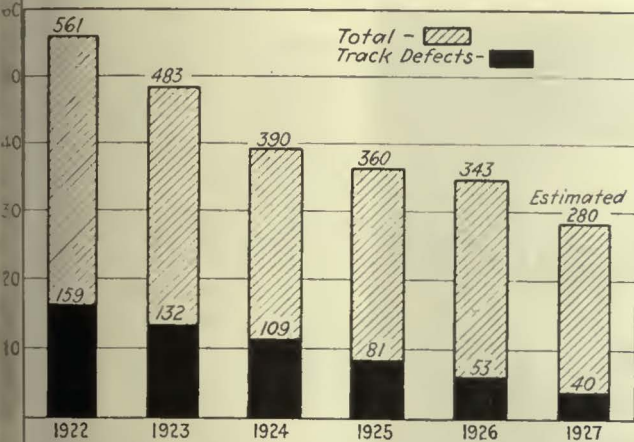
*Abstract of a paper presented at the annual convention of the American Electric Railway Engineering Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

joints, tie rods on 5-ft. centers, tie plates, 6-in. x 8-in. x 8-t. creosoted hard pine ties and 6 in. of ballast. This costs about \$1.40 to \$5.40 per foot of track, exclusive of painting, depending on type of rail, traffic, etc.

Particular attention has been paid to drainage, as the greatest enemy of good track is water. Most of the old tracks needed more drainage, especially on country lines where there were no side ditches. The tracks formerly were backfilled to the tops of the rails and for long distances the track area was below the highway level. One of our problems was to convince highway and municipal

EASTERN MASSACHUSETTS STREET RAILWAY. ACTUAL COSTS CITY TRACK CONSTRUCTION

Acct. No.	Lowell, Lawrence Street 600 Ft. 7-in. T-Rail		Lowell, Bridge Street 1,380 Ft. 7-in. T-Rail	Lowell, Bridge Street 1,280 Ft. 7-in. T-Rail
1	Superintendence.....	\$83	\$35	\$100
2	Ballast.....	823	364	1,336
3	Ties.....	905	418	1,496
4	Rails.....	1,686	722	2,913
5	Rail fastenings.....	574	247	976
6	Track roadway labor.....	1,870	1,004	2,965
9	Miscel. track expense.....	147	80	435
	Total.....	\$6,088	\$2,870	\$10,221
	Cost per foot.....	\$4.41	\$4.78	\$4.48



Deraillments have shown a steady decrease on the Eastern Massachusetts Street Railway since the inauguration of the track rehabilitation program

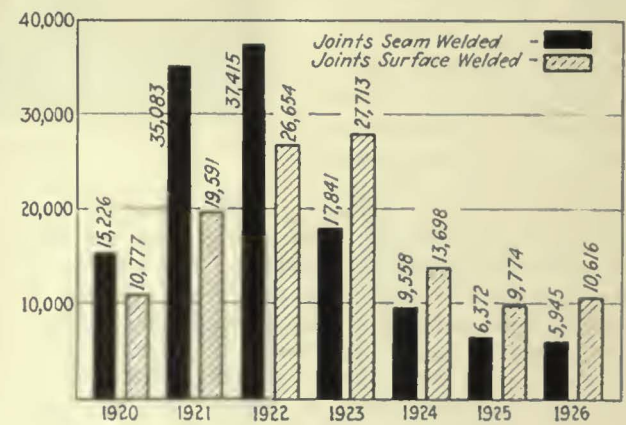
authorities that we should be allowed to raise our tracks level with the shoulders of the adjacent road. An energetic campaign of education was carried on, with the result that we were permitted to raise and ditch about 23 miles of country track. As a result the tracks are more easily maintained, water is carried into the side ditches to culverts, snow is more easily removed, and much better conditions exist than heretofore. In cities the matter of drainage is different, but by placing more catchbasins and seeing that the pavement itself is sealed against the entrance of water along the rails and into the subgrade and ballast the question is largely solved.

The matter of suitable ballast for both paved and unpaved track received considerable thought. The old company had used broken stone ballast on a portion of its paved track and on one or two lines in the country. On unpaved track broken stone is undoubtedly best. It is also the most expensive. On the major portion of our country lines a good quality of bank-run gravel was used. On heavy service country lines stone was used. On paved tracks the practice of using broken stone was abandoned for several years, but on account of its increased cost and the fact that the modern type of pavement almost effectually sealed the track area against the entrance of water, the use of screened gravel was adopted several years ago, and it has been found not only that this is less expensive but that it is as good as if not better than broken stone.

Maintenance costs of paved and unpaved track have been materially reduced in those sections of the track which have been rebuilt or rehabilitated and particularly where the rail joints have been welded. The welded unpaved track has been successful beyond our expectations. Maintenance expense has been reduced at least \$300 per mile per year. Riding qualities have been

materially improved. Bond renewals, formerly at the rate of about 20,000 to 25,000 per year, have gradually decreased to almost nothing on welded track and only a few hundred per year on the remainder of the system. Return circuit on all lines is in excellent condition, and very rare indeed are complaints made of electrolysis conditions. Deraillments due to track defects, bad joints or special work and such other causes have decreased from about 1,000 per year to about 40 per year.

For every \$100 spent on track, \$44 is spent for material and \$56 for labor. The human side of track work is, therefore, of more importance than the material side, if viewed from a dollar standpoint only. An engineer recently asked, "What makes good track?" To this we replied, "The hearts and muscles of the men who do the work." On this property the great need of having work performed properly and by men who knew how to do good work was early recognized. Although the methods employed must be fundamentally sound and the rails, ties, ballast and other materials must be proper for the location, the most important thing is to do the job in a workmanlike manner. We have imbued all of



Yearly record of joints welded on Eastern Massachusetts Street Railway

our men with the idea of not being satisfied with "good enough" and remembering that the best was "none too good."

It is of the utmost importance to have interested men, whether it be supervisory or productive, and it was not difficult to get those men interested. We try to have no old time "bosses" on this job. On the contrary, those of us who are in authority endeavor to be instructors rather than drivers. As a parting thought, I will say that such success as this track department has had on the Eastern Massachusetts property has been because we have considered the human element as of more importance than the material one.

Trends in Motor Coach Engineering*

By H. D. Church

Director of Engineering White Motor Company, Cleveland, Ohio

SEVERITY of the operating requirements of the modern motor coach is rapidly setting up new standards of engineering in motor coach design. Certain engineering practices that are perfectly safe on other types of vehicles have no place in a modern motor coach. The design of any piece of mechanism is determined by operating requirements. A satisfactory motor coach design must be one that either earns or saves money for its operator. The most important developments in the immediate future will probably be in the direction of refining and improving present designs to give greater safety, greater passenger comfort and, last but not least, lower operating costs.

Considering the various chassis units, the engine, clutch and transmission are those in which the greatest improvement is to be expected in the near future. In the broadest sense, the engine design is determined to a large extent by the maximum torque requirements. The engine must have a number of cylinders that gives inherent balance, and the maximum torque requirements will be an important factor in determining how many cylinders are used. With the present-day fuels a distinct limitation on the cylinder bore is imposed by the detonation characteristics of the fuel. A discussion of this phase of engine design would take too much time, but considering the factors involved, it is not likely that cylinders of larger than 4½-in. diameter will be used, owing to difficulties with detonation and cooling of piston heads. There is something to be said in favor of each of the three types of cylinder construction in use today—namely, the sleeve valve, L-head and overhead valve. Each type is being constantly improved, and actual service alone can give the ultimate answer as to which is the best.

The engine lubricating system is at the root of many troubles today. Full forced feed to all working parts is essential. Provision for properly cleaning the oil is



H. D. Church

the detachable cylinder heads almost universally used, the design should be such that the tightening of cylinder head studs does not distort the valve seats or guides.

Rapid progress is being made in exhaust valve cooling, which will greatly lengthen the periods between valve regrindings. Improvements in the induction system are coming which will give better distribution, higher mean effective pressures for the same detonation and better economy with the present-day low volatility fuels.

All engine accessories, with the possible exception of the fan, should be positively driven through inclosed and automatically lubricated chains or gears. Clutches will probably have lower unit pressures and better provision for heat dissipation in order to prolong the life of the facings. Some provision to insure a really soft and progressive engagement throughout the life of the facing is highly desirable, as it will save wear and tear on the entire driving train between the clutch and the rear wheels. It is probable that pedal pressures will be decreased in order to prevent driver fatigue. Transmission modifications are to be expected in the directions of easier gear shifting and greater silence in the geared speeds.

Chassis frames are being designed to give greater resistance to twisting, which should permit the use of lighter bodies without the sacrifice of body life. In this

desirable, as well as some design of oil cooler to maintain proper viscosity in hot weather. A lubricating detail that should be given more attention in design is the elimination of oil leaks. An engine or chassis unit which is covered with dirt externally as a result of oil leaks is hard to inspect for condition, and difficulties that may have developed are less likely to be discovered. Improvements in engine design as well as in lubricating systems will undoubtedly give much longer life to all the engine bearings.

The importance of rigidity on the life of the working parts cannot be overestimated. A sufficiently stiff crankcase and crankshaft design will go a long way toward the elimination of bearing troubles and the attendant expense. Stiffness of the cylinder block and head is also important. With

*Abstract of a paper presented at the annual convention of the American Electric Railway Engineering Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

connection, I think, there are interesting possibilities in the development of light-weight bodies.

There is a strong trend toward greater accelerative ability to enable the coach to keep its place in modern traffic; by the same token better brakes are needed. I believe that metal-to-metal brakes on all four wheels operated by compressed air or some other form of servo device will soon be considered indispensable. This construction utilizes the entire vehicle weight for braking reaction, requires little muscular effort of the driver, is excellent from a cooling standpoint, and its action is practically unaffected by oil, water or grease on the braking surfaces.

The use of low-pressure tires should become more general, due to the demand for increased passenger comfort. In addition, there should be a distinct decrease in chassis depreciation when low-pressure tires are used, due to the added cushioning effect, which protects the entire chassis from minor road shocks. The more widespread acceptance of low-pressure tires has probably been somewhat delayed by several causes. In the first place, they have not as yet fully demonstrated their ability to give the same cost per mile as the high-pressure tires. This is because of overloading and constructional difficulties met by the manufacturers. Low-pressure tires have one other less serious drawback, in that they require a greater mechanical advantage in the steering gear.

There will probably be distinct improvements in chassis lubrication. The lubricating requirements of a motor coach chassis are exceptionally severe, due to the high mileage per day. Many of the points requiring lubrication are inaccessibly located, with the result that they are neglected or else the time required to get at them is too great. The solution may be some form of central lubrication or thoroughly housed constructions carrying a sufficient supply of lubricant for long periods.

The question of riding qualities is also due for consideration. The variation in spring load between a part-passenger load and a full-passenger load is great, and means should be provided to insure comfort under either condition.

Two very important items are body heating and ventilation. The exhaust gas-heating system which has been extensively used in the past will probably be replaced by some system using water or air. Some satisfactory provision to give adequate body ventilation without drafts is also most desirable.

Considering for a moment the more radical design possibilities, there are several promising developments in sight. The double rear axle construction, which has been used for the past few years both in this country and abroad, is attractive from the standpoint of good riding qualities, less damage to road surfaces and ability to carry the maximum loads on pneumatic tires within a limited over-all width. However, this construction involves some difficulties in taking care of the torque reactions from the driving and braking loads. From the standpoint of traffic congestion, the present-day motor coach probably has reached the limit on over-all length. It is possible that future developments may result in a complete relocation of the various chassis units in an endeavor to obtain more seating capacity within the present over-all length.

It is difficult to prophesy the future of motor coach design with any degree of accuracy. The rapid increase

in motor coach use has brought about a specialized vehicle in such a short period of time that the engineering fraternity has found it difficult to keep pace with the operating requirements. It is safe to say, however, that the design of the motor coach of the future will be dictated primarily by the demand for safety, comfort and reliability, and it is certain that with close co-operation between the motor coach operators and manufacturers we can look forward to a constant improvement in design, with an attendant reduction in operating costs.

Modern Cars

Effect Economies*

Modernization and Budgetary Control of a System Will Convert a Deficit to a Surplus

By *W. R. McRae*

Superintendent Rolling Stock and Shops
Toronto Transportation Commission, Toronto, Canada

IT IS indisputable that attractive, comfortable and speedy rolling stock, equipped with safety devices and modern appliances for fast loading and unloading, fare collection, etc., attract the riding public. The car, being modern in itself, is not sufficient from the point of view of maintenance and operation. Modernization must not stop there. To get the best from this equipment, modernization must be carried into the office, shops and car houses in the form of design, equipment organization, system and method. The result of this is lowering maintenance and operating costs and promoting among the personnel a spirit of co-operation, a pride of accomplishment and association, in a modern electric railway system.

On Sept. 1, 1921, modernization of the Toronto Traction System commenced. The Toronto Transportation Commission unified the railway systems, taking over 838 passenger cars previously operated by the Toronto Railway Company and 70 cars operated by the Toronto Civic Railway. Delivery of new rolling stock commenced in October of the same year and continued until the orders for 575 new cars had been completed in August, 1923. These cars included two types of Witt cars and large roomy trail cars. At intervals, 491 of the Toronto Railway cars were scrapped. The remaining 347 cars were of the pay-as-you-enter type, the bodies of which were of such design and in such physical condition as to warrant reasonable expenditure to redesign and convert in a manner that would permit of their being operated under the standard operating conditions adopted on our system, which included a uniform system of front entrance for all types of motor cars.

Modernization did not stop with the redesign of bodies; storage air-brake equipment was scrapped in favor of brakes of the latest design. Obsolete fenders

*Abstract of an address delivered at the annual convention of the American Electric Railway Engineering Association, Cleveland, Ohio, Oct. 3 to 7, 1927

were replaced with life guards. Hand straps were replaced by hand rails. Stoves were replaced by modern heaters. Monitor windows were replaced by modern ventilators. Trolley catchers and tail lights were installed. Manually operated doors were changed to pneumatically operated. On 156 cars spur gears were discarded in favor of helical, and the ratio changed for train and trailer operation.

New shops were designed and constructed, utilizing modern methods in the progress of the work and equipped with modern machinery and appliances. Obsolete car houses were abandoned or rebuilt. Some existing car houses were redesigned and enlarged to correspond in efficiency with the new car houses that were erected.

The I.C.C. uniform system of accounts was adopted, with many subdivisions. The rolling stock department installed a complete cost system in the shops and car houses, together with a system of compiling individual and group cumulative mileage for passenger and service cars, buses and coaches, and a record system for all component parts of equipment that could be identified by numbers. Histories and maintenance costs are kept of the different groups of the modern equipments as well as individual motors, armatures, compressors, etc. Additional new systems were put into force using mileage instead of daily or weekly schedules for inspection, lubrication, etc., and standard practice cards were placed in shops and car houses covering this type of work. Mechanical labor-saving devices, such as adding and calculating machines, filing systems, etc., together with furniture of the most modern type, were installed in a newly erected office building.

Budgetary control was adopted by the commission, and it naturally followed that this system of control was applied in its fullest sense by the rolling stock department.

The Hillcrest shops have a labor budget covering each of the 24 pay periods in the year under ten separate headings of maintenance and expense—i.e., maintenance of equipment, passenger car body maintenance, truck maintenance, brake maintenance, service equipment maintenance, electric motive equipment maintenance, shop machinery maintenance, shop expense, miscellaneous equipment expense and conducting transportation.

Each of the eight shop sections, such as motor shop, truck shop, etc., has a labor budget under headings that apply to the work of each section. This requires 40 budgets, each covering 24 pay periods. Fourteen budgets are required for the seven carhouses. Maintenance of equipment and conducting transportation are the only headings used in each division. Within ten days of the

end of the pay period labor distributions for each shop section and carhouses have been compared with budget, and reports issued to the chief inspector, master mechanic, general foremen and foremen. Amounts are converted into dollars per thousand car-miles and analyzed for excessive expenditures. These results are curved for the purpose of records and comparisons.

The costs of each of the carhouses are based upon the actual mileage of cars operated out of each division. These costs are classified under thirteen headings—i.e., maintenance of equipment, car body maintenance, truck maintenance, brake maintenance, electric motive equipment maintenance, conducting transportation, inspection, car cleaning, car shunting and shifting, car oiling, miles per pull-in, miles per inspection and pull-ins per inspection.

The results are plotted graphically for each carhouse, together with the average costs of the six other carhouses, and blueprinted, a copy of each being sent to the senior foreman for each carhouse. The competitive nature of these graphs creates keen rivalry among the various carhouse staffs and at the same time provides cost data of a valuable nature.

Does this modernization process pay? A comparison of the records shows quite effectively the value of modernization. Over the period of 1923 to July, 1927, inclusive, the reduction in the number of pull-ins for different portions of the equipment was quite substantial, as you will note: Bodies 80 per cent, trucks 64 per cent, brakes 87 per cent and electric equipment 61 per cent. Because of these reductions it is expected that our maintenance of equipment for 1927 will cost \$375,000 less than for 1922. The total reduction for the various classifications over the period from 1922 to June, 1927, inclusive, were found to be: Maintenance of equipment, 33.9 per cent; armature maintenance, 59.1 per cent; controller maintenance, 59.1 per cent; electric motive equipment maintenance, 60.8 per cent; labor charged to equipment maintenance, 53 per cent. The carhouse payroll has been reduced 10 per cent since 1924, in spite of the fact that our cars are cleaner and more attractive than at that time. The advent of new rolling stock considerably reduced the paint shop payroll, but the time arrived when repainting became a necessity to maintain the standard of appearance required.

I think that we are unanimous in the thought that modernization is the keynote of the electric railway of today. The purchase of new rolling stock when possible, modernizing old cars when warranted, budgetary control of all expenditures and standard practice throughout the department will convert a deficit to a surplus.



W. R. McRae

Automatic Substations Prove Economical*

By **W. E. Bryan**
Superintendent of Power
United Railways of St. Louis



W. E. Bryan

PREVIOUS comparisons of automatic and non-automatic substations have necessitated an estimate of certain operating economies obtainable with automatic stations, since actual data were not available. I will attempt to give some actual figures covering such economies on the property with which I am connected, the United Railways of St. Louis.

In 1922, due to increases in the number of cars operated over the system as a whole, a number of our manual stations became overloaded, some to a serious degree. Two courses were open: (1) the installation of additional equipment in existing stations where this was possible, and (2) the installation of the additional equipment in automatic stations located in the districts served by the overloaded stations. We decided on automatic stations, so that we now have seven such stations aggregating 8,600 kw. in capacity. These seven stations effected a reduction in the load of nine manual stations, which indicates the widespread effect of the new stations. These stations have now been in operation for about five years.

In the studies of past years it was estimated that the cost of operation and maintenance of an automatic station, say of 1,000-kw. capacity, would be \$750 to \$1,000 per year. On a kilowatt basis the ratio of such costs for automatic stations as compared with manual stations varied, as shown by the 1926 report of the committee on power generation and conversion, from 7.1 per cent to 50 per cent, with an average of 25.4 per cent. These results proved that even during the initial period of automatic substation operation a material saving was realized on this score.

Comparative data for two 1,000-kw. manual stations and two 1,000-kw. automatic stations in St. Louis, taken from the auditor's accounts, show that the operating and maintenance costs of the two manual stations for the two-year period 1925-26 averaged \$3,540, whereas the comparable figure for the automatic stations averaged \$130. Stated in percentage, automatic operation cost 3 per cent of manual operation. The annual difference of \$2,410 in favor of the automatic station on a 15 per cent fixed charge basis would justify an investment of \$5,000 for automatic control equipment for the manual stations. However, certain types of manual equipment, but years ago, are not altogether suited for automatic

operation, and this is true of the two manual stations referred to.

Power economy is, of course, one of the principal advantages of automatic substations. Most railways purchase power on the basis of a demand charge plus an energy charge. In any study of power questions, therefore, both of these elements must be considered. The use of automatic stations in urban districts tends to decrease the demand figure, as the improved voltage possible with automatic stations, as usually located, permits of more coasting for a given schedule speed. High voltage may increase rheostatic losses at the car, but where considerable free running is possible, the net result is improved acceleration and higher speed. In congested areas, where schedule speed is primarily dependent upon traffic congestion rather than on voltage, high voltage increases rheostatic losses without, however, an attendant improvement in schedule speed. It has actually been found in several cases that a marked improvement in trolley voltage in congested areas has resulted in a serious increase in the power demand with no improvement in operating conditions.

Probably the most satisfactory method of avoiding this condition is by the use of the shunt-wound converters. The two St. Louis stations installed in the heart of the congested district use this method, having a drooping characteristic from 600 volts at no load to 560 volts at full load and 540 volts at 150 per cent load. This arrangement has resulted in holding the voltage at the cars in this district at practically the same figure as existed formerly, so that there has been no increase in rheostatic losses or in power demand. There has been, of course, a marked decrease in the I^2R losses in the feeders. Another advantage of the use of the shunt field is that in case of overload the automatic stations "back off" from the load, which is thus shifted to adjoining stations. This arrangement, coupled with the current-limiting re-

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sistances at the stations, permits the moving of an abnormal number of cars at reduced voltage under emergency conditions.

As to distribution losses, a feeder section fed from a station located at one end of the feeder has a certain I^2R loss, but with a second station at the other end of the feeder section the distribution loss would be less. On the other hand, with light loads, the operation of both stations would result in light loads on the converters, with attendant decrease in efficiency. The point at which the second station should be brought on the line can be determined mathematically.

The two St. Louis stations in the congested district are roughly a mile apart, and as they are connected by heavy feeder copper, they might be considered as a single two-unit station with an unusually long bus between units. We have set the relays at these stations so that one unit operates somewhat as does the lead unit in a two-unit station, the second unit coming on when the voltage drops to 520 volts. This arrangement has been altogether satisfactory from an operating standpoint.

Another situation often found on street-railway systems where distribution losses are an exceedingly important factor is a long heavy feeder section fed from a distant station. Under normal conditions the distribution loss on such a section is serious enough, but if a blockade of cars occurs, the trouble becomes cumulative. Cars pile up in the section, further reducing the voltage and extending the time during which power must be fed over the long feeding distance. The feeding of such a section from an additional station or stations reduces the demand figure, saves energy and, what is much more important, materially improves operating conditions. It is difficult to evaluate this third benefit in dollars and cents, but no railway man needs to be told that this advantage very often outweighs, in the eyes of the management, those other advantages which involve a direct saving in energy.

ELECTROLYSIS MITIGATION

All of you are familiar with the effect on electrolysis mitigation of an increase in the number of stations from which the general distribution system is fed. The 1921 report of the American Committee on Electrolysis brings this out very clearly. Our new stations being rather widely scattered, we expected and have actually realized a marked decrease in electrolysis troubles. Our greatest trouble from electrolysis has occurred on underground transmission cables, of which we own and operate 81 miles. Shortly after the first of these cables was installed, back in 1903, we experienced a great deal of trouble due to sheath corrosion where return railway current left the cable sheath. This was easily corrected by installing drain wires so as to keep the cables negative to other earth structures and lead the current safely to the negative bus. This cable was laid in tile or concrete duct.

In 1913, at the time of receipt of Keokuk water power, a large amount of duct of a somewhat porous texture was laid by the local power company, and the new cables laid at that time by the power company and ourselves largely occupied these new ducts. Although the precautions previously in use were taken from the start, serious corrosion of the sheaths developed, this corrosion occurring not in the vicinity of the substations but in those localities where the current flowed to the cables and where the current density on the sheaths was the greatest. This corrosion depended on the amount of

current flowing to and along the cable sheaths, and it became necessary to reduce these currents. In 1917, in one of the districts particularly affected, which was fed by a 4,000-kw. manual substation, we installed an insulated return system, which materially bettered conditions, although damage previously done continued to show up.

The distance between substations feeding the district in question and the overloaded condition of these substations justified the installation of two automatic substations between the old manual stations, which reduced the potential gradients along rail, cable, etc., to a small proportion of their former value. The actual cable burnouts for the five years prior to the installation of the automatic substations were 63 for the system and 28 for the lines in question. For 3.7 years subsequent to the installation of these stations there have been 28 burnouts on the system, of which seven were on the lines mentioned previously. The decrease in underground cable troubles was from 12.6 per year before installing the automatics to 7.6 per year afterward. On the section principally affected the burnouts in the two periods averaged 5.6 and 1.9 per year respectively. The reason why the general decrease is not proportionately as large as the decrease in the section hitherto referred to is because the older cables were laid in non-porous duct and did not suffer to the same extent from sheath corrosion as the newer cables.

The approximate net cost to us per cable burnout is \$500. The average reduction in burnouts, amounting to five per year, is due almost solely to the increase in the number of feeding points and is therefore a credit to automatic substation operation. Thus we have a credit of \$2,500 per year on this score. I might add that the power company has had a comparable decrease in its cable burnouts.

As might be expected, the use of automatic substations brought a decrease in general electrolysis complaints. There was a decrease from a maximum of 51 complaints in 1919 to fifteen in 1927 (to date). For the five years just prior to the use of the automatics complaints averaged 43.8 per year, while since they have averaged 33.2 per year, a decrease of 24 per cent. Based on our average cost per electrolysis claim, this means a saving amounting to some \$750 per year, and as damage claims are not particularly conducive to good feeling, this reduction has a good effect on public relations.

IMPROVEMENT IN OPERATING VOLTAGE

The greater the number of feeding points the higher the average system voltage, and as the new stations are often placed at points of low voltage, the effect on service may be quite appreciable. This effect, because of variation in other conditions, is difficult to evaluate in dollars and cents. Improved voltage on an interurban line not only may reduce the number of cars required to maintain a given schedule but will also, because of increased schedule speed, serve as a means to meet competition of buses and private automobiles. On urban systems, while the effect may not be so marked, any improvement is applied to a greater number of units. Good voltage tends to keep cars on schedule and is particularly valuable in case of blockades. With the present method of feeder control, heavy loads of short duration on individual feeders are carried up to the limit of the safe capacity of the converter, and usually before this point is reached the cars have passed to the territory of an adjoining station.

Cost of Crime to Electric Railways Each Year Is Enormous*

By **W. L. Barnhart**

Resident Vice-President National Surety Company,
New York, N. Y.



W. L. Barnhart

PERHAPS no statement that has appeared in public print recently created quite such widespread interest as did the article by Mark O. Prentis which appeared in the *Manufacturers' Record* a few weeks ago, estimating the cost of crime in the United States today between fifteen and sixteen billions of dollars. This figure places crime as one of the leading industries of the United States. The annual loss through crime is shown to be greater than the entire foreign trade of the United States, which amounted to less than ten billion dollars in 1926. In fact, our annual losses through these dangerous and brainy criminals who are preying upon the business public are greater than the aggregate value of all the agricultural products grown in the United States during the past year. Crime necessitates the employment of more than half a million people who do nothing but endeavor to combat the criminals, comprising our police forces, our sheriffs' organizations, our jailers and all the public servants whose occupations are dependent upon crime.

And who pays that gigantic loss? Who is charged with such enormous tribute to the power of the criminal? Why, you and I, and every business man—we all must pay our share. We pay it in taxes to take care of the police and the courts, we pay it in higher burglary insurance rates when criminals become especially rampant in this section or in any other portion of the country. We pay it in higher prices that other business men must charge for their products to repay themselves for their own losses through crimes, and sometimes we pay it through our own lives or the security of those nearest and dearest to us when the modern criminal gets in a corner and, to secure his own liberty, takes without hesitation a human life.

Mr. Prentis estimates the loss due to fraudulent securities at \$500,000,000 per year. I dare say that there has never been a time in history when there were as many counterfeit signatures and raised and altered shares of stock on the market as exist today.

Embezzlement is the second big cause of loss. It is estimated that the amount lost annually from that cause is \$150,000,000. Embezzlements have been on the increase recently not only in number but in total amounts. One of our investigators told me the other day that whereas losses of \$10,000 to \$15,000 were considered large five or six years ago, today embezzlements of \$50,000 and \$150,000 are quite common.

The electric railway field has seemed to prove an un-

usually fertile one for large embezzlement, probably due to the large sums handled by many utility companies, and due, in part, I think, to lax methods of auditing and checking up accounts of trusted employees. Too often the auditors, cashiers and bookkeepers are left with too few outside checks upon their operations.

The recent experience of a certain transportation company is an example of what might befall any company neglecting to audit its books carefully. When the cashier of this particular company disappeared, a complete audit of the books showed a loss of nearly \$70,000. It was learned upon the cashier's arrest that, being successful in covering up a paltry \$350 which was stolen from him, he had carried out the practice to the extent of \$67,000, all for his own use.

Still another case may be cited—this, in way of contrast, being a quickly negotiated fraud. The paymaster of the traction company involved, with a payroll amounting to \$41,000 in his care, slipped away with the entire sum instead of returning to his office, as he had done so faithfully for many years. Craving a part in a speedy gambling affair, he met up with the "type," eager to prey upon his desires. One week was the time required to extract the entire \$41,000 from the paymaster.

What were the mental processes of this man who thus in an instant reversed his record of fifty years of blameless living? Who knows? I confess it's too deep for me. But it may be that for years he had suppressed desires for just this sort of thing, for years he had day dreams and night dreams of being able to do it some day—to sit in and play for big stakes. Perhaps that payroll fascinated him and it may have often figured in his dreams as a way of helping him make a big winning. Maybe these suppressed longings, these inhibited desires just backed up in his brain, like water backs up behind

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a dam in the spring freshet, and suddenly when the pressure gets too great the dam goes out, and all that has been held back all these years goes out with a rush, carrying the traction company's \$41,000 with it.

CAUSES OF CRIME

In investigating hundreds of cases of embezzlement and defalcation, we find the chief causes of crime to be:

1. Speculation and gambling. Probably 60 to 70 per cent of all embezzlers have lost most of their stealings through gambling—on the stock market, through bucket shops or by playing the races. The gold digger type of woman has seemed to become more numerous and more insistent in her demands for jewels, fur coats and all the things that take money to buy. And seldom does she seem to care how her victim gets the money to satisfy her whim, just so she gets it.

2. High cost of fast living and fast women. High life as practiced these days in the large cities is an expensive process. Expensive liquor, high night club charges, speculators' prices on seats for popular shows and so forth, have been a factor in many a defalcation.

3. Liquor and drugs. Those who investigate our claims tell me that there is no question that high cost and poor quality of liquor and the growth of the drug habit have had a great deal to do with increases in crime today.

4. "Keeping up with the Joneses." Extravagant living is unquestionably responsible for a great deal of embezzlement and crime today. Installment sales and long retail credits have made it easy for the average American family to live beyond its income, and the spirit of "keeping up with the Joneses" is in the air. Things go along so far, then bills accumulate and creditors get ugly, and the temptation to steal from the employer may be very strong.

5. Finally, the factor responsible for the least of all our embezzlement crime is actual family needs. Sickness or death or trouble of children or parents may put an unusual burden on an employee and he may steal because that seems to him to be the only way out.

Such are the five chief reasons upon the employee's part. But there are yet three causes of crime for which you must accept actual responsibility and I am not sure that, after all, they are more vital causes of embezzlement losses than anything the employee may be responsible for.

THE RAILWAY COMPANY'S RESPONSIBILITIES

Here are your responsibilities for the growth of crime:

1. The employee steals from you because he is able to find a way of doing so without fear of being detected. In other words, your employee, an expert in figures, finds a vulnerable spot in your armor. If he couldn't find a way to steal without fear of prompt detection, he would not become an embezzler.

I should be foolish to attempt to tell you folks, who are professional auditors, how to establish checks and counter-checks on your accounts. Let it suffice to say that every case of loss reveals that somewhere a treasurer or auditor has fallen down in his duty of knowing what is going on. Some loophole has been left unguarded and through it your bank account has been attacked.

Have frequent outside audits made. Get the best talent you can and pay for the best and most complete check-up. It may save you many thousands in losses. Devote some of your thought and energy to finding out yourself what's going on. Go over the books occasionally and draw off some figures for comparison. Any auditor

or treasurer worthy of the name should have some sort of personal checking figures that would tell him very quickly that something was wrong when several thousand dollars had been extracted from the bank balance in a week.

Another duty no treasurer should ever intrust to a subordinate is that of going to the bank to get the canceled vouchers and then checking them up with the check-book stubs. We know of many cases where employees raised or forged checks, got the money, and then went to the bank for canceled vouchers and destroyed the evidences of their guilt before they got back to the office.

2. The second way in which you employers encourage crime is by not knowing enough about the home life of your employees. If more employers had an idea of what their employees were doing after hours, hundreds of embezzlements would be nipped in the bud. In fact, I suppose quite as many defalcations are discovered through the employer accidentally finding out his employee's scale of living or his night dissipations as from any other cause.

We recommend that every employer of labor should have one or more "assistant managers" whose chief duty it would be to mingle with the employees, especially those handling money, and find out as much as possible about them. He should be a man of tact so that employees would never suspect his duties, and he should also have some actual work to do about the place, but his chief function should be to mingle with the men, to go around with them at nights, to learn anything that might be of interest to his employer.

3. Third and last, don't put too much trust in anybody. It sounds wonderfully noble and altruistic to trust everybody, to proceed on the basis that all men are honest. But to believe in everyone has proved costly to many.

Remember this: Only the trusted men can steal. It was that very trust placed in him which gave him the opportunity to steal. And who shall say that it was doing him a kind act to trust him so implicitly? That very trust made him a criminal, an outlaw, despised in the eyes of the world, a betrayer of the faith of his family and his employer, the wrecker of the hopes of his wife and children.

No, my dear men, you are really handing your employees a curse instead of a blessing when you trust them too far. If you won't do so for your own sake, if you won't do it for the safety and security of your own money, you owe it to your employees to insist that they have the added protection, the added stiffening of their moral backbones, that comes through the knowledge that they are bonded by a large surety company that will relentlessly pursue and prosecute them if they do wrong. And if you should decide upon this course, be sure to secure adequate protection. Little \$5,000 and \$10,000 bonds are hardly a drop in the bucket as compared with the \$50,000, the \$100,000 and the \$150,000 fidelity losses that are so common today.

Wouldn't it have been infinitely better from the standpoint of the employee, from the standpoint of society as a whole and from the standpoint of his employer's account to put a strong restraining influence upon the employee, such a restraining influence, for example, as comes from the knowledge upon the part of the employee that he is under heavy bond, that his every act will be checked up by competent auditors and that if he does steal the long arm of organized surety prosecution will follow him, and will bring him to justice sooner or later, no matter how far away he goes or how long he seems to escape immunity from punishment?

Maintenance of a Large Overhead System*

By M. W. Cooke

Superintendent of Power and Inclines Pittsburgh Railways, Pittsburgh, Pa.

Mass production methods can be applied to the construction as well as to the repair of overhead lines



M. W. Cooke

A large railway system covers so much territory that the natural tendency has been to break the line maintenance crew up into small units and place the units at different parts of the system, in much the same way that the cars are housed at different parts of the system. This is the so-called district or division form of organization. The number of men is small and the variety of the jobs large, so that there is little opportunity to put the work on a functional basis and secure the benefits of specialization.

If it were possible to pick the entire railway system up and put it on a conveyor, it would also be possible to have repairs made as the several parts passed the men whose specialty it was to repair each of them. The problem of having an adequate supply of machinery and tools would be greatly

reduced, because it would be necessary to have them at only the one place. The problem of supplying material with which to make repairs would be reduced for the same reason. Supervision would be made so simple that instead of the supervisor spending his time and energy locating the men out on the system he could spend them studying and organizing the work so as to secure ever-increasing efficiency.

It is, of course, not possible to put the railway on a conveyor, but it is possible to run the equivalent of a conveyor past the railway. By consolidating men, machinery, material and supervision and moving the combination over the system as a unit it is obvious that repairs can be made more efficiently than by having the component parts of the consolidation working at widely separated places. After the method has been in effect long enough, it is reasonable to expect either a higher standard of maintenance for the same cost, or the same

DISCUSSION of any broad maintenance problem is naturally divided into two parts. First, and most important, are the principles involved and their method of application. Second are the practices that develop as the result of the application of the principles.

Generally speaking, maintenance work is a tinkering sort of operation, with different pieces of equipment, more or less widely apart in location, requiring repairs at the same time and with no apparent connection between the causes or the times of failure. The problem is further complicated by the wide variety of things a maintenance mechanic is expected to be able to do.

It is small wonder, therefore, that construction work is much more efficiently organized and handled than maintenance work. The desire to build things or to be tied up in construction is common to all of us. Even as children we got pleasure out of building things, but few of us took care of our blocks when the game of building was over.

The development of the building or production instinct has resulted also in the development of a production technique. Relatively small numbers of men now produce vast quantities of material as the result of that technique. The technique is the combination of such principles as standardization, specialization, functional organization, and so forth, and the final result is mass production.

If this sketchily drawn contrast between the tinkering methods of maintenance and the production methods of construction really exists, it is obvious that maintenance work can be vastly improved and simplified.

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standard at a lower cost, or both higher maintenance standards and reduced costs. Human nature being what it is, a reduction in costs and a better standard of maintenance will both be secured. The psychological basis for that statement is well known.

The adoption of this method will involve some difficulty, and it is to be expected that troubles will develop which will result in pressure tending to break it down, especially during the transition period. Undoubtedly more failures will occur while the tinkering process is being tapered off and the mass method is not fully in effect. However, unless both methods can be afforded simultaneously, there will be nothing to do but grin and wait for better results to follow.

The organization of the line department to secure the best results by using mass production methods will vary somewhat with local conditions. It is essential that it be organized on a functional basis, so as to secure the benefit of specialization. The work can be divided on the basis of routine and emergency, or usual and unusual, or, in more familiar language, repair and construction. These jobs that have to be done over and over again, are to be assigned to the group doing the routine, usual or repair type. The other jobs are to be assigned to the group doing the emergency, unusual or construction type of work. To illustrate, the changing of ears or of span wires is a routine job, while the stringing of long renewal sections of trolley wire is a construction job. Another way of looking at this division of work is to consider it from the standpoint of size. A small job will fall in the repair classification, a big job in the construction classification; the whole point being that the work assigned to the floating mass production crew is such as not to delay it unduly, and thus interfere with its prime advantage, which is its rapid rate of movement over the property.

The rate at which the crew moves will depend on the amount of work which has to be done. This rate can be varied to suit the requirements of the job by varying the size of the crew and the amount of equipment assigned. It is to be expected that it will take longer to go around the first time or two than it will on later trips, because the first few trips will plow into the system a backlog of material the renewal rate of which is low.

Careful judgment will have to be exercised on the initial overhaul trips not to renew material which might reasonably last until the next time around. If there is any doubt about a given piece of material, it should be changed as a matter of course.

Since the schedule is set up on the basis of the length of time the most rapidly wearing part will last, it is obvious that a fine sense of judgment will have to be exercised with reference to the parts that wear longer. Some will last two or three times as long and in the interest of economy should not be renewed. In order to preserve the efficiency value of the grouping of men and machinery, the work to be done should be laid out for the crews, so that no time will be lost inspecting and debating about the renewal of a given piece of material. This laying out can be done by having the line inspected in advance of the arrival of the crew, and the parts for renewal marked, or a list made of their kind and location. Such a list from a competent inspector will enable the supervisor, in charge of the crew to assign the work in advance to each unit, and the whole job can then proceed without delay.

The schedules being set up on the basis of the life of the most rapidly wearing part, that part now assumes a

value not before recognized. Obviously, if by substituting another type in its place, or by redesign, the life can be increased, the overhaul period can be lengthened and further economy achieved.

It is to be expected that as a further result of this method the ratio of labor to material in the cost of line maintenance will change—that is, it will be necessary to spend less money for labor—although in fairness the rate of compensation per man should be increased, while the amount of money spent for material should decrease. Generally speaking, the cost of labor in line maintenance work is greater than the cost of material. If the method advocated here were successful, the spread between these two items should narrow and probably closely approach.

Just where the two should stand with reference to each other is probably impossible to determine accurately and will vary with the cost of both labor and material, but it is certain that as the spread between the two is narrowed the condition of the plant should improve.

Lack of time prevents the carrying of the discussion over into the construction phase of the maintenance problem, but it would appear that by suitable modification the same mass production method might be applied.

Development of methods of this kind not only should prove economical to the railways company but should at the same time improve the quality of the service to the public and the condition of the men who do the work.

Handling Passenger Revenue*

By *Horace L. Howell*

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RELATIVE merits and the possible economies that may be effected in the accounting and auditing of passenger revenue, based upon the use of metal fare tokens, versus the use of paper tickets, in transacting fare payments, are of interest.

The first economic value gained with the use of metal tokens, as compared with the use of paper tickets, is in the initial or investment cost. The initial cost of the tokens is chargeable to capital account, since tokens are indestructible and therefore are a part of the company's physical inventory. On the other hand, the cost of paper tickets is an operating charge, the paper ticket being used but once to transact the single fare payment.

On most properties it is found that the single token is put into circulation about 50 times, or once each week, during the year; this means that the cost of the average paper ticket will be materially greater than the initial cost of the metal token over a given period.

The amount of the second economic phase resulting from the use of metal tokens depends primarily on the physical arrangements of the property—that is, the system of fare collection employed; the rates of fare; the provisions at receiver's or main office, and the size of the company.

The important and vital work of checking through the earnings can be accomplished more economically, faster

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H. L. Howell

that might occur with the inauguration of an increased fare rate.

In connection with the operation of any property having a commutation or reduced fare rate, there will undoubtedly be a collection of a number of foreign tokens. The amount of volume of such collection of foreign tokens will vary somewhat in proportion to the size of the operation, the number of reduced fares in daily circulation and the proximity of the railway system to other reduced fare operations.

I am advised that our association now has this matter in hand and is concerned as to what should be done to best take care of exchange settlements for foreign tokens between member companies.

The writer avails himself of this opportunity to state that he is an ardent advocate of the establishment of but two adult rates of fare—that is, a cash and a commutation rate of fare. The differential between the cash rate of fare and the commutation or token fare should be as wide as possible, since it would then tend to re-establish the single coin unit form of fare payment and facilitate platform transactions and permit of economies in the accounting and auditing of the passenger revenue. This system of fares would also expedite passenger platform movements and would in turn be reflected in the car schedules.

In conclusion, it may prove of interest to note briefly the relative advantages and disadvantages of the use of both paper tickets and metal tokens as follows:

PAPER TICKET FARE

Advantages—Good for handling in large quantity sale lots. Useful for clearly stating fare rates and privileges. Good for hand collection, since canceling with punch is obvious by inspection.

Disadvantages—Can be counterfeited without great effort or expense. When sold in strips, can be torn short and thereby obtain more tickets than to which entitled. Can be split, thus making two tickets from one. Not conducive to good accounting—thus affording opportunity to peculate, holdout and resale. The printing charge is a recurring operating expense. Requires considerable labor for sorting, counting, destroying, etc. Makes for slow auditing. Less sanitary.

METAL TOKEN FARE

Advantages—One investment in tokens will suffice for years, since they are indestructible. They lend themselves to mechanical accounting because of uniformity of size and shape. Difficult to reproduce. Metal basis gives them a greater intrinsic value. Speedy for transacting fares on platform with changers. All fares are metal. Makes for quicker and better mechanical auditing, thus reducing labor cost.

Disadvantages—Bulky in weight for large quantity sales. Limited at present to but four distinctive size diameters, other than those of standard coins.

The noblest religion in business is downright honesty and square dealing, which means giving a dollar in value or service for every dollar received.

—DR. ALFRED W. WISHART.

"The Claimant's Doctor"*

How May He Be Convinced of the Company's Fairness and His Friendly Co-operation Enlisted?

By Hart E. Fisher, M.D.

Chief Surgeon Chicago Rapid Transit Company,
Chicago, North Shore & Milwaukee Railroad and Other Companies

THIS subject is primarily one of public relations between a transportation company and its customers, the traveling public. The successful claims man and his assistants can make more true and loyal friends for his company by cordial business intercourse with claimants, than can any other official or department. High-handed, high-pressure, critical and gruff tactics can make more and lasting enemies than all other employees combined can counteract.

When a person is injured, be it trivial or serious, he may be so mentally disturbed that he will do and say things that he never would have done or said in calmer moments. Many people are ignorant of the methods of big business and its routines, and when under stress of an accident they are afraid if they say anything regarding their injuries that their words will be misconstrued and used against them in suit. The past performances of unscrupulous employees in claims work in making small settlements of cases, the rough treatment that many claimants experienced at the time of making settlements, the suspicion evidenced on the part of the claims men that claimants are malingering, have all been magnified by the average claimant, with the result that the old, obsolete claims methods are the ones that he has in mind when he is injured. It is up to each one of you as executives in our industry to eliminate from your personnel those employees who do not have the milk of human kindness and the business finesse essential to successful claims men. A settlement, made with a claimant who goes away dissatisfied and settles his claim in a frame of mind that it is the best he can do under the circumstances, is a costly investment, many times over what a satisfactory settlement of a few more dollars would cost,

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Dr. Hart E. Fisher

besides losing a friend to the company in future contact.

It may be asked, what has this got to do with the confidence and co-operation of the claimant's doctor? The answer is—if we secure the confidence of claimants in our honesty, fairness and good intentions, this mutual understanding will very quickly be inculcated in the claimant's doctor and he, in turn, will have confidence in the fairness of the claims men and the company we represent. You cannot convince a claimant's doctor of our honest intentions if his patient tells him of unpleasant contact with other employees of the company. This confidence grows with the speed with which medical aid is secured, the dispatch with which the patient is removed to his home or hospital, the attitude of

part of the medical man summoned by the company, the thoroughness with which an examination and treatment is instituted and the speed with which the claims men get on the job to be solicitous as to the comfort and need of the patient. There is plenty of time for a settlement later, if we gain the claimant's confidence in the heat and excitement of the accident, or soon afterward. The time to prepare the patient for settlement is when he is comfortable and calm.

The claimant's doctor now enters the scene, either at the request of the claimant or the company itself. If you can secure the name of the claimant's doctor at the time of injury and then invite him on the case at once, you will show by this action that you have nothing to cover up and that you value his aid. In most cases this places the claimant in a more receptive and confident mood as to your real intentions. If it is a liability case, it is better to have your own surgeon working in harmonious unison with the claimant's doctor. Do not quibble about the doctor's expenses and the hospital bills, but give free rein just as you yourself would expect to be treated and cared for if some other company was liable for your be-

injured. Keep claim adjusters away from the patient until he is discharged, cured or healed as far as medical and surgical science can do. If the patient is turned over to his family physician, keep your interest up in the case, but do not belittle the doctor by sending so-called experts or examiners out to check up on him, under the guise of securing an examination. Untactful, pompous doctors, feeling their importance, having an attitude of suspicion as to the patient's real injuries, who are sent by the company to consult with the claimant's doctor, have done more to cause a feeling of distrust and resentment on the part of the doctor than anything I can think of. Treat the physician on the case in an ethical manner, value his opinions and you will get his co-operation. Do not permit claim adjusters to call up the claimant's doctor promiscuously, making suggestions, asking for information as to treatment, or asking him when the claimant is ready to settle. This may seem a trivial matter to you, but is resented by the attending physician as a transgression on his professional rights.

SEE THAT THE PHYSICIAN IS PAID

When the company calls a physician on an accident or sends the case to a hospital it should guarantee the doctor and the hospital that all bills will be paid up to the time they are notified to the contrary. Failure to pay initial expenses after it is found that there is no liability makes a doctor belligerent, and hard feelings arise that bode no good for the company in future contact and co-operation will be found lacking. You hate to lose a dollar, so why should you expect the doctor or hospital to hold the bag and lose by your transaction when, by nature of their profession, a great deal of their work is done without compensation. Furthermore, each hospital has on its staff doctors who are located in the vicinity, and they act as a large family. When the hospital or one of the staff has difficulty with a claims man or a surgeon sent by the company, it will be spread over the entire hospital. One doctor's grievance becomes the grievance of the others, until sentiment in that hospital is antagonistic toward the company and your cases are not wanted. Your next claimant's doctor may be on the staff of some hospital that has had unpleasant relations with your company, and you will suffer in securing his co-operation. If the doctor is antagonistic you can be sure that the patient he is treating will look upon your efforts with suspicion.

Many times a claimant is not honest with his or her doctor, and after a settlement is made for a stated sum plus the doctor's bill, the claimant does not pay the doctor. You say that is no concern of yours as you have paid the full sum to the claimant. That doctor's advice and treatment have made it possible for you to make a settlement economically, and you want to hold his good will against the day when he might again be a claimant's doctor. How easy it is to ascertain if the physician has been paid when you settle with the claimant. Get in touch with him so that he knows you are at least trying to safeguard his interests. He will appreciate your efforts and be glad to assist you in the future. Another good practice is to assure the claimant's doctor that you will take care of his bill when the case is settled, so he will not have worked in vain, should the claimant fail to pay him for his services.

Do not have purposely refrained from mentioning claimants and doctors who are not honest with the company or have what is known as "blind" cases, but you can

secure even their co-operation if your attitude is right. No matter how guilty a man may be, he does not relish being considered a crook or a fraud. If he can be made to look at your side of the case and if you have the services of competent surgeons, he will, of necessity, modify if not retract his claims as to injury. The fault most common in handling these cases is to permit this class of doctor to see that you believe they are frauds. They assume the rôle of a discredited doctor and so confide this to their clients.

When a claimant's doctor sends his bill to you for services that have been rendered a claimant, do not take the attitude that his charges are exorbitant. This puts the doctor in the light of having wilfully padded his bill. If he reduces the bill in order to secure the money without suit, he will remember this the next time he has contact with one of your company's claimants.

When a claimant makes a settlement under stress, which is unsatisfactory to him, be careful, as he may be the relative of some physician and in the future you may have the unpleasant sensation of having this doctor attend a claimant. Most likely, he will recall the poor settlement or inadequate services rendered by your personnel and advise his patient of the fact, thereby creating antagonism in an otherwise fair and honest claimant.

Spread your medical and surgical cases among the general medical profession in your locality and do not depend upon the services of a chosen few who are given the bulk of the work out of friendship, or because they make calls at a low figure. This makes the future claimant's doctor feel that he is slighted. Make as many friends as you can in the entire medical profession. It is better to have too many doctors making calls for you than to have one doctor disgruntled because favoritism is shown to a few of the elect.

Very often, in all sincerity a doctor advises a claimant to settle with the company as he believes the patient has recovered or that there is no possibility of any future disability resulting from the injury. The claimant settles in good faith. In a short time some unforeseen condition arises resulting from the injury, and the patient is forced to undergo further medical attention and asks for further aid. If you call in his doctor, offering assistance toward putting the patient in good health, you make lasting friends of both the claimant and his medical advisor, and the return in friendly public relations for your company is tenfold over the additional money spent by you after the case was settled.

TREAT THE CLAIMANT'S DOCTOR WITH CONSIDERATION IN COURT EXAMINATION

Testifying in court is an event that no physician relishes and he consents to appear as a witness only on account of his obligation as the claimant's doctor. This is where many an otherwise friendly and open-minded physician becomes antagonistic and resentful against your company, which in turn means your claim department, by the fact that you permit a so-called expert medical witness to place the claimant's doctor in the position of telling an untruth, and the trial attorney attempts to make a monkey out of him before a jury, by his confusion. Remember, the jurymen are each forming an opinion, and it is human nature to be on the side of the under dog. Sympathy for an honest but confused doctor on the stand at the mercy of superior cleverness and legal intelligence has been the deciding factor in a verdict for the plaintiff, and at the same time a life-

long enemy is made for your company. A little more tolerance and consideration should be shown the claimant's doctor on the witness stand.

I believe all men have open minds, and will co-operate when they know all parties concerned are acting in a fair and honest manner; but allow discord to creep into this harmonious circle by some suspicious or untactful error, and then there is cause for lack of confidence and co-operation. I believe that the friendly public relations existing today will make the settlement of claims easier in the future, and claims men will experience the satisfaction of knowing that each settlement has been the means of making many new friends for their company.

Co-operation

Among Public Utilities in Local Territory*

By **C. B. Hardin**
General Claim Agent
United Railways of St. Louis

NEVER has there been a time within my experience when the active co-operation of men in our line of business was so imperative. The alignment of the crooked doctor with the crooked lawyer has stimulated the presentation of exaggerated and fraudulent claims against public service companies, automobile owners and industrial plants, sometimes of claims against several different companies by the same parties. The passage of a workmen's compensation law in our state lately has increased the activity of the ambulance chaser in the solicitation of public liability cases. The growing indifference to perjury by those in charge of our law-enforcing agencies is quite noticeable, and the increasing political power exerted by the ambulance chaser and his henchmen has given more power to him in the courts and over judges.

There are other important reasons for our co-operation. The claimant of no unusual prominence collects from some local company for a bona fide injury. Later he has another accident in which my company alone is involved. He does not publish to the world his former claim experience nor the injuries sustained therein, and I may pay him again for some former injuries certified to by his physician working hand and glove with his attorney. I am next confronted with a "No Report" claim. No amount of investigation has developed any information from our employees. If I could go to a properly functioning central bureau, I might find that he has had a previous claim against some insurance companies' assured, or against the city on account of some sidewalk case, or against some other public service company—all "No Reports." If so, I should be in a much stronger position either to decline the claim or to make a cheap settlement.

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Then a central bureau is a splendid check on your own business. Handling 10,000 new claims a year does not permit you or the members of your staff to remember the repeaters nor the experience you have had with persons in the same block or immediate neighborhood. A proper filing of your record cards both as to name and address gives you this information at a glance. We know we often have to combat the bad influence of an improvident settlement in a neighborhood, yet if fully informed, we may sometimes be in a position to invoke the aid of a satisfactory settlement or the satisfactory ending of some litigation, to our advantage.

So far we have been unable to get the co-operation of some of the other public utility companies in reporting their personal injury claimants, and none of the insurance company adjusters seems to be interested. I could cite from my files a number of instances where money could have been saved for my company had the records of the claimants with other local companies been available. You may say, "Well, why didn't you dig up such records?" In reply, I say, "Unless such records are voluntarily sent to a central bureau, you cannot cover by one-half the local field. You cannot obtain authority to employ sufficient help to do this and it would be impracticable to have personal calls made on each other company on every personal injury claim."

MEANS OF GETTING CO-OPERATION

In what way can co-operation be best accomplished?

First, by the organization of a central index bureau to which all the liability insurance companies and public service companies in the local territory report the name and address of every personal injury claimant. Such a bureau could be operated for \$200 per month. In a small city the expense would be lower. It should be consulted by the various companies on every personal injury claim. My company has maintained such an index for many years at its own expense, furnishing free information to anyone who will promise to report personal injury claimants. We put everything in it: personal injury claimants, divorces, newspaper clippings, damage suits against others as well as our own, unusual happenings, adverse witnesses, including doctors, jurors who serve on our cases, property claims declined, inquiries from other cities and records of any crooks.

Second, by frequent informal meetings of the local adjusters of insurance companies, the chief representatives of the claims departments of the public service companies and anyone else who might be interested in our work. The acquaintances made and friendships formed through the meetings are most valuable.

Why do we have to work so hard to get this co-operation? In the first place, the insurance companies have not the same incentive to keep the cost of their settlements down, for if their claim experience with an insured is bad, up goes his rate. Adjusters of many insurance companies are permitted to take outside business, so do not hesitate to represent any of their assured and their guests or their employees against other insurance companies or public service companies. Then the adjusters of some of the small public service companies have only a few claims to look after and are not impressed with the seriousness of the situation that now confronts us. For the last two years I have paid out for my company nearly 7 per cent of its gross earnings in the investigation, adjustment and defense of claims of every character, and this year it will not be much better. Some measure of relief will have to be found.

The Company Doctor and the Professional Medical Witness*

By John A. Leeming, M.D.

Medical Counsel Chicago Surface Lines

IN DISCUSSING "The Company Doctor and Litigation," I shall make some reference also to "The Claimant's Doctor." Consider briefly an injury which may develop into a case of neurosis: A woman is hurt in a street-car accident. No bones are broken, but she is bruised, scared and shaken up. She calls her family doctor. Suppose he makes little of the injury and its effects; he uses appropriate measures to relieve the pain and soothe the bruises. He discourages any suggestion of a claim for damages, encouraging his patient to believe that the company will treat her with perfect fairness. It is safe to say that under these circumstances the outcome of the case would be just the same as if the injury had occurred by the patient falling on her own kitchen floor, which means in all probability that in two to four weeks the whole incident would be a thing of the past.

But suppose the family doctor is hostile to the company's interests, even at the expense of his patient's speedy recovery. Such a medical man usually has but little difficulty in bringing about in his patient's mind a condition of introspection which leads her to dwell upon and magnify her symptoms. He makes it known that he has had cases of this kind which were followed by serious and permanent after-effects. He drops the remark that, as he understands it, the company is absolutely liable, and he sees no reason why it should not be made to pay for its carelessness. In such an atmosphere his type of claimant's doctor has much to do with the progress and outcome of the case.

The company doctor must also be considered, but his connection with the case will be considered later.

Then we have "The Professional Medical Witness." I wonder whether we all have the same understanding of what is meant by a professional medical witness. A marked distinction should be made between a professional witness and an expert witness, not only in the medical but in any other learned profession.

The true professional medical witness as a medical man who is ready to sell his evidence for money. To be a success in this line he must necessarily adapt his goods to the purchaser. In other words, he must please his customer if he is looking for more business from the same source. Let us look into this matter and see how it works. I have medical men in mind who correspond to each one of my fingertips. If necessary, I could name them and describe fairly accurately their individual methods, but they are practically alike in all essential particulars. They all "stand in" with one or more plaintiff's personal injury lawyers.

A close relation exists between such lawyers and medical men. They refer cases to each other, and it is well understood between them that while the doctor does no business on a contingent basis and he must be prepared so to swear on the witness-stand, yet he never thinks of sending a bill for services unless a verdict is returned against the defendant. The usual setting is something like this: Take the case described above. The case gets into the hands of a lawyer. He listens to her story and makes arrangements for her to present herself to the doctor who is later to appear in her behalf as a professional medical witness.

The doctor proceeds to examine her, and listens patiently and encouragingly to the list of subjective symptoms, even though he knows full well he will not be permitted to testify to them in court but will be, or should be, limited strictly to objective findings. Why does he favor the relating of all the subjective stuff? He will not say, though he has his reasons. A certain plaintiff on cross-examination, when asked if she had told the whole story of her sufferings to the doctor who had examined her a few days before trial at the request of her lawyer, replied, "Yes, the doctor said I should go over the story as often as possible so that I would have it down 'pat' for the witness stand." But there are other reasons. The professional medical witness writes a report to the lawyer, but before doing so he tells him over the phone that he finds very little objectively—increased reflexes and an appearance of nervousness—but he says she tells a fine story of her pain and suffering, and if this story can be presented to him in the form of a hypothetical question embodying also his few objective findings, he would be able to answer the question and express the opinion that the hypothetical individual was suffering from traumatic neurasthenia.

CROSS-EXAMINATION OF THE RIGHT KIND

How are you going to nullify the effects of such evidence? There may be various ways, but the first step in this direction is by the right kind of cross-examination. I advocate showing the close relationship between the witness and the plaintiff's counsel; that the case was sent to him by the lawyer for the express purpose of preparing himself to take the witness stand and testify in her behalf; that he has done the same thing in other cases for the same attorney. I recommend next that he be examined closely on the hypothetical question, making him admit that in his replies he did not take anything into consideration which was not contained in the question, that in answering it he was not influenced in any way by what the plaintiff told him and that his responses referred to the hypothetical person only and

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not to the plaintiff, that he assumed to be true everything stated in the hypothesis, that if the assumed facts were not correctly stated in any essential particular it might change his answer, that he assumed as stated in the question that until the time of the accident the hypothetical individual was a perfectly healthy woman.

In reference to his examination, I would ask him if he had sent a written report of his examination to the lawyer, whether he has a copy of it with him and, if so, would he object to producing it. When this is evaded or declined, I like to hear defendant's attorney inquire whether the witness has described everything he did in his examination, if he has told everything he found objectively, whether he learned while taking the history that the plaintiff was well until this accident occurred, and then follow this line of cross-examination by directing attention to the objective evidences described. In the sample case under consideration these evidences were an increase in the reflexes and an appearance of nervousness. There may be given other alleged objective signs such as limping, muscular rigidity, rapid pulse and heart action, etc.

It is a difficult and somewhat risky task properly and safely to question a real professional on these symptoms. Let me suggest a rule which I have presented to my class in law school for many years: Never question an adverse witness unless you are satisfied that his answer cannot hurt you but may help you. Some of you will say, "That is an easy rule to state, but a difficult one to put into practice." I am willing to agree with this, but if men engaged in this line of work should fall down because of this or other difficulties daily encountered, they would be prostrate most of their time.

Let me suggest the following line of questions and invite your criticism as to whether they would be safe or whether the answers thereto could hurt your case.

Doctor, what is an objective symptom?

Do you agree with this definition, an objective symptom is one which the examining doctor can discover without the aid of the patient and which cannot be simulated by the patient?

Do you think "an appearance of nervousness" is purely objective?

Have you not seen "an appearance of nervousness" with somewhat increased reflexes in women who have never been injured?

In such cases will you name some of the various causes which might produce it—not too many, on account of the time required—but give the jury about a dozen of the most common ones.

In answering the hypothetical question, did you exclude all such possible causes?

In making your examination of the plaintiff did you make a careful investigation that enables you to exclude all such causes in her case?

Did you examine the pelvic organs, the rectum, the urine, the blood or take the blood pressure?

Do you know whether this woman has any local foci of infection in her teeth cavities, tonsils, accessory sinuses of the upper air passages, appendix, fallopian tubes or gall bladder?

[If on direct testimony the doctor has omitted to mention a pelvic examination and upon cross-examination he says he has described everything he did and all he found:]

Do you know whether this woman has any local pelvic irritation resulting from laceration of the cervix, endometritis, antelexion, retroflexion, uterine prolapse, salpingitis or ovarian displacement?

In your experience as a medical man have you ever come across cases in women who suffered from backache, headache, increased pulse, excessive reflexes and an "appearance of nervousness" that was due to or might have resulted from any of the pelvic disorders above named?

Suppose the plaintiff in court has concluded the presentation of evidence and announces, "We rest." And suppose further that as a doctor acting in the capacity of the company's adviser you feel convinced that the plaintiff's medical case is vulnerable and can be successfully attacked, how do you proceed? My method, after studying carefully the plaintiff's case during its presentation and deciding what I believe to be a more plausible and accurate explanation of her physical condition, is to recommend putting on a strong medical defense based upon defendant's theory. Do not be satisfied by simply offsetting plaintiff's doctor with a medical man who will offer a counter-opinion. Back up your judgment by opposing plaintiff's medical theory with two medical expert witnesses to her one, or three to her two, as the case may require. Prove this part of your case by a preponderance of the evidence. If properly done, this should be convincing to a fair-minded jury, and if it fails, your record is in much better shape for a reviewing court. In addition you should use your best efforts to outdo the plaintiff in the quality, standing and experience of your medical witnesses. Confer freely with the company's trial attorney; assure him that the theory you have outlined is confirmed and borne out by the experience of the best men in your profession, and if he so desires, make full notes for his use while questioning your doctors. Your final step in preparation is to consult with competent, high-class and skilled specialists—surgeon, internist, gynecologist or neurologist—and in this way back up your contention by presenting to the court and jury convincing evidence by real medical expert witnesses.

I think I am safe in saying that in compensation cases in our state 50 to 60 per cent of the reversals by the Supreme Court are based upon the medical theory introduced by the respondent as being more plausible and reasonable, the language of the court in substance being: "We cannot confirm an award based on speculation, conjecture or doubt."

THE accident cost to the street railways of the country growing out of motor vehicle operation is not far from \$20,000,000 annually, to say nothing of the cost resulting from collisions with persons on foot who use the highways, or the loss of lives and limbs to individuals.

—RUSSELL A. SEARS.

The Company Doctor and Litigation*

By Benjamin E. Sibley, M.D.
Surgeon Boston Elevated Railroad



Dr. B. E. Sibley

MY EXPERIENCE indicates that a standard form of accident report is of great value, since its main divisions may be made comprehensive enough to cover all cases and by following the form the examiner will always be reminded to secure and record relative to every phase of each case. Such a skeleton report may well express the views both of the company doctor and the company attorney on what information the doctor's report should contain. A blank form I am using, at present, is as follows:

Name, address, occupation, age, date of injury, date of examination, place of examination, those present at examination, claimant's physician, physician's statement, claimant's story of injury, past history of claimant, physical examination, conclusion and opinion.

Without attempting to discuss each of these headings, let us consider first the physician's statement. The statement of the claimant's physician is important, because it gives us the first information about the nature and severity of the injuries sustained. The sooner after the accident it is secured the better. Furthermore, getting definite statements about what the physician found

soon after injury puts him on record, before his impressions are changed or modified by the afterthought of the claimant, his friends or his attorney. Such an opinion, given early in the history of a case, will more nearly represent the doctor's real views than one obtained later or given for the first time at trial.

After the doctor's statement I get the claimant's story of how his injuries were sustained. This inquiry should be painstaking, to bring out clearly just how the injuries were received, the direction of forces operating to produce trauma, the force of blows, etc. It is very important to quote the claimant's own words on many points.

With this story in mind, the examiner will quickly note whether the injuries he finds are reasonable results of the accident or whether the alleged injuries are not of such character as to be caused in the manner described.

Here again an early history is important and the exact quotation of the claimant's words most valuable. His exact words, describing his injuries, incorporated in the original report help to prevent enlarged claims later and convey to judge and jury a strong impression that the claimant actually did say just what the doctor's report states and not that the doctor got a wrong impression or only part of what the claimant meant to say.

It is well, however, for the examiner to be on his guard, in taking down the story given, not to present in his report a picture which the claimant or his lawyer is drawing for him. I mean that a clever attorney may coach his client in the kind of a story to tell and the latter may get the examiner unwittingly to overload his report with tales unfairly favorable to the claimant.

I conclude this portion of my report with a concise list of the claimant's present complaints. This group has a tendency to grow and at trial may hardly be recognized, so that the list made at examination may serve as a valuable check.

I also make a brief inquiry into the past history of the individual. Even if the past history seems to have no vital bearing on claims made at time of examination, it may have a vital bearing on claims made at the trial.

Former injuries or diseases may be noted, which are caused by pathological conditions, alleged to be the results of recent injury. Or, if such happenings are denied, information from hospital records or other sources may establish the fact of former injury as the cause of present disabilities, and this will weaken or destroy the claimant's credibility.

PHYSICAL EXAMINATION

The physical examination should be comprehensive and include more than the parts alleged to be injured. A brief but adequate picture of the entire patient should be given, with a careful, detailed description of the parts injured. The doctor should record conditions just as he finds them. He should not try to minimize them but endeavor to give them their true value. Upon his statement of injuries found the claims agent depends in settling cases and paying damages, and the company's attorney depends in deciding whether to fight the case or not. As important, also, as a true picture of injuries found is the doctor's opinion of their importance and their probable after effects. I find it advisable many times to give a supplementary, confidential report, not embodied in the formal one. This document may contain views which could not wisely be put in a report that might appear in court.

For example I might wish to state that certain symp-

*Abstract of a paper presented at the annual convention of the American Electric Railway Claims Association, Cleveland, Ohio, Dec. 3 to 7, 1927.

toms following injuries, such as dizziness, headaches, etc., often persist for long periods. It is manifest that for the company doctor to include such remote possibilities in his report of a particular case where there was no actual likelihood of them being true, might prove unfairly damaging, but he might like to call attention to that possibility. The formal report should therefore reflect the doctor's true personal estimate and not contain extraneous impressions, which might be construed to give an inaccurate view of the case.

The value of the doctor's testimony in court rests largely on his general intelligence and honesty. On the witness stand he should establish a reputation for honesty by giving his real opinion on questions asked, whether that opinion seems primarily to favor the company's interest or not.

Doctors who will not make an admission which might be detrimental to their side do not render as valuable services to their company as those who give honest answers, whatever they may be. But in giving these answers the doctor's general intelligence must come into play. He should not allow himself to be led into a discussion of subjects not relative to the case. When asked his opinion on irrelevant matters or on subjects with which he is not familiar, he should not hesitate to say "I don't know." He should remember that he is not expected to know everything, even in his own profession.

The more the doctor tries to express opinions on subjects on which he is not well posted, the more trouble he will have. The real issue may be so befogged that the value of his testimony on subjects he did know about will be lessened or lost.

Should the Company Doctor Attend the Claimant?*

By Dr. Ernest W. Miller

Milwaukee Electric Railway & Light Company

SHOULD the company doctor attend the claimant? Emphatically, no. The company doctor, as such, has no place in the medical world. The term "company doctor" or "company physician" has long enough suffered the stigma of criticism and has long enough carried with it some unfavorable application.

But the surgeon of the industry has a worthy profession and a dignified one and he should attend the claimant!

For many years past and on every occasion possible I have attempted to elevate the plane of the surgeon of industry above that to which the old title has carried it. It is only by constant endeavor along these lines that we shall be able in the future to bring to this field the acknowledgment it deserves.

Last year, in this section, a paper was presented offering many points in favor of non-attendance upon the claimant. Such a policy may be entirely applicable in

*Abstract of a paper presented at the annual convention of the American Electric Railway Claims Association, Cleveland, Ohio, Oct. 3 to 7, 1927.



Dr. E. W. Miller

a community with which the writer was familiar. The problems of the various railways are local, and it is quite impossible to apply any fixed plan to all operating properties. My opinion is based upon my experiences of attending the injured as a surgeon of the industries for the past sixteen years.

The policy of the organization involved may be to treat: (1) Cases of liability only; (2) cases of all injured patrons; (3) cases of liability plus some protection settlements. After experience with each I believe the most desirable is the one we follow—namely, the first, or treatment of claimants where definite liability exists.

To do so satisfactorily, a thoroughly organized medical staff and staff of competent first-aid men are essential. This means also one or more men qualified to do all kinds of major surgery, traumatic and general. There must also be a close co-operation between the medical and claims departments.

In the event of injury, major or minor, the patient is assured not only of first aid but of complete treatment of the highest character. This certainly is to his material advantage. The advantage to the company cannot be overestimated. The contact of a competent, respected surgeon of a community alleviates many of the conditions which naturally arise between the individual claimant and the adjuster. Disability, if any, is reduced to the minimum, and the returns to the company are definite.

The surgeon of the industries should be equipped to the last word in his profession. He must put forth his best efforts, as any successful professional man must do. My experience forces the conclusion that it is possible for an organized medical service to treat practically all of the injured patrons where liability exists.

The patient who is imbued with the idea that he or she is receiving the best possible medical attention must have confidence in the physician, which leads to successful treatment of the patient. With recovery, both mental and physical, a sane approach is laid for adjustment.

Uniform Traffic Regulation*

By Russell A. Sears

General Claims Attorney, Boston Elevated Railway

Its advantages are set forth, together with the applicability of the Hoover Conference recommendations



R. A. Sears

CONFERENCES concerning motor vehicle operation held at Washington, the first in 1925, the second in 1926, popularly and appropriately known as the Hoover Conferences, may be considered as important epochs in the history of the development of the nation.

In no national conference since the Constitutional Convention was there displayed a greater, more wholehearted and unselfish intention to prevent or reduce the great loss than was shown by the delegates in those conferences. Every state in the Union was represented, and the personnel of the conferences was a cross-section of the citizenship of the country. More than a dozen committees composed of eminent and able men had met preceding the two convention meetings and prepared the way for action without loss of time. After a full and free discussion the work of the convention was embodied

in the "uniform vehicle code," with which you are more or less familiar.

That the electric street car is a very important factor in the safe regulation of traffic needs no comment. In all probability the accident cost to the street railways of the country growing out of motor vehicle operation is not far from \$20,000,000 annually, to say nothing of the cost resulting from collisions with persons on foot who use the highways, without mentioning the loss of lives and limbs to individuals. Hence as an economical problem alone, anything or any means that will reduce these losses is worthy of consideration.

There isn't a recommendation made by the Washington conference or in the uniform vehicle code to which the street railways can object concerning rules for the safe operation of vehicles. Hence we should interest ourselves in the observance and practice of those recommendations, and we have a further reason for our interest in the recommendations in that many of the railways are at present operating motor-driven buses. A study of the conference reports will also prove of help. Without going into the relative importance of street cars and motor vehicles in the transportation of the public, this much we are sure of: Both street cars and automobiles are here to stay, at least for the present, and any advice as to the operation of both should be welcomed by us.

Each delegate attending the conference should carry to his own state its message and advice. As the subjects dealt with in the conferences are of the highest importance to street railways, should we not ally ourselves with those carrying on this work? This would seem to be simply intelligent self-interest. As many other conferences are being held, at least in the eastern part of the country, of automobilists to promote safety on the highways active association with such bodies would seem to be appropriate for a street railway man so that the association may have the benefit of his experience and he share theirs.

If there is no body corresponding to an automobile safety association near by, then it is desirable to sit in with any neighboring safety association. Whatever be its function, the subject of automobile accidents is always pertinent and the reports of the Hoover conference constitute the best chart in existence from which one can always find his position and the direction in which to proceed.

At least we in Massachusetts think so, and we try to think and do in practical terms. As this is written the Governor of Massachusetts, prompted by the recommendation of the Hoover conferences and the two state conferences called by him, has offered valuable trophies to the three cities and towns having the best record concerning highway accidents for the six months beginning June 1, 1927.

What does this mean—an offer to award distinction on the residents of the city or town excelling in care on the highway? Isn't it apparent that care of persons in the streets and highways has a tendency to reduce highway accidents—and who would profit more as a class than the street railways? Finally, may I recommend this? Send to the Secretary of Commerce for a complete set of the committee and conference reports and recommendations concerning highway accidents, read them carefully and then deny, if you can, that you are more informed than before and hence better equipped to carry on your own work.

*Abstract of a paper presented at the annual convention of the American Electric Railway Claims Association, Cleveland, Ohio, Oct. 3 to 7, 1927.

American Committees Continue Research

Important changes in constitution the feature of reports this year. Other reports on motor vehicle information, education, insurance, rapid transit and taxation presented

CHIEF among the reports of committees of the American Association this year is the one on revision of the constitution and by-laws, which was adopted in its entirety at the convention of the association held this week. The changes provide for the admission of independent bus operators under certain restrictions, revision of the financial structure of the Advisory Council and a change in the dues.

Continuing the custom of the past two years, these reports were not read at the convention, and this year for the first time, except for the constitution changes, they were not made the subject of special mention. Abstracts of the reports follow.

Rapid Transit

IT WAS the opinion of the committee on rapid transit that the most important problem this year was to present an authoritative analysis, from the viewpoint of an economist with adequate training, experience and standing, as to the proper allocation of the burden of cost in building rapid transit.

For some years the committee has been collecting all the available data on this subject, but felt the need of obtaining a study from a purely economic point of view. For this task it obtained the services of Leslie Vickers, economist of the association. He was given an entirely free hand in the preparation of a review of the economics of rapid transit which accompanies the report.

Mr. Vickers' study does not present exact formulas or specific detailed plans applicable generally, but advances principles on which the procedure in each city should be based. In his treatment he considers rapid transit as a special phase of general urban transportation by common carriers. The rights of the latter have been recognized in our commercial and industrial scheme for many generations.

Mr. Vickers says that the need for rapid transit has grown with the economic development of our cities into residence and business districts widely separated, which in turn is caused by the high degree of specialization reached within industry and commerce. The study points out that although few cities have any rapid transit facilities today, many are calling for them on account of street congestion. New surface routes are possible only in the smaller cities, where land values are low. In the larger cities new street facilities must be either elevated roads or subways.

New thoroughfares confer benefits on four distinct groups, according to Mr. Vickers. These are (a) the city as a whole; (b) the property owner; (c) the car rider, and (d) the automobile

owner. He concludes that new thoroughfares should be paid for by all who benefit by them and not only by the group that uses them.

The study further points out that the city's share of construction and equipment can be met by taxation, the property owners by assessment, the car riders by taxation and the automobile owners by license fees and special taxation, without inflicting hardship on any one group.

No rule is laid down applicable universally as to the proportions of these payments or the means of collecting them. In each city where rapid transit



G. A. Richardson

is proposed, a local survey, free from the influence of politics, is recommended.

In an appendix to the report the committee presented extracts from reports and documents relating to the consideration of plans for financing rapid transit in Philadelphia and Boston, together with some extracts of suggested procedure on the physical development of rapid transit in Boston.

Combined with the reviews and extracts of opinions included in previous reports of this committee, the 1927 rapid transit report concluded the survey which the committee has conducted for

several years and which has resulted in bringing together an exhaustive analysis of the fundamentals of rapid transit as reflected by men of various schools of opinion interested in the subject.

The report was signed by H. L. Andrews, W. B. Bennett, Edward Dana, J. S. Doyle, S. E. Emmons, H. E. Ehlers, B. J. Fallon, Thomas Fitzgerald, R. F. Kelker, Jr., E. J. McIlraith, W. S. Menden, D. W. Pontius, F. H. Shepard, C. E. Smith, J. B. Stewart, Jr., D. L. Turner, James Walker, J. H. Alexander and G. A. Richardson, chairman.

Revision of Constitution and Bylaws

CHANGES proposed in the constitution of the American Electric Railway Association, as outlined by the committee, were made necessary mainly for the following purposes: (1) To broaden the statement of the objects of the association to accord more nearly with actual practice; (2) to make it possible for the executive committee to admit, with proper restrictions, companies operating any form of urban or interurban transportation systems; (3) to correlate more effectively the relation between the national association and the geographical railway association throughout the country; (4) to provide for "plural voting" when demanded; (5) to consolidate the finances of the advisory council with the finances of the main association; (6) to revise the schedule of dues to the association.

In the discussion of the reasons for these proposed changes the committee pointed out that the actual work of the association involves discussion of all forms of urban and interurban transportation—not only electric railway but every other form, including buses. It was felt desirable that the statement of objects should be indicative of the broad function of the electric rail industry, which is to provide transportation in the community by whatever agency is best fitted to the particular task at hand.

Regarding the second reason for the changes, the committee explained that some of the present members of the association in smaller communities represent companies which have abandoned rail operation and have turned to buses but which have continued membership under the old constitution. There are, the committee pointed out, similar companies which have not gone through the rail stage and which under the old con-

station cannot join the association. There are also dependable bus companies operating in conformity with the association standards but not technically coming under the definition of subsidiary or affiliated companies of rail organizations, which the association might desire to admit as members. In the proposed constitution effective safeguards have been thrown around the election of such companies so that the membership may be protected against the admission of companies the interests and practices of which might be inimical to those of the association or of any of its members.

Since the American association does not have geographical sections, it was considered desirable to provide a class of membership for the existing sectional railway organizations, as such, in order

expenses were supported by contributions from member companies separate from dues. This made double machinery for the collection of funds from the industry in supporting what is essentially one activity and it was felt by all those concerned with the matter that it would be much more equitable in the long run to readjust the schedule of dues so that the financial side of all American Electric Railway Association activities would be consolidated. Careful studies were made by a subcommittee thoroughly representative of the various classes of membership, and the schedule of dues was arrived at as a more equitable method than the old system of dealing with the various classes of members.

The report was signed by J. G. Barry, H. V. Bozell, H. L. Brown, H. C. Clark, F. W. Doolittle, J. E. Hutcheson, M. B. Lambert, E. B. Meissner, L. H. Palmer, Harry Reid, G. A. Richardson, Paul Shoup, R. P. Stevens, J. H. McGraw and C. D. Emmons, chairman.

In the effort to cut down expense on new construction, it is easy to allow fire hazards to creep in when, if fire prevention were properly considered, the additional expense involved would save a great deal more than its annual carrying cost in lower insurance rates.

Safety and fire prevention go hand in hand, and safety committees should be encouraged to give suggestions which will help to improve the condition of the property. If this places too great a burden on the safety committee, the work may be given to a separate committee organized to follow fire prevention work alone. Such a committee should be drafted from different parts of the organization. The inspections by this committee should embrace all phases of fire protection, including housekeeping, storage of combustible



C. D. Emmons



P. E. Wilson

Insurance

COLLECTION of a two-year history of insurance experience was continued. The number of companies reporting this year was 35 more than a year ago, with \$68,000,000 more insurance and \$145,000 more premium. Tables which accompany the report show for the 279 companies allocating insurance to types of property covered, insurance carried, premiums paid, rate, losses and amount recovered, also the same data for 60 companies which do not allocate their premiums to the types of insurance carried. The committee also points out that the loss ratio is declining.

At President Sawyer's request the committee appointed a subcommittee to give the subject of fire prevention special attention. The conclusions in brief follow:

Too much emphasis can hardly be laid on fire prevention for street railways. It often appears that where several methods of reducing a particular fire hazard possess equal merit, one is accepted by the insurance authorities as the best and if followed, a maximum insurance credit will be obtained. The Engineering Manual Section B-100-23 contains some very helpful suggestions and recommendations on this subject. The Crosby-Fiske-Forster Handbook of Fire Protection is a nationally recognized authority on all matters of this sort, as are the various pamphlets published by the National Fire Protection Association.

It is advisable to submit plans of all new construction to the local rating bureau, or your insurance broker if he is in a position to furnish insurance engineering service, before the work is started, to obtain their suggestions regarding details of construction and fire-extinguishing equipment. Where automatic sprinklers are to be provided, the plans should provide that the work be done so as to conform to the bureau requirements.

material and extinguishing equipment. Inspection work will be greatly aided if the employees feel that the management is personally interested in the work. The reports of inspection should be followed closely to see that defects are corrected as soon as possible.

Excellent results have been secured by many member companies in engaging the services of firm whose specialty is fire prevention. This is applying in a larger way the advantage derived in forming fire prevention committees among our own staff and our own employees.

It is essential that all employees be carefully instructed as to what they should do in the event of fire. This includes giving the fire alarm, use of fire extinguishers, running out of hose, the removal of essential records and property, etc. From time to time fire drills should take place to be sure that each person not only understands what he is to do but knows exactly how to do it.

Good housekeeping is largely the result of a habit of mind. There is nothing that so influences a clean mind as a dirty workshop or a dirty street car. Therefore street railway managements should lay great emphasis on the subject of good housekeeping, the result of which will be not allowing waste to accumulate about the plant. Any infraction of fire prevention rules should be followed up as strenuously as infractions of rules for operation of cars, the handling of revenue and all of

to tie together the work of all the various organizations in the industry.

The reasons for the provision of "plural voting" are, first, to make it possible to give proportional voting weight, on such matters as the adoption of engineering standards, to those companies whose purchases represent a large part of the equipment manufactured for the industry. In other words, a company that buys several thousands of certain piece of equipment per year should have more to say, according to the committee, about the standards adopted to that equipment than a company that buys only fifteen or twenty pieces a year. The second reason advanced for the provision for "plural voting" was that under the amended constitution permitting admission by the executive committee of bus companies, "plural voting" would provide a check against the possibility of a large number of such small companies becoming a deciding factor in determining the policy of the association. Accordingly, it was provided in the new draft of the constitution that in case a member demands it, plural voting may be invoked and companies will have one or more votes depending on the dues paid.

The last two objects listed by the committee—namely, the consolidation of the finances of the advisory council with the finances of the main association, and the revision of the schedule of dues—are very closely related. Since the organization of the advisory council, its

the other ramifications of our business.

The committee recommends that it be continued another year with authorization to negotiate with insurance rating authorities for a reduction in the rates applying to street-railway properties. Such negotiations, naturally, will require the closest co-operation of the membership. The data collected indicate such rate negotiations are warranted.

The association statistician, Mr. Murphy, has again been invaluable to the committee.

The report is signed by O. H. Bernd, Edward J. Blair, A. C. Blinn, Granville H. Bourne, C. E. Brown, W. C. Campbell, N. H. Daniels, Samuel W. Greenland, F. M. Hamilton, L. R. King, A. D. Knox, F. H. Miller, John H. Moran, A. B. Paterson, F. J. Petura, B. L. Tomes, Edward A. West, H. B. Potter, vice-chairman, and Paul E. Wilson, chairman.

Education

IN LAYING out its program for the past year the committee decided not to try to cover too much ground, but to confine attention principally to continuing the work of last year along lines that seemed most promising.

The advisability of conducting another demonstration conference was considered, but the committee concluded that the purpose of that demonstration had been accomplished as far as it could be by that means. This purpose was to arouse interest in the conference form of instruction and to stimulate the holding of such conferences on as many railway properties as possible.

Omitting numerous intervening details, the outcome of the committee's discussion and correspondence was a plan for a "Training Course for Foreign-Conference Leaders" to be held in connection with the Cleveland convention. The conferences will be conducted by A. J. Sarré, of the New Orleans Public Service, Inc., and Henry H. Norris, of the Boston Elevated Railway, with the assistance and co-operation of Frank Cushman, of the Federal Board for Vocational Education, Washington, D. C.

The invitations to enroll in the leader-training course went out early in July, to permit correspondence with the registrants during the summer. Last year five letters with enclosures were sent by the committee to the members of the foreman-conference group. The result was the building up of a spirit of solidarity which facilitated the starting of the discussion at Cleveland.

The committee and the men in charge of the training course for foremen-conference leaders wish to emphasize the preliminary nature of this series of conferences. In six sessions of four hours' duration it is impossible to furnish the equivalent of the longer courses available at other times and places for this purpose. The course can form only a part of the training desirable for conference leadership. It is hoped, however, that as far as possible the men selected may be those who have already

made a start in this field. The course also should be followed by reading along the lines suggested by the instructors.

Another subject which appealed to the committee as urgent at this time is the instruction of car operators, particularly along lines of courtesy, skill in giving good service, interest in the job, etc. A questionnaire was sent out to ascertain the present practice in post-employment instruction. The returns indicate a substantial interest in such training, but show that there is a wide field here for study and improvement.

A representative of the committee



Edward Dana

attended the twelfth annual convention of the Engineering Extension Division, Pennsylvania State College. A foreman-conference demonstration was a feature of that convention.

In the course of its researches the committee learned of much educational and training activity that could not be covered statistically. It is impracticable to include accounts of all of this in the present report, but typical descriptions are appended to indicate the trends of the best present-day educational effort.

The committee has been greatly encouraged by the interest of the industry in its efforts. These appear to be producing results. The "educational director," or his equivalent is increasingly in evidence on electric railway and allied properties. The committee desired to make a definite contribution to this development this year and to avoid spreading its activities over too wide an area. Co-operation by the industry in the leader-training course will insure such a contribution.

Following the committee's established custom, a bibliography is appended to this report referring to some of the important recent articles in the field attempted to be covered by the committee. This makes no claim for exhaustiveness, and the committee will welcome additions which can be included in the revised report.

The report was signed by H. H. Adams, George B. Anderson, A. H. Armstrong, W. H. Boyce, W. H. Burke, John A. Dewhurst, M. B. Lambert, R. J. Lockwood, M. McCants, F. H. Miller, Henry H. Norris, Arthur J. Rowland, A. J. Sarré, T. H. Tutwiler, J. S. Hyatt, vice-chairman, and Edward Dana, chairman.

Motor Vehicle Information

QUESTIONNAIRES were sent out to determine the trend of motor bus operations as affecting the electric railway industry. The results of this questionnaire follow:

1. Will the electric railways in your section purchase and operate appreciably more buses in 1927 than in 1926?

As a broad generality the trend still appears to favor the operation of appreciably more buses by electric railways this year. From the number which reply in the negative, however, it seems more accurate to conclude that a substantial part of the electric railways have now reached the limit to which they intend to expand their bus operations, while a larger number, who perhaps have undertaken bus operations more recently, still contemplate substantial increases in that form of service.

2. Will these buses be used to supplant electric cars or to furnish additional transportation service?

A marked uniformity of opinion is expressed in the responses to this query. New buses to be operated this year will function largely as feeders, in crosstown service and generally supplementary to the existing railway service of the electric railways concerned. Only in small cities does there appear to be any intention of supplanting the street cars with buses.

3. Is the number of buses operated by other than electric railways increasing or decreasing?

Opinion is sharply divided on the trend of independent operations. One group reports increased independent operations, while nearly an equal number find the situation stationary or decreasing. Where increases are noted they apply largely to interurban operations and not always in competition with electric railways.

4. Are the buses now being operated by the railways and by others making a fair return on the investment?

It is the consensus of opinion that bus operations are not yielding a fair return on the investment. Interurban bus service seems to be generally more remunerative than city bus operations.

5. What is the trend of bus design in your section—toward larger or smaller buses?

Apparently many operators have already standardized on bus sizes which in their opinion best fit the local traffic requirements. Our replies indicate that 21 to 29-passenger buses are the average in city service, with larger buses on interurban routes. Where any trend is noted, it is almost uniformly toward larger vehicles.

6. Is the trend toward more luxurious buses or toward more passengers per 1,000 lb.?

A broad uniformity of opinion allows of two definite conclusions:

First, that interurban bus design tend toward more luxurious equipment, while with city buses the trend is toward lighter cars of plainer but more comfortable design; and

Second, that the trend is decidedly

toward better buses—i. e., buses of structural stability, with six-cylinder motors and durable finish; buses designed with special consideration to reasonable life and low maintenance cost.

1. What is the trend of the schedule speed of buses—faster or slower?

In the southern sections the responses largely reflect a trend toward faster schedule speeds. While this appears to express the general purpose, many report slower schedule speeds resulting in traffic congestion.

2. Is there any change in liability insurance premiums, either higher or lower?

Several reported the appropriation of additional funds to injuries and damages reserve for the purpose of carrying their own insurance. The majority reported no change in liability rates and none reported lower rates.

3. What is the rate of fare tendency?

In no case is there any downward tendency in the rate of fare; the majority, regardless of their desires, anticipate no change, but several indicate an upward tendency.

4. When buses operated by independent operators are obsolete or otherwise unfit for use, is the tendency in these cases to abandon the lines or buy new buses?

With approximate uniformity the responses reflect tenacity in the independent operators and an ability, with the aid of time payments, to replace their equipment.

5. Are the bus manufacturers solicited in business in competition with electric railway operated lines? If so, who?

A substantial majority exonerate the bus manufacturers from the implication of undue efforts to establish independent competitive operations.

6. What is the tendency toward freight haulage by trucks in your territory?

While some replies indicate a comparatively small increase in freight haulage by trucks, nearly all agree that an increase, either large or small, is taking place; and none report a decrease.

7. To what extent have unregulated interstate bus lines been established and what is the tendency toward an increase or decrease in this kind of operation?

Some observers located centrally in the respective states note little if any interstate bus operations, but the majority report a small to large interstate bus business—mostly increasing.

8. What other indications do you see in your territory that have bearing on the tendency of future bus operations?

As far as such a leading question might be expected to result in any uniformity of reply, it may be said that several look for increased bus operation. Among the comments we find the expectation that bus operation in the future will tend to become concentrated largely under the management of the electric railways and the anticipation that the continued increase in the use of the private automobile will have the greatest bearing upon future bus operations.

15. What, in your opinion, should the executive committee of the association be giving particular attention to in regard to the bus situation?

In the field of legislation four companies direct the attention of the executive committee to the need for state or interstate bus regulation in their respective territories. Others suggest that the executive committee should investigate and give wide publicity to (1) the relative function of the railway and bus, and effect of bus competition upon electric railway operations; (2) the relative cost of bus and electric railway operations when equally burdened in respect to service regulations, taxes and liability for injuries and damages; and (3) the unseen cost of bus operation which the public pays through the various forms of taxation that provide for the upkeep of the highways.

Among the replies we find the promulgation and prompt adoption of a uniform system of bus accounting very strongly urged, while efforts toward standardization of bus design and elimination of high-pressure sales policy of bus manufacturers toward prospective bus operators are suggested.

The report was signed by Joseph H. Alexander, Carl H. Beck, M. R. Boylan, Luke C. Bradley, F. G. Buffe, H. B. Flowers, M. B. Lambert, D. W. Pontius, Harry Reid, R. B. Stearns, W. B. Tuttle, E. P. Waller, S. B. Way, vice-chairman, and R. P. Stevens, chairman.

Taxation

CONSIDERATION during the past year has been given to the problem of the complicated and discriminatory tax systems which now prevail in most states against street railways. In many states street railways are carrying a greater tax burden than is now carried by other public utilities or by mercantile and manufacturing corporations. This fact was very clearly established for New York State by the survey made a few years ago by the special joint legislative committee on taxation and retrenchment, of which Senator Frederick M. Davenport was chairman.

A survey conducted by the advisory council of this association in 1925 and 1926 showed that street railway companies in the various states were faced with inequitable tax burdens similar to those existing in the State of New York.

It is self-evident that when any industry is compelled to pay more than two-thirds of its net revenue in taxes, relief of some sort should be furnished.

We are calling attention to the above inequalities of taxation, not for the purpose of establishing that any other public utility is not paying a large enough share of the tax burden, but merely for the purpose of showing that any system of taxation which produces such inequality must be wrong in principle.

The report of the New York committee referred to, recommends the adoption of a tax on public utilities based on the elements of both gross and net income and said that such a tax would

possess the advantages of certainty, simplicity and equity. Your committee on taxation has devoted its entire attention during this year to the question of whether it should recommend to this association the adoption of the principle of a gross net tax on street railways in lieu of all other forms of state and local taxation, such gross net tax to be apportioned by the state authorities among the various municipalities or governmental agencies of the state.

It is realized that the street railway industry is now faced with a tax system which has grown up historically by piecemeal legislation applied at different times to different classes of corporations, with the result that such tax system has the defects of uncertainty, arbitrariness and complexity. It is further realized that the street railway industry is now paying an unjust and discriminatory portion of the tax burden of the various states and that some simple and equitable form of taxation should be substituted in place of the present complicated and discriminatory tax systems which now prevail in most of the states.

The gross net tax, such as suggested by the New York legislative committee, would impose a minimum tax on the gross revenue from operation of street railways, even though its net revenue from operation was small or non-existent, and the rate of tax would increase in the case of such street railways as had a net operating revenue, such rate of tax being increased in the proportion that the net operating revenue bore to the gross operating revenue. The gross net tax, therefore, has, first, the element of simplicity; second, the element of equity, in that the rate of tax is graduated according to the ability of a particular street railway to pay such tax, and, third, the element of insuring a permanent stable revenue in that it provides for the imposition of a minimum tax on gross revenues from operation irrespective of whether or not a street railway has a net operating revenue. At a meeting of the committee on Dec. 10, 1926, a vote was taken by the members upon whether it should recommend this form of tax to the association. The vote was 9 in favor and 1 opposed.

The members felt that in view of the importance of the subject and that a full membership of the committee was not present, a subcommittee should be appointed, with the chairman of the committee on taxation as chairman, to prepare a report to be submitted to all the members of the committee for their action by letter, vote or otherwise. This report has not yet been completed, and the committee on taxation asks that it be continued for another year so that it may act upon the question to be submitted by the subcommittee.

The report was signed by Charles H. Allen, B. J. Denman, Robert M. Feustel, Albert W. Flor, Harold L. Geisse, James P. Griffin, Daniel J. Hennessy, William A. Jackson, H. A. Mitchell, L. R. Nash, D. J. Strouse, C. L. S. Tingley, A. C. Watt, Paul E. Wilson, Edward W. Wakelee, vice-chairman, and Alfred T. Davison, chairman.

Latest Developments in Accounting Methods

Reports of committees of Accountants' Association summarize progress during the past year. Wide range of subjects covered illustrates scope of electric railway business

MUCH activity characterized the work of the committees of the Accountants' Association during the past year. The classification of bus accounts adopted at the 1925 and 1926 conventions was adopted by the National Association of Railroad and Utilities Commissioners last October. The report of the committee this year is one of progress. No requests for a revision have been received, nor has it been found necessary to issue a condensed classification.

Abstracts of this and the other reports presented follow.

Stores Accounting

THE SUBJECT chosen for study and report was storage, distribution and accounting for gasoline, oils and grease used on buses and automotive equipment. Seventeen questions were sent out to 55 companies. Forty-one companies responded. Due to varying conditions the committee made no extended recommendations.

The answers showed that the amount of gasoline purchased a month ranged from 3,000 to 1,000,000 gal. and that the average for the 41 companies reporting was about 58,713. The total purchases of gasoline for the year of these 41 companies was about 28,900,000 gal., having a value perhaps in excess of \$4,500,000. These figures show the



R. A. Weston

desirability of following the best practices to eliminate waste and to insure statements of cost as correct as possible.

Twenty-five companies purchase gasoline in tank wagons, seven in tank cars, three in both tank wagons and tank cars, two in both tank wagon and from service stations, two from service

stations and two companies did not report. In general the capacity of the storage tank is for a few days only.

For measuring the gasoline delivered, seven companies use tank wagon measurements, two companies use standard-size cans and two companies use gage tank cars. The remainder measure shortage in the tank. In general, the method followed in checking the quantity of gasoline delivered is by means of wooden calibrated sticks. One company that receives by tank car gages the car and figures for temperature correction.

In receipting for gasoline, some companies use special receiving forms and others use regular receiving receipts. The receiving record is checked against the invoice generally. Only two companies carry large enough supply so that advantage can be taken of trend of market. Most companies have small-capacity tanks.

Inventories are taken at various times as follows: yearly by one company, semi-yearly by one, monthly by fourteen, daily by five and at various times by eleven. No inventory is taken by two companies and no report was received from seven.

No companies reported any great amount of trouble from the accumulation of water in their tanks.

On the question of loss through evaporation, wastage or other causes one company reported an estimated loss of from 1½ to 2 per cent and one company 1.75 per cent. The rest estimated less than 1 per cent or had no available data.

Sixteen companies gas their buses from storage points, nineteen from storage points and public stations, one from wagons and public stations, one from storage and wagons, two from public stations and two companies made no report.

In accounting for the gassing and oiling of buses twelve companies use material and supplies requisition and eighteen



L. E. Lippitt

Retiring President Accountants' Association

companies use special gas and oil requisition.

Gasoline is purchased under a year contract by 23 companies, under monthly contract by one and under various other kinds of contracts by six. Nine companies have no contract and two companies made no report.

Twenty-seven companies maintain special ledger account for gasoline, thirteen do not; one did not report.

Twenty-nine companies carry oil—their stores account, seven companies charge this material direct to the proper account and five companies did not report. With grease, twenty companies carry it in stores account, twelve companies charge it direct and nine companies did not report.

Among the companies reporting forms used in gasoline and oil accounting, the one that has gone most extensively into the operation of buses and whose consumption of gasoline is approximately 1,000,000 gal. a month reported its methods in considerable detail. Briefly, they are as follows:

Blanket requisitions on the purchasing agent are prepared by the stores department. One requisition is made for gasoline covering delivery at all points. A separate requisition is made for each kind and grade of oil and grease. The requisitions also specify that the material

als are to be delivered as required and at when the vendor makes deliveries, the company's order number must be indicated on the delivery slip left at the delivery points by the drivers of tank wagons. Purchase orders to conform to the wording on the requisitions are issued by the purchasing department.

As gasoline, grease and oil are required at each point the vendor is notified, but at points where there is a large consumption this is not necessary, the vendor becomes familiar with the requirements and makes deliveries at regular intervals. When each delivery is made, the clerk or foreman measures the contents of the tank; then he sees at the tank wagon compartments are full before being emptied and that these compartments are empty when delivery is made and again measures the tank after delivery. A receiving report is made on a special receiving card, showing the date, by whom delivered, what delivered and the quantity, the vendor's delivery ticket and tank wagon numbers, the order number, and stating at the tank wagon compartments have been observed before and after delivery. The tank wagon contents are taken out of the tank, a statement to that effect is made in the place provided. The vendor's delivery ticket is attached to the original or paper copy in the receiving card book and the cardboard copy is torn out and forwarded at once to the stores department general office.

The vendor renders bills for each delivery made at each point. They are checked, then classified to the proper account. The receiving card number is entered thereon, certified as to correctness, listed on a bill statement and forwarded to the purchasing department, where they are again checked as to price and entered against the proper orders. Bills are then forwarded to the auditing department for recording and payment.

As gasoline or oil is put into buses or otherwise used, a daily memorandum kept on the quantity, this being determined by measuring apparatus on the pump and tanks, or, in the case of oil, cans. The data on these daily memorandums are transferred daily at each filling point to a monthly gasoline and oil report. The consumption is totaled by bus numbers several times a month so that the total consumption per bus may be noted periodically at short intervals. At the end of each day the consumption, receipts and quantities on hand (by stick measurements) are checked up and entered at the bottom of the form and the "over" or "short" shown as the case may be. These overs and shorts are carried through to the end of the month, where a net "over" or "short" is arrived at. Then the original of this report is forwarded to the stores department, where it is checked against the record of receipts (from receiving cards) and invoices. It is then forwarded to the auditing department for further checking. The net "over" or "short" for the month is then apportioned against each bus number shown in the report in proportion to the consumption of each bus to the total con-

sumption, for the purpose of keeping a consumption record by bus numbers.

A special supplementary report is made monthly by the stores department to the auditing department of any deliveries made in the month for which bills have not been received, in order that charge entries may be taken up in that month for deliveries not billed.

On a large system it is advisable to have one man take complete charge of gasoline and oil matters, for maintaining relations with the vendors as to details and for the general system of operation as regards fuel and lubricants.

The report was signed by W. V. Shoemaker, W. S. Stackpole, F. E. Wilkin, and R. A. Weston, chairman.

Standard Classifications

DURING the past year the committee received a notice from the Interstate Commerce Commission of a hearing on depreciation for electric railways to be held Feb. 28, 1927, at Washington. This hearing was subsequently postponed to May 23, 1927, and later indefinitely postponed. In view of the



M. W. Glover

fact that when this subject came up for discussion several years ago in connection with a similar hearing before the Interstate Commerce Commission relating to steam railroads, a special committee was assigned to handle the subject by the American Electric Railway Association, the committee felt it would be inadvisable to take any official action in connection with the proposed hearing, even though it appeared to cover an accounting matter, which would presumably be handled by the Accountants' Association. Nothing has therefore been done on this subject other than to keep in touch with developments.

The subject of accounting questions appearing in the question box of *Aera* was brought to the attention of the committee and arrangements were made with the editor of *Aera* that all accounting questions involving an interpretation of the classification of accounts would be sent to the committee before publication, in order that an official answer could be secured when necessary from the Interstate Commerce Commission, in accordance with the arrangement in effect between the bureau of accounts of the Interstate Commerce

Commission and the committee, whereby all inquiries relating to the classification of accounts for electric railways are submitted to the committee before a ruling is issued by the commission.

All accounting questions which do not require an interpretation of the classification will, of course, be published in *Aera* without reference to the committee. The only questions submitted to the committee will be where an interpretation of the classification is involved.

During the year several inquiries were received from electric railways operating in the United States and in Canada. These were submitted to the bureau of accounts of the Interstate Commerce Commission and answers approved by the committee and by the commission were given. [These questions and answers will be published in a later issue of *ELECTRIC RAILWAY JOURNAL*.—Ed.]

The report was signed by H. L. Wilson, I. A. May, P. S. Young, C. S. Mitchell and M. W. Glover, chairman.

Bus Accounting

THE most important development during the past year was the adoption by the National Association of Railroad and Utilities Commissioners at their convention in Asheville, N. C., in October, 1926, of the bus classification of accounts, approved by the Accountants' Association at the conventions in October, 1925, and October, 1926.

This therefore makes the bus classification the standard classification of accounts for motor bus transportation companies and in future this classification will be referred to as the "Standard Bus Classification."

During the past two years the standard classification has been used by a number of companies operating in the states of Connecticut, New York, New Jersey, Pennsylvania, Maryland, West Virginia, Virginia, Ohio, Indiana, Illinois and Wisconsin, and is in use by companies operating in the District of Columbia. The classification is probably used in other states by companies which have not adopted a classification of bus accounts, but the committee has not been able to secure the names of the companies and the other states in which the classification is now in use. Its adoption by the National Association of Railroad and Utilities Commissioners, the membership of which comprises the public service commissions of all states as well as the Interstate Commerce Commission, should result in an increased use of the classification and will promote uniformity in bus accounting throughout the United States, which is very desirable.

During the year the committee has received several questions relating to interpretations of the classification, and in accordance with the authority given at the October, 1926, convention, answers to these questions have been given by the committee. [They will appear in a later issue of this paper.—Ed.]

The General Office Equipment Cor-

poration of New York has issued a pamphlet entitled "Standard Accounting System for Bus Operating Companies," using the standard classification as a basis of the system suggested, and copies of the pamphlet have been furnished for distribution to the members attending this convention.

The chief of the bureau of accounts and statistics of the Pennsylvania Public Service Commission invited the committee to attend a hearing in Harrisburg, Pa., Aug. 17, 1927, to review a proposed tentative classification of accounts for passenger motor transportation companies which has been under consideration by the Pennsylvania commission. A meeting of the committee was held in Harrisburg on Aug. 16 and the tentative classification was considered and compared with the standard classification. The result of the examination of the two classifications showed several small differences. The committee attended the hearing on Aug. 17 and offered verbal suggestions relative to changes in the proposed Pennsylvania classification to bring it in line with the standard classification. The chief of the bureau of accounts and statistics at the close of the hearing invited the committee to submit suggestions in writing and stated that they would be carefully considered before the classification was issued by the Public Service Commission. In response to this invitation the committee submitted a statement under date of Sept. 1, 1927.

It is needless to advance reasons showing the desirability of uniform accounting throughout the United States, and it is hoped that the Pennsylvania Public Service Commission, as well as the commissions of other states, will carefully consider this subject before issuing a classification different from the standard classification, which has been approved by the National Association of Railroad and Utilities Commissioners. The most serious objection to the adoption of different classifications in the various states is the fact that a number of bus companies operate between states, handling interstate passengers, and it would be manifestly impossible for such companies to keep their accounts under two different classifications if the states in which they operated should issue different classifications.

So far no requests have been received

for a more condensed classification than that adopted at the 1926 convention, but if smaller companies feel that a more simple classification is needed, it can be readily prepared from the two classifications now in use, the complete classification being prepared for companies with annual operating revenues in excess of \$100,000 and the condensed classification for companies that have operating revenues of less than \$100,000.

The report was signed by P. R. Jacques, H. C. Kimball, C. R. Mahan, C. W. Stocks, N. E. Stubbs, E. A. Tuson, and M. W. Glover, chairman.

Representation at Convention of National Association of Railroad and Utilities Commissioners

THE chairman of the committee attended the 1926-27 convention of the commissioners, and while he took no part in the discussions he was present at practically all the sessions and discussed matters of interest with members and other guests of the association.



W. L. Davis

Probably the item of most importance to this association was the action taken by the committee on statistics and accounts of public utility companies. This committee, in its report, covered the following subjects: (1) Standard classification of accounts for motor vehicle operations, (2) pending (or possible) revision of the standard classification of accounts for electric railways by the Interstate Commerce Commission, (3)

destruction of records of public utilities. The present status of each is:

1. The committee's report recommended for adoption two classifications, one covering operations with gross revenue of more than \$100,000 per year and the other for operations with gross earnings under that amount. The report states that the uniform system of accounts, made a part of the report, has been adopted by the American Electric Railway Association. In making its recommendations, however, the report was submitted "with the proviso that in so adopting these systems of accounts each state commission or regulatory body having jurisdiction in such matters will have the right to amend or modify such system of accounts in order to meet their own special requirements or needs."

2. The chairman of the committee recommended that the committee appointed to take care of this work during the coming year co-operate with the Interstate Commerce Commission in any changes or revisions in the present classification of accounts for electric railways. The chairman also advised, in this same connection, that Chairman Eastman of the Interstate Commerce Commission had been consulted and had approved the recommendation.

3. Recommendations were made that the subject of destruction of records be assigned to the incoming committee, as the present committee had not sufficient time to consider it.

The report of the committee on statistics and accounts of public utility companies was accepted by the convention; hence it will be very essential for this association to follow up the work outlined in sections 2 and 3 above. Possible changes in the situation in connection with a uniform regulatory law (now under consideration) and possible revisions of the electric railway classification may have an effect on the status of the bus classification and the application thereof.

The matter of accounting for renewals, replacements, retirements and depreciation on electric railways was discussed informally by several present at the convention, but it was not mentioned in the proceedings.

The time and place of the next convention was fixed for the third week in October at Dallas, Texas.

The report was signed by W. L. Davis, chairman.

*BUS operation is playing a very important part in the transportation field. * * * It behooves every member of our association to put forth every effort to have our standard classification of accounts for bus operation adopted by all state commissions and used by the bus operators, rather than some time later to find ourselves confronted with a classification put out by the several state commissions. It is highly important that a national standard be adopted.*

—From PRESIDENT LIPPITT'S address to the Accountants' Association.

Definite Recommendations Made by Engineering Committees

Work done during the past year by way and structures and equipment divisions has progressed favorably under new group organization. Additional reports presented on heavy electric traction and power subjects

THIS year the committees studying equipment subjects were grouped under the same general plan as that adopted by the way and structures group a year ago. The reports presented show clearly the beneficial results of this procedure. Committees studying the subjects of heavy electric traction and power generation and distribution continue to work independently. Abstracts of the reports follow.

Power Transmission and Distribution

IN REVIEWING existing manual sections the committee agreed upon data to be added to the section covering insulators for contact bar supports and submitted a drawing.

The committee submitted specifications covering materials for catenary construction. These are designed to be included eventually in a comprehensive specification for overhead line material, for both direct and catenary suspension, which will include the material appearing at present in the manual.

The committee reviewed the specifications for catenary overhead construction for other than steam railroad electrification for the purpose of preparing any necessary revisions. It found that a number of changes are desirable and presented a list of them as information only. The committee felt that there is

still much work to be done on this specification and did not recommend the adoption of these revisions at this time.

The committee continued the study of trolley wire breaks and carried it forward in a manner uniform with that used in reports for 1925 and 1926, covering substantially the same properties.

The committee felt that the data available are still insufficient for a full comparison of results, and it is believed that next year, with four years of uniform data at hand, a more complete comparison can be made and reasonably safe conclusions stated. The committee called attention to the decreasing frequency of trolley breaks, due to both crystallization and wear, at points of support. Attention was also called again to the increasing percentage of breaks due to causes beyond the control of the line maintenance forces, such as burn-downs and pull-downs by cars, etc. This item shows a steady increase

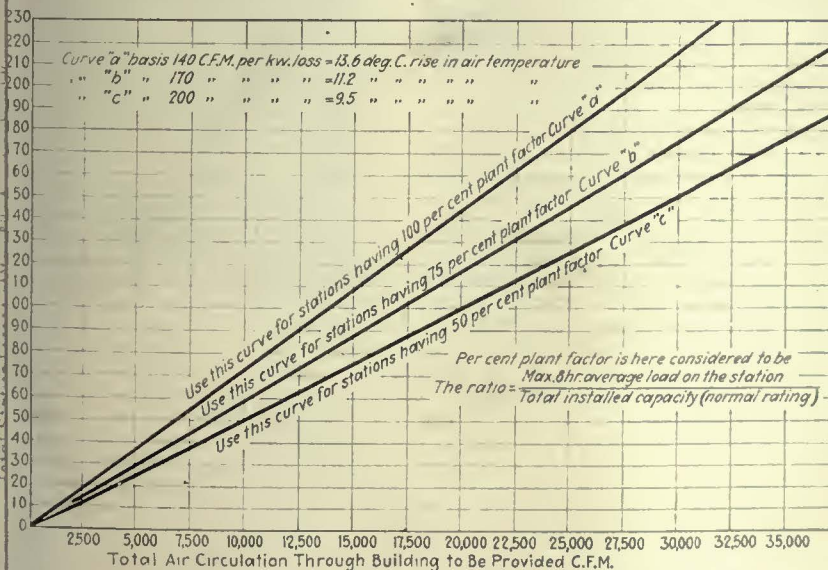


Daniel Durie
Retiring President Engineering Association

from 27.1 per cent in 1922 to 34.6 per cent in 1926.

At a joint meeting of the A.S.T.M. and the association, the specification for bronze trolley wire was discussed. It was shown from the experience of the past two years that the present tensile strength requirements represented selected material and could not be reached by all good and acceptable wire. It was also shown that the per cent elongation in 10 in. for the 133,225-circ.mil size was slightly out of proportion with the requirements for the other sizes. The manufacturers also pointed out that the present requirement (that grooved trolley wire should have 95 per cent of the tensile strength of round wire) was not supported by tests of the material, and there appeared to be no reason why the tensile strengths should not be the same for wire of the same nominal cross-sectional area. It was, however, also brought out that grooved wire would not normally have as great an elongation as round wire, with the result that a reduction in this requirement was agreed upon.

With regard to the twist test, it was shown that the present A.E.R.E.A. requirement was too severe for the larg-



Total air circulation required through building corresponding to total losses at average load for stations having 50, 75 and 100 per cent plant factor

est sizes and that the A.S.T.M. requirement was not severe enough for the smaller sizes. It was agreed to state a minimum number of twists for each size of wire, at the same time keeping the test as a qualitative test to discover defects.

The changes were embodied in a revised specification which was submitted for approval.

A number of cases of radio interference were brought to the attention of the committee, but in each case the causes had been anticipated and described in the 1926 report. Remedies suggested in that report were applied in a few cases with gratifying results. No new additional sources of interference were brought to the attention of the committee since the last report was made and it is the opinion of the members of the committee that the 1926 report is comprehensive enough to identify nearly all cases of radio interference caused by trolley car operation and to apply a remedial measure.

The committee gathered some data relating to the physical conditions and methods employed on various systems, with the idea of establishing a standard by which the various methods of operating and maintaining overhead lines may be compared. In making a preliminary digest of these, it was found that there is possibly a very fruitful field for investigation, the results of which, it is expected, will set up an arrangement by which an operating engineer may compare his methods of using labor and material and the results he obtains with the methods and results obtained on different operating roads, traffic density and such other factors of wear being taken into consideration.

The committee recommended that this subject be continued next year.

The committee has been in communication with various users of trolley wire reels and found that, with the existing divergence of opinions, no formal report could be made at the present time.

The report was signed by J. Walter Allen, S. H. Anderson, W. H. Bassett, James H. Drew, D. D. Ewing, C. E. Hancock, W. F. Healy, S. S. Hertz, Kirk J. Keith, A. J. Klatte, John Leisenring, H. S. Murphy, W. J. Quinn, M. B. Rosevear, W. Schaake, A. Schlesinger, Dwight L. Smith, R. E. Wade, George F. Wennagel, M. W. Cooke, vice-chairman, F. McVittie, chairman, J. F. Neild, secretary and Charles H. Jones, sponsor.

Power Generation and Conversion

SUMMATION of the investigation made regarding ventilation of automatic substations was given. This was arranged so that with a given machine and knowledge of the load to be carried, the quantity of air to be circulated and the size of inlet and outlet openings may be determined easily under various combinations of plant factor and ventilating head. A brief summary of the tests was given, together with a num-

ber of suggestions to substation designers in the determination of characteristics and arrangement of required ventilating equipment and result in generally improved temperature conditions in substations.

The plant factor on railway substations generally averages less than



F. McVittie

50 per cent. Sustained overloads of as much as two hours' duration occur frequently, however, but these are to some extent counterbalanced by the thermal storage capacity of building structure and equipment as well as of the machines themselves in so far as the required temporarily increased dissipation of losses is concerned. The resultant temperature in the usual railway station, after its customary two-hour overload period, is decidedly lower than that corresponding to a continuous load of the same magnitude because of this thermal storage capacity. It is estimated that the masonry work alone of an average two-unit substation will absorb 72 kw.-hr. per deg. C. rise in temperature. Obviously some advantage can be taken of these mitigating circumstances in the determination of the ventilating equipment which must be provided for dissipation of losses. One means to this end is to determine sizes of openings or fan capacities on the basis of air circulation per unit of loss during maximum eight-hour average load for stations of low plant factor and decreasing the air circulation per kilowatt loss as the plant factor increases in some such ratio as: 200 cu.ft. per minute per kilowatt loss for stations having 50 per cent plant factor, 170 cu.ft. per minute loss for stations having 75 per cent plant factor, 140 cu.ft. per minute per kilowatt loss for stations having 100 per cent plant factor, corresponding to temperature rises of the ventilating air of 9.5, 11.2 and 13.6 deg. C. respectively. Curves were worked up on this basis for total station losses at maximum eight-hour average load, as high as 220 kw. They may be extended indefinitely. The total air circulation to be provided through the building can be read on the lower scale directly below the intersection of the horizontal line corresponding to the eight-hour average losses and the curve corresponding to plant factor.

The free areas of inlet and outlet

openings required to obtain the necessary amount of ventilation in naturally ventilated stations depends on the velocity which can be imparted to the flow of air, and this in turn depends largely on the arrangement of station equipment relative to the ventilating openings. Based on observations during test, it would seem that velocities equaling 50 per cent of the theoretical velocity due to chimney action alone can easily be obtained if machines are so arranged that their fan action aids the chimney action in the ejection of heated air from the building.

As the capacity of individual machines increases it becomes necessary to dissipate more heat per cubic foot of building space. For equal capacities, motor-generator sets require more ventilation than converters, due to their lower efficiencies. For relatively large units the outlets may become so large as to occupy the entire roof, resulting in expensive roof construction or costly ventilators or both. In some localities roof ventilators may present objectionable architectural features. In addition the high indoor temperature consistent with natural ventilation may become uncomfortable, particularly in warm climates. It then becomes necessary to collect the heated air as discharged from the machines conducting it outdoors. This can be effectively accomplished by means of collecting housings and ducts.

FORCED VENTILATION

There are conditions more or less special where forced ventilation is the proper solution as:

(a) When continuity of operation is highly important, it has been deemed advisable to install forced ventilation where stations are subjected to protracted durations of dead calm with high outdoor temperature.

(b) In noiseproof stations.

(c) Where air filters, washers, coolers or other known high resistances against air flow are introduced.

(d) In stations located in basements or underground where space is not available for ventilators of sufficient area for natural ventilation.

(e) In particular cases where capital charges and operating costs for forced ventilation are less than that for natural ventilation costs.

Since it is the recirculation of the heated air discharged from the machines that causes a high ambient temperature, it seems logical that the most effective method of ventilation is to collect this heated air and convey it outdoors. This procedure presents an easier problem than that of feeding cooling air at outdoor temperature to the machines. It lends itself more readily to an arrangement in which fans and machines combine their efforts to eject heated air. Fans of lower discharge pressure can thus be used, since the heated air, being confined, can be allowed higher temperature rise and the fan capacity be correspondingly reduced, resulting in minimum energy consumption of the motor.

Efficiency curves were given prev

ly for 600-volt and 1,500-volt 60-cycle mercury arc rectifiers in comparison with similar synchronous converters. The inherent characteristics of the rectifier as at present designed are somewhat different from those of the synchronous converter or the motor-generator set. The committee recommended that the A.I.E.E. standard of rating for synchronous converters and motor-generator sets for railway service be applied to mercury arc rectifiers for railway service. It was the opinion of the committee that this method of rating will put the rectifier on the same basis as the rotating machines and will avoid confusion in the minds of operators when making comparative studies of converting machinery. It was recognized, however, that under the suggested standard of rating the rectifier of present design will have a continuous capacity greater than its nominal rating and also that it will be able to carry higher momentary loads than the converter with the same nominal rating.

Questionnaires were sent to 23 owners and operating companies in the United States and Canada, requesting data on characteristics of their rectifiers and experience thus far obtained in operation. Replies were obtained from practically all of these companies.

Automatic operation was reported as fully satisfactory as far as the rectifier itself is concerned. Trouble has been experienced, however, with accessory equipment of various kinds.

The report was signed by C. E. Bennet, C. A. Butcher, H. W. Coddling, A. M. Garrett, H. W. Kidder, Nelson R. Love, H. W. McRobie, Otto Naef, F. W. Peters, W. S. Richhart, G. W. Sathoff, L. J. Turley, R. L. Weber, R. G. Winans, G. I. Wright, W. E. Ban, chairman; L. D. Bale, sponsor.

Wood Preservation



C. A. Smith

PREVIOUS committees have covered the subject of wood preservation so thoroughly that it remains only to keep specifications and recommendations up to date and in line with those of other organizations, such as the American Wood Preservers' Association and the American Railway Engineering Association.

Creating timber in place has been

adopted by the two largest communicating companies as standard practice. As a result of the carefully compiled reports from these companies there is evident a rather widespread interest in securing the longest life possible from the pole timber now in line. While a considerable number of companies adopted such treatments during the past year, these are in no position to add to the information already presented in previous reports. Those interested are urged to obtain the reports which will be issued by a committee on service records of pole timber which was appointed by the American Wood Preservers' Association at its last annual meeting. No further report has been received on the Cobra treatments used abroad and especially in Germany and Austria.

Most of the users of the record form reproduced in last year's *Proceedings* do not keep any record of the treatment or installation, but keep simply a record of the number of ties or other materials installed each year as a starting point, and record is kept of the removal of such treated materials from year to year. When such removals take place, the date of installation is obtained from dating nails put into the material at the time of treatment. Such a practice is very satisfactory where a standard specification has been adopted so that all of the material is handled in the same manner before treatment and the treatment itself is standard.

The committee wished to impress on all users of treated timber the importance of keeping some record of the life obtained on all their particular materials, as it is only by such records that necessary changes in specifications can be intelligently adopted and the actual economy of treated materials can be definitely obtained.

The continued and growing interest in wood preservation as a part of the country's belief in timber conservation supports continued interest in new preservatives or methods. Information on two of the newer preservatives is reported this year. The first, wood preservation with insoluble inorganic salts, is a new development in the form of preservative salts said to remain in the wood without loss due to leaching or weathering influences. It was sought to discover preservative materials which would be as permanent as creosote, low in cost and available in large quantities. The second uses cold treater dust as a wood preservative. Cold treater dust is a smelter byproduct obtained from the Cottrell precipitators of smelting works. The material comes in the form of a finely divided powder. It is composed mainly of arsenic trioxide usually containing about 75 per cent of this substance mixed with compounds of lead, copper, zinc, bismuth, selenium and tellurium.

It was recommended that the committee on wood preservation as an independent committee be abolished, and that a special committee of the Way and Structures Division be appointed to handle the subject in the future. This

special committee should contain representatives from the Power Division, as this group is vitally interested in creosoted poles and crossarms.

The report was signed by J. M. Curtin, T. H. David, J. L. Fritsch, W. H. Fulweiler, Ernest F. Hartman, W. L. Harwood, Leo P. Scanlan, F. H. Swayze, A. P. Way, R. H. White, and C. A. Smith, chairman.

Purchases and Stores



J. Fleming

NO CHANGES in the existing recommendations and miscellaneous methods and practices, as incorporated in the *Engineering Manual*, are recommended.

Owing to the apparent lack of interest in supporting a central exchange for the disposal of unused, inactive material, the large expense involved in its operation and the limited application of the surplus materials offered, the committee recommends against the establishment of such an exchange. Instead, the following procedure is suggested: (1) Endeavor to dispose of materials through company subsidiaries or allied companies, (2) seek permission of the manufacturer to return surplus materials to him for credit or obtain from him a list of other users who might be interested, (3) canvass nearby properties, (4) advertise individually in trade papers or seek an outlet through equipment or second-hand dealers, (5) scrap locally on the recommendation of a storekeeper or a committee duly authorized to act in such matters.

The committee outlined in its report a schedule of routine methods to be departments and suggested it be approved as a recommended method in the *Manual Section*.

The committee believes that a systematic plan for inspecting and testing materials should be adopted by all railways but that such testing and inspection of materials are primarily a problem for the engineering department of individual companies, and that department should decide what methods should be followed and the extent to which standard tests should be applied. It is believed, however, that the stores department is in a position to handle the inspection of a large percentage of

stocks materials which will satisfy the requirements. It is also the duty of the purchasing or stores department to bring to the attention of the engineering or testing department the receipt of materials on which testing instructions have not been received or which should be tested before being accepted.

The following subjects are recommended for consideration by the committee on purchases and stores for the year 1928: (1) Review existing purchases and stores sections of the Manual for revisions and corrections, (2) study the advantages and economics of unit piling and standard packages and recommend a suitable system for use on electric railway properties, (3) study investment in material and supplies and the cost of operating stores, (4) recommend methods and practices for keeping price records and pricing materials and supplies received and issued.

The report was signed by J. Y. Bayliss, A. S. Duncan, A. L. Fischer, B. W. Forkner, F. A. Jordan, P. F. McCall, T. H. McGarry, W. E. Scott, C. Thorburn, W. J. Walker, A. E. Hatton, secretary, A. A. Ordway, vice-chairman, J. Fleming, chairman, and P. V. C. See, sponsor.

Heavy Electric Traction

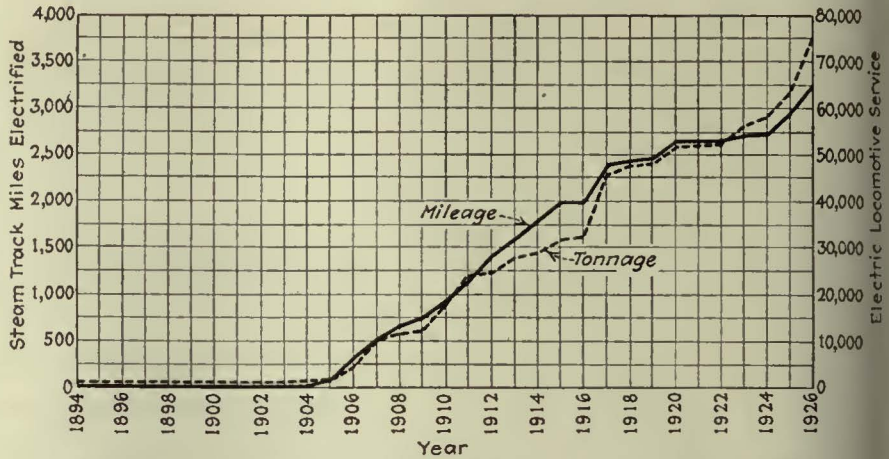


H. F. Brown

SEVEN subjects were assigned to the committee. The study of track and third rail bonds for heavy traction work was continued. It was felt that information on the use of supplementary negatives as an appendix to the tabulation prepared last year of bond practice of electrified steam roads and heavy traction lines will be a valuable addition to the information on track bonding. A questionnaire covering data desired has been prepared.

Information is being collected on the various factors involved in contact resistance. This subject requires some research and the compilation of data not readily available at the present time.

There is no information available as to the extent of reapplying bonds. In some cases pin expanded bonds are reapplied after again milling the terminals and using oversize expansion pins. A number of properties make a practice of removing and reapplying gas-welded bonds. It is recommended that this subject be continued.



Electrified steam railroad mileage and tonnage of electric locomotives, 1894-1926

It was understood that some experiments had been conducted in Europe with the thought that by applying a coating to the rail and joint plate the necessity for rail bonds might be overcome. Nothing of this sort has proved successful. It is possible that more information may be developed on this subject.

Some tests have been conducted to determine the current carrying capacity of the different types of rail bonds. The tests have not been conclusive due to the short sections of rail used conducting heat from one bond to another. The set-ups are hard to make and the problem is further complicated by splice-bar design, bond length and rail sizes. It is recommended that this subject be discontinued.

Information concerning rail joint clearance and its effect on rail bond design was presented, showing several shapes and types of rail bonds serving the same purpose which are made necessary by variation in the design of angle bars.

Drawings of a large number of angle bars have been secured and these will be used in compiling information. It is recommended that this study be continued.

Pursuant to action of the committee, the bibliography of heavy electric traction prepared by the committee was turned over to the New York Library, and its publication has now been authorized. It is hoped that it will appear in the library bulletin early in 1928. Publication will continue serially until the entire bibliography is complete.

Data on branch line electrification and self-propelled cars and locomotives were published in the report, bringing the subject up to date.

Information on articulated trains operated by nine different companies has been obtained, and brought up to date. The data now cover all such units as the committee found were being operated in the United States, Canada and England. No further information, other than named, has been forwarded to date from foreign countries. Articulated train units are now in operation in street car service, subway service and steam road service and have recently been added to high-speed interurban service. The units actually operating

in the heavier services are still comparatively new and limited in number. Further comparative operating data of value are not yet available.

On account of the errors in the tabulation of data on electrification, electrified steam mileage and electric locomotive tonnage on steam roads appearing in last year's report, the committee revised the existing tabulation, retaining the same headings and including news items covering this year's progress. The committee has also brought up to date the chart, which was last published in the 1925 report, showing the growth of steam railroad electrified mileage and electric locomotive tonnage in heavy traction service in the United States and Canada. This chart appears herewith.

The report was signed by A. H. Armstrong, H. W. Cope, A. H. Daus, John C. Davidson, J. H. Davis, J. V. B. Duer, H. H. Febrey, James T. Hamilton, William E. Huber, E. C. Johnson, John O. Madison, M. W. Manz, L. S. Wells, A. H. Woollen, Morris Buck, secretary; J. M. Bosenbury, vice-chairman; H. F. Brown, chairman, and F. H. Miller, sponsor.

Unification of Car Design



H. H. Adams

SINCE the progress report was circulated, following a meeting of the committee held on Jan. 6, there has been considerable development in the subject of car and equipment design. Interest is increasing and considerable experi-

mentation is under way. The committee believes that its function at the present time should be that of following closely the development and directing thought along these lines, rather than preparing a more elaborate report.

The report was signed by J. A. Brooks, C. A. Bursleson, W. J. Clardy, L. J. Davis, C. Gordon, J. W. Hulme, G. L. Kippenberger, J. Lindall, V. Wiloughby, A. L. Kasemeier, A. P. Jenks and H. H. Adams, chairman.

Way and Structures Division

THE committee held three meetings during the year with chairmen of special committees present for the purpose of discussing their assignments and giving them the benefit of such suggestions as the standard committee might make. This policy was a change from that which was followed the preceding year, when no meetings were held, and it is believed that the results obtained under the new plan were much more satisfactory.

In the case of special committee No. 2, the way and structures committee approved the following specific recommendations, involving revision of existing Manual sections:

(a) Revision of W-108-23 to agree with A.E.R.A. specification regarding countersinking of rivets.

(b) Revision of clause 402-B in W. 105, 106, 107, 108 and 109-23 changing depth of flangeways.

(c) Revision of clause 403, same Manual sections as above, covering depth of groove.

(d) Addition of a new paragraph to clause 403 in above specifications covering the matter of continuous flange bearing.

The standing committee voted to amend clause 401-h-4, Manual section W. 1-25, to read: "No variation will be allowed in dimensions affecting the fit of the splice bars except that the fishing template approved by the purchaser may stand out not to exceed 1/8 in. laterally."

The experiment in reorganizing the Engineering Association with a group standing committee supervising the special committees in its own division and passing upon standards submitted was first tried out in the way and structures division during the year 1925-1926. It was but natural that the first year's operation under the new plan was not all that might have been desired. Profiting by the first year's experience, some modifications in the procedure followed were made during the past year's operation, with decidedly beneficial results. It is the opinion of the committee, as the result of two years' experience with the new method of handling the work in its division, that it would be well to definitely fix the procedure to be followed in taking letter ballots so as to standardize this for all standing committees. It is recommended that clause 505-d of the regulations governing committees be revised to read: "Before any recommendation of a special committee shall be placed before the association for adoption, it shall be approved by letter ballot by at least a two-thirds vote of

the standing committee of the division in charge. Such letter ballot shall be taken in the following manner: In sending out a report for ballot, two weeks shall be allowed from the date of transmittal within which all members of the standing committee must submit their initial ballot to the chairman, with a copy to every other member of the standing committee. A further period of ten days shall then be allotted for submitting a final ballot, thus giving an opportunity for every member to reverse his original decision should he so desire. Furthermore, if any recommendation of a special committee involves more than one division (as may occasionally be the case) approval must be similarly obtained from the other interested divisions."

It is the opinion of the committee that if such procedure is adopted there will not only be a uniformity on the part of all standing committees in taking such letter ballots, but there will also result a more intelligent ballot in each case, as there will be presented a definite opportunity to reverse an original ballot in the light of such opinions as may be expressed by the other members of the committee in their original ballots.

The report was signed by C. A. Alden, E. B. Entwisle, W. G. Hulbert, E. J. McIlraith, J. R. McKay, H. F. Merker, C. A. Smith, A. T. Spencer, H. M. Steward, W. W. Wysor, E. M. T. Ryder, vice-chairman; H. H. George, chairman.

Alloy Steels Other than Manganese in Special Trackwork

FOR a number of years manganese steel has been regarded by the industry as an approved product for use in special trackwork. Production is economical, fabrication is easy and a uniform product is secured. A number of roads have had quite unsatisfactory experiences in attempting to build up and repair manganese steel in special trackwork and considerable controversy has taken and is still taking place over the possibilities of making uniformly satisfactory repairs to this class of steel. This, together with a desire to secure a material which could easily be machined in a track shop, has evidently resulted in a search to secure, if possible, a substitute.

A number of manufacturers have intimated to the committee that they are ready and willing to adopt a new alloy steel for use in special trackwork, provided it can be manufactured as economically as manganese steel and in

such tonnage as would justify the training and organization of crews. Being familiar with the qualities of chrome nickel steel as applied in directions other than for trackwork and with a knowledge of its sensitiveness in handling during manufacture and the difficulty in securing a uniform product, they advise that it should supersede manganese steel only after it has proved itself more serviceable and to present a higher resistance to shock and abrasion under service.

The committee, therefore, decided to proceed with investigations to cover the following points.

(a) Comparative prices of alloy steels in special trackwork layouts.

(b) Road tests or experience under service with alloy steel layouts already installed including the securing of records and comparative wear of manganese and other alloy steels in existing layouts and on test pieces and layouts to be installed during the current year.

(c) Practical tests of comparative superiority of weldability of manganese and other steels and a study of records from the use of various kinds of welding rods.

(d) Laboratory tests on welded section of alloy steels.

In general, manufacturers have produced only chrome nickel special trackwork in substitution for manganese steel and the cost to manufacture has been somewhat higher than the standard manganese steel product. Layouts, however, have been furnished to the industry for test purposes at about the same price as quoted for manganese steel.

The committee has, through the courtesy of manufacturers and the cooperation of users, been able to secure information as to location, date and conditions of installation, and some wear data on practically all of the special trackwork pieces and layouts which have been fabricated in alloy steels, other than manganese, and which have been installed in the United States and Canada up to the date of this report. With the exception of some recent experiments with chrome molybdenum steel, all layouts furnished in other than manganese steel were manufactured of chrome nickel steel. Nearly all of the layouts, records of which have been secured by the committee, have been manufactured to specification, an abstract of which is as follows:

Chemical Analysis:	Per Cent
Carbon.....	0.45 to 0.55
Manganese.....	0.60 to 0.80
Phosphorous.....	Not over 0.05
Sulphur.....	Not over 0.05
Silicon.....	Not over 0.40
Chromium.....	Not less than 0.80
Nickel.....	Not less than 2.75

Physical Qualities	Not Less Than
Elastic limit, pounds per square inch.....	60,000
Ultimate tensile strength, pounds per square inch.....	100,000
Elongation in 2 in., per cent.....	12
Reduction of area, per cent.....	17
Minimum Brinell hardness.....	200
Metal thickness of treads, inches.....	1 1/2
Metal thickness of throatways, inches.....	1 1/2
Metal thickness of base at outer edge, inches.....	1 1/2
Metal thickness of base at web, inches.....	2

Committee Chairmen, Way and Structures Division



1. S. C. Baker 2. W. R. Dunham, Jr.
3. H. H. George 4. C. H. Clark
5. H. E. Bachman

6. A. T. Spencer 7. E. M. T. Ryder
8. C. F. Gallor 9. W. W. Wysor
10. A. E. Harvey

The committee understands that chrome nickel test pieces, including some of the earlier installations, noted below as having failed, were manufactured with a chromium percentage of 0.50 and a nickel percentage of 1.25, but dynamic and endurance tests have indicated that the higher chromium and nickel, as noted above, makes the steel more resistant to shock.

Information secured as the result of a questionnaire is somewhat conflicting. The committee has arranged to have five special trackwork manufacturers make up as requested a number of pieces of manganese steel and of chrome nickel steel for welding tests. It has also arranged to have these welding tests made by experienced welders on five electric railway properties.

The committee believes that the possibilities from the use of alloy steels other than manganese in special trackwork are such that the question should receive further consideration than it has been able to give. It therefore recommends (1) That observations should be continued on installations of chrome nickel steel in special trackwork; (2) that the experiments suggested be carried to a conclusion.

The report was signed by R. B. Fehr, F. G. Hibbard, E. F. Kenney, P. A. Kerwin, B. P. Lagaré, R. H. Noderer, O. C. Reyfuss, F. B. Walker and A. T. Spencer, chairman.

Tongue Switch and Hard Center Plates

COMPLETE detail drawings are submitted for a "100-ft." solid manganese switch, showing the general plan, the plan of heel, sections at heel and pin-holding device. Full-size iron

models of the switch tongue heel were made to aid in studying its practical action.

The type of heel and heel-fastening device is novel in several particulars, but is believed to be thoroughly sound and to present several marked advantages. The heel or pin is of the tadpole type of 9½-in. diameter and is carried down to a bed on the base of the 7-in. casting. This provides a vertical wall of large dimensions which resists any forward motion of the tongue under trailing traffic. The distributed wear on this wall will be very slight, even if the holding device is not kept in operative condition, so that the joint between heel of tongue and casting should not increase materially during the life of the switch.

The supporting area under the heel is as large as in any previous design and is located with special effectiveness, as the extreme rear portion has a bearing directly at its edge, as the recess under the casting back of the pin makes it possible to grind the bed true at this point.

The fastening device holds down and back as well. It consists of a lever held in place by a bolt which is readily accessible. The lever makes contact with the heel on an inside diaphragm at the center of revolution, thus providing rolling motion instead of frictional wear. The diaphragm also stiffens up the floor of the heel. Drawings of this switch

were published in *ELECTRIC RAILWAY JOURNAL*, Sept. 24.

In the study of hard center plates the committee decided not to take up the question of methods of fastening the plates down to the castings, but to consider the surface areas required to take care of tread widths, proper supporting pressures, etc.; also to consider the possibility of selecting a limited number of sizes, each size to serve between given limits of frog angles; also to consider plate thickness, depth of groove taper of inclines, etc. The committee has agreed on the limits, dimensions, etc., referred to above and they are shown on a drawing submitted.

The committee recommends:

1. Approval of tongue switch design as "recommended design."
2. Continuance of subject with instructions to prepare designs for run other than 100 ft.
3. Approval of center plate dimensions as "recommended design."
4. Discontinuance of subject.

The report was signed by C. Alden*, J. U. Bragg, E. B. Entwistle, R. B. Fisher*, H. F. Heyl, William Hulbert, M. M. Johnston, D. R. Payne, G. A. Peabody*, E. P. Roundey, W. W. Wysor* and E. M. T. Ryder, chairman.

Track Ballast and Drainage

AT THE beginning of its study was the opinion of the committee that previous reports could be reviewed and brought up to date. It was found, however, that all phases of the subject under consideration were covered and that standard practice with reference to ballast, rail, etc., had been changed on a number of properties.

*With reservations.

was decided, therefore, that the only way to get data on present-day practice was to send out a questionnaire. The answers indicate not only a very wide range of practice, but also a wide difference of opinion as to what the individual or standard construction would be. This was naturally to be expected and is due, in a large measure, to local conditions. It shows clearly at any specifications or recommended designs which might be adopted should be very broad in their scope, so as to permit of wide latitude in the selection of a suitable design, materials and methods.

The committee recommended that the subject be reassigned to the ensuing committee with instructions to continue the study.

The report was signed by E. J. Archambault, Louis T. Botto, A. C. Cuddy, C. L. Hawkins, J. H. Haylow and S. Clay Baker, chairman.

Light Section Rail

IN ITS investigation of the desirability of adopting a standard light rail the committee secured statistics of the production of 7-in. grooved girder rails by the two American producers. These figures are given in an accompanying table.

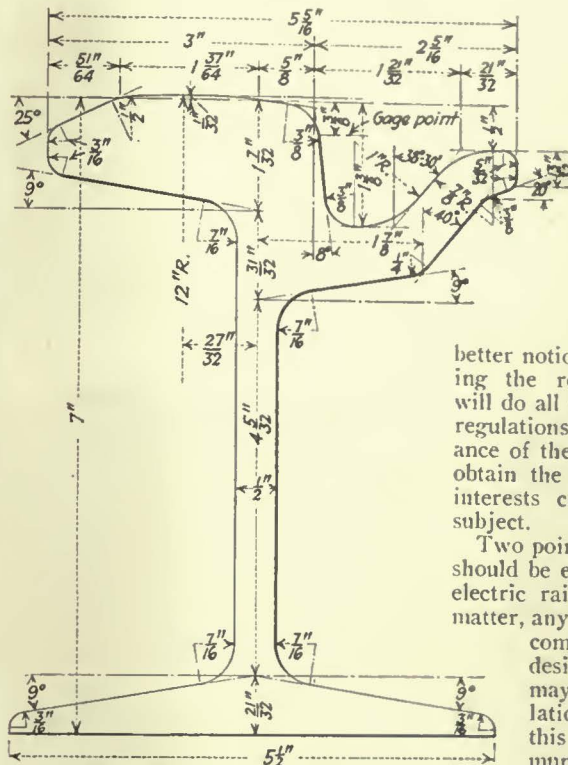
The present standard rail has been available since 1913. While it has secured extensive use, constituting 76.24 per cent of Bethlehem's production and 0.04 per cent of Lorain's, the produc-

PRODUCTION OF GROOVED GIRDER RAILS

Weight per Yard	Bethlehem*		Lorain	
	Section No.	Production Percentage	Section No.	Production Percentage
9.....	412	.....	89-439	0.01
0.....	.....	.....	90-392	.....
0.....	243A	.....	90-471	.....
3.....	.....	.....	93-419	1.58
5.....	.....	.....	95-376	.....
5.....	.....	.....	95-479	.....
6.....	.....	.....	96-357	0.01
6.....	.....	.....	97-420	0.64
7.....	402	.....	97-424	6.42
7.....	.....	.....	97-527	2.08
1.....	.....	.....	101-486	.....
3.....	287	.....	103-426	.....
3.....	287A	12.07	103-478	11.16
5.....	295	0.47	105-481	1.18
5.....	405	.....	105-484	0.93
4.....	.....	.....	114-393	1.14
4.....	.....	.....	115-462	.....
5.....	.....	.....	115-508	0.51
6.....	292	5.09	116-434	6.50
6.....	.....	.....	116-494	2.26
0.....	.....	.....	120-442	.....
2.....	407	.....	122-467	0.10
A.E.R.A. standard	407A	76.24	122-491	50.04
A.E.R.A. standard	404	6.13	128-456	15.44
		100.00		100.00

* Rolled in period 1922 to 1926 inclusive.

tion of other sections is evidence of an insistent demand for a lighter section. Examination of the statistics show that the section known as Bethlehem 287A or Lorain 103-478 has been most largely used. This section has the rounded head similar to the present standard. The tram portion which receives the vehicular traffic is thinner and narrower. This is in line with the change in vehicular traffic. The base is also thinner and narrower. These differ-



Proposed design for 7-in., 103-lb. girder rail

ences reduce the weight to 103 lb. per yard.

Adoption of this section as an association standard would tend to eliminate the other light sections and to secure the advantages of simplified production in this field. The committee concludes that it is necessary and advisable to adopt a 7-in. grooved girder rail lighter than the present standard and that the section known as Bethlehem 287A and Lorain 103-478 is most suitable for that purpose.

The report was signed by B. R. Brown, H. M. Flanders, C. G. Keen, E. B. Entwistle, vice-chairman; C. A. Alden, chairman.

Motor Bus Garage Design

IN CONSIDERING this subject the committee made a study of tentative regulations for the construction and operation of bus garages already prepared by a special committee of the N.F.P.A. A conference was also held with the National Fire Protection Association committee on motor bus garages and hazards and members of our committee were supplied with a copy of a tentative draft of regulations prepared by that committee. All our committee members considered these too stringent or requiring clarification, and many of the changes suggested in the memorandum prepared by our committee were received by the N.F.P.A. committee and incorporated in the third draft submitted to the convention in Chicago.

Substantial agreement has been secured on many features of the regulations. However, notable exceptions are to be found in sections governing areas, wall openings, heating, and ventilating,

more particularly the latter. A natural draft system under the regulations is a practical impossibility. Many of the objectionable features are discussed in an article by Mr. George appearing in the June issue of *Bus Transportation*, pages 338-339. Those who have not read this article are urged to do so in order that they may gain a

better notion of the importance of studying the regulations. This committee will do all in its power to obtain proper regulations but the thoughtful assistance of the whole industry is needed to obtain the best possible results for all interests concerned in so important a subject.

Two points relative to the regulations should be emphasized. The first is that electric railway operators, or, for that matter, any owners, are not in any sense compelled to follow them when designing garages. An owner may choose to follow the regulations when adopted, and in this event will receive a minimum insurance cost, or he may design as conditions warrant, transgressing stipulations in the regulations, thus incurring for

himself an increased premium cost comparable to the extent to which he does not follow the regulations. There are times in design when it is both proper and economical to take a penalty rather than carry out specific provisions in the regulations. The second point to be emphasized is that state and municipal ordinances, where such are in effect, naturally take precedence over these regulations. It is suggested that, since these are obligatory, they be checked to make certain that they are not being violated.

Outside doors should be of such a type that they will be reliable and will operate conveniently. The width of door will depend upon whether one or two or more vehicles are to be accommodated. A practical width is one providing at least 2 ft. of clearance on each side of the vehicle. This committee recommends an opening of not less than 16 ft. for one bus and 24 ft. for two buses. Where sliding type doors are used there should be ample leeway for clearance.

The height of doors for single-deck buses should be at least 11 ft. and for double-deck buses should be at least 14 ft. The former height does not permit tower trucks to enter. It is desirable to make the height sufficient to care for any vehicle that might be brought into the building for repairs and for that reason the question of whether the door should be such as to permit a tower truck entrance should be given consideration.

The best types of doors are those embodying these features: quick, easy and economical operation, clear openings (i.e., occupying, when open, the minimum of useful space), convenience and safety, automatic opening and closing.

A mechanical operating device, such as a push button regulating the opening and closing of doors electrically, gives the greatest satisfaction and the best results. Such a control makes possible the stopping of the door at any point in its travel. A push button control which must be held in during the time the door is opening or closing gives the greatest measure of safety. The control should be conveniently located, preferably inside under an operator's care and charge. The control should automatically stop the opening or closing if the door meets an obstruction in its travel.

Where all wood doors, of sliding, swing or accordion type are used one of the leaves should not exceed 6 ft. in width. This may be increased to 10 ft. if substantial steel framing is used.

All metal doors are more expensive and require more substantial supports than do other types. They are also more difficult to repair when damaged. Such doors, however, when properly installed, give better satisfaction and results because they stay in shape.

The committee believes that, generally, best results are obtained by using some form of horizontal sliding door with suitable guide rigging at the top and supported and operated on adequate wheels and track at the floor. The floor guide should be slightly rounded and above the floor rather than a groove. The wheels should be flanged to operate over the guide.

The committee included a drawing of a bus washing machine used in Edinburgh, Scotland. It also presented plans of two garage layouts. One was of 20,000 sq. ft. for 56 buses, the other was of the Frankford bus garage of the Philadelphia Rapid Transit Company with ultimate capacity for 214 buses.

The washing machine can be used for all vehicles from a small two-seater car to a 52-seater double-deck omnibus. It covers approximately 495 sq. ft. of floor space. The extreme outside length is 29 ft. and the width between inside of island curbs is 7 ft. 9 in. These islands serve as the foundation for the frame of the machine. Rounded at the ends they contain a trough, 18 in. wide by 6 in. deep, which extends the whole length of each island.

The two center pipes on each side, are movable and, being coupled together, are actuated by lever handles. This arrangement permits of the lowering and raising of the spray of water as required.

The number of men required to operate the machine is three, one at either side to manipulate the spray handles, and the third at the front end to wash the bonnet and front part of the body. The time occupied in washing a bus is four minutes, as compared with twenty minutes under the old method, and the quantity of water used per bus has been reduced from 150 gal. to 100 gal. each. The water pressure is approximately 100 lb. per square inch. [Further particulars of this machine will be published in a later issue of this paper.—Ed.]

Pressure systems are, in part, or wholly, more or less widely used. Such systems are not altogether suitable for

body washing. They do a very good job on the washing of parts under the bus body, trucks, etc., but frequently damage the body paint.

Some companies are experimenting with substances producing a dry wash applied in solution form much as a polish, but the committee does not yet have authentic data to show the results obtained.

The report was signed by A. J. Blackburn, G. H. Haldeman, A. Hughes, Jr., L. F. Parlette, W. W. Wise, and J. R. McKay, chairman.

Effect of Rubber-Tired Vehicles on Pavement

QUESTIONNAIRES were sent to representative member companies throughout the country and replies received from practically all, containing a variety of opinions, all of which, however, tended along the same general line and to the conclusions which were finally arrived at by the committee.

In reply to the question as to whether there was an increase in the number of failures of street pavement within the railroad areas which are attributable to the increased use of heavy rubber-tired vehicles, a number of member companies reported there had been no noticeable increase. The majority, however, reported there was an increase in the number of paving failures due to this cause, in some cases to the wearing surface, but in general the failures could be traced directly to the fact that the paving foundation was too light for the heavy vehicular traffic of the present day. It appears that there is no increased wear to the paving surface on account of the use of rubber-tired vehicles carrying ordinary loads.

Inquiry as to the types of pavement now used brought a variety of answers showing the tendency in heavy traffic areas to continue the use of granite block and brick paving, wearing surfaces which are the least affected by the increased wheel loads. Concrete paving is coming into more general use, as it provides a smooth riding surface and has the advantage of combining the wearing surface and base into one solid slab. Asphalt paving is being used by a number of street railways and is giving satisfactory service. Creosoted wood block paving has shown the greatest relative wear under heavy vehicular traffic loads and many companies have discontinued its use.

In general there is a decided tendency to adhere to the usual wearing surfaces, with the exception of creosoted block, and to increase the depth or strengthen the paving foundation, in some cases by introducing reinforcing in the slab, as all companies have conceded the fact that the life of the pavement depends largely on the foundation.

Regarding the cross-sectional contour of the top surface of paving in track area, it was formerly the practice in many cities to crown the pavement between the rails and in the case of T-rail track to lay the paving on the gage side

to meet the underside of the head of the rail. The majority of the companies have found that the best results may be obtained by laying the paving in a plane surface, level with the tops of the rails, thereby eliminating the impact from heavy wheel loads, which is injurious to the pavement and track structure, especially at street intersections.

The use of rubber tires has introduced a hazard in operation over asphalt pavements, on account of skidding, which did not exist with the use of steel tires, and this feature is receiving consideration in some localities, with a tendency to use surfaces which have a better holding effect upon the tires.

The conclusions of the committee are that damage is being done to track pavement due to the use of rubber-tired vehicles which permit excessive concentrated loads and further that such vehicles generally travel at high rate of speed, with abrupt acceleration and stops, all of which has a detrimental effect on the pavement.

The committee recommends that in cities where paving failures occur in the track area a request be made to the proper city or state authorities to check up on the loading of trucks, buses and other vehicles above the maximum weight permissible for various types of trucks, etc.

The report was signed by N. R. Alexander, C. W. Burke, W. G. Matthews, W. L. Wilson and A. E. Harvey, chairman.

Track Construction

In Co-operation with A.S.M.I.

DURING the year 1923 specifications for street railway track construction prepared jointly by a committee of the American Electric Railway Engineering Association and a committee of the American Society for Municipal Improvements was approved by the A.E.R.E.A. and published in the Manual as a "Recommended Specification." These specifications were adopted by the A.S.M.I. by letter ballot in 1924. During the year 1925, however, certain drastic changes in these specifications were recommended by certain members of the committee on street railway pavements and track construction of the A.S.M.I. and these changes were embodied in a report submitted by these members to the convention of the A.S.M.I. in October, 1925. A representative of the A.E.R.E.A. appeared at this convention and requested that the suggested modifications be given further consideration and if alterations were found advisable such changes should be passed on by a joint committee of the A.S.M.I. and A.E.R.E.A. before submission to A.S.M.I. for approval. This suggestion was adopted and the matter was referred to a new committee.

Since the reference of the matter to the new A.S.M.I. committee various suggestions were made by the members of the A.E.R.E.A. committee and it was clearly shown that the proposed changes were not warranted. The A.S.M.I. com-

tee, after careful consideration, did not deem it wise to recommend any changes in the present specifications. It was thought that it would be well to allow these specifications to stand for a few years or until a real need for their revision is shown. In the meantime this committee will consider carefully all matters pertaining to tracks submitted to it. If complaints should be made by members of the A.S.M.I. that certain details of track construction work are not satisfactory the committee, working in conjunction with the committee of the A.E.R.E.A., will furnish the complainant information as to the locality where similar types of construction are in successful use, and with this information complainants can determine for themselves the reason for the troubles. If, for any reason, the committee is unable to give locations where the type of construction under criticism is in successful use, modifications of the specifications might prove advisable. The report of the A.S.M.I. committee was adopted. Apparently there will be no attempt made this year to change the specifications for street railway pavements and track construction by the A.S.M.I. The A.E.R.E.A. committee recommends that the subject be assigned to an ensuing committee with instructions to co-operate with the A.S.M.I. in matters pertaining to specifications for street railway pavements and track construction.

The report was signed by W. R. Dunham, Jr., Howard H. George, E. M. T. Wyder, W. W. Wysor and C. L. Hawkins, chairman.

Rail Corrugation

DURING the current year the committee has continued its accumulation of data from test sections of track. The co-operating companies are so widely distributed geographically that the track sections now under observation permit the accumulation of data over a wide range of climatic, construction and operating conditions. The data accumulated so far have not been analyzed and digested in detail, as it is desired to secure data covering a longer time before attempting a detail study. Last autumn at the Barcelona meeting of the International Association of Tramways, Urban and Interurban Railways and Public Autobus Transportation a sub-committee of the international committee on standardization of rails and track equipment presented a valuable and rather extensive report on the subject of rail corrugation, or as they call it in continental Europe, "undulatory wear of rails." There appears to be a rather general agreement between the tentative findings of the foreign committee and those of your committee.

From the mitigation standpoint the foreign committee seems to be centering its attack on the problem of improving rail quality. It believes that corrugation is caused by frictional wear and periodic impact blows, and there-

fore to resist corrugation the rail should be capable of resisting both frictional wear and crushing. These requirements call for a rail metal which has a high elastic limit in order to withstand impact blows without permanent deformation and a high work of rupture in order to withstand the tearing off of particles, or abrasion. The work of rupture is measured by the area under the stress-strain diagrams obtained in a tensile strength test:

In making physical tests on test specimens cut from corrugated and non-corrugated rails the foreign committee found that for each specimen of corrugated rail the work of rupture was relatively low and for the non-corrugated rails relatively high. The idea of work of rupture as an item in the specifications for rail steel seems to be a new and important one from the standpoint of mitigating corrugation.

Foreign test data, analyses of data collected by this committee on its inspection trip in 1925, results of studies of hardness of rail surface, physical characteristics of corrugations and vibration of track and equipment are presented in a series of appendices.

As a result of its study of the various data and information presented with this report the committee makes the following tentative suggestions relative to corrugation mitigation:

1. Increase the contact area between the wheel and the rail. This will reduce the localized stresses which produce cold working and abrasion.

(a) Select wheel and rail contours such as will give maximum area of contact.

(b) Tilt the rails so that the heads are inclined inward slightly.

(c) Use wider wheel treads and larger diameter wheels.

2. Minimize car nosing.

(a) Keeping a proper relation between wheel and track gages.

(b) The use of properly shaped wheel and rail contours.

(c) The use of longer wheel bases.

(d) Keeping the "play" out of bearings.

(e) The use of longer cars or cars with a greater distance between truck centers.

3. Minimize vibration and impact loads.

(a) Better track and rolling stock maintenance.

(b) Minimizing the unsprung weight.

(c) Minimizing wheel vibration.

4. Minimize wheel slippage.

(a) Maintain equal diameters of wheels rigidly fastened to the same axle.

(b) Use independently coupled wheels and in case of trailers, loose wheels.

(c) Minimize car nosing.

(d) Use wheels with properly shaped contours.

(e) Avoid extra tight or extra loose track gage.

5. Improve the surface of the rail head.

(a) Accepting only straight rails from the mills.

(b) Keeping the tracks free from sand, gravel and other street debris.

(c) Grind the rolling surface smooth before putting the track into operation.

(d) So constructing the track that the rail heads will be slightly above the paving level.

The committee realized that many of these suggestions are impractical in specific cases. The apparent and immediate causes of corrugation as far as they may be determined by the data now in hand are the cold working and abrasion of the rail head surface caused by the irregularity of the rolling of the wheels and by the vibration of the rails and rolling stock, imposing excessive loads on small areas of the rail surface.

As to the removal of corrugation, the best information in the possession of the committee seems to be that the corrugations should be ground out as soon as they appear and that the grinding should be so done as to maintain a maximum area of continuous wheel-rail contact and to maintain this area centered within the "middle third" of the rail head.

The committee believes that the collection of data from the test sections of track now under observation should be continued and that some experimental sections of track should be installed with the end in view of determining a type of track construction which will better resist corrugation than do existing types. It also believes that the vibration studies should be continued and that certain physical laboratory tests should be made on specimens from corrugated and non-corrugated used rails.

The report was signed by C. H. Clark, E. B. Entwisle, D. D. Ewing, secretary, R. B. Fehr, H. Fort Flowers, C. R. Kinneer, T. J. Lavan, E. L. Lockman, A. M. Nardini, J. Ormondroyd, H. Jackson Tippet, Claude L. Van Aucken, H. S. Williams, vice-chairman, and W. W. Wysor, chairman.

Rails

RELATIVE advantages of 7-in. rail and 9-in. rail are outlined in the report of the committee, but no attempt has been made to prescribe the use of either type. After considering the varied conditions under which 7-in. rails have been selected, the committee finds them to have the following advantages:

1. This rail, on account of its lesser depth, requires less excavating and in most instances requires less material to be installed in the way of foundation and structure.

2. For a specified weight per yard a 7-in. rail with a proper distribution of metal would afford considerably greater lateral stiffness on account of the base and head being heavier. Similarly, the 7-in. association standard rail compared with the heavier 9-in. association standard rail has almost the same moment of inertia about a vertical axis in spite of its lesser weight. Lateral stiffness of a tangent rail in track is very helpful in maintaining pavement, while at the same time, it reduces the need for tie rods. When paved with granite the 7-in. rail requires less reinforcement

from the tie rods than does the 9-in. rail. When asphalt pavement is used, many railway companies are, on account of the concrete going to within 3 in. of the top of the rail, no longer using tie rods.

3. If rails are to be welded in tracks, the cost of the welding in many of the modern methods is cheaper for a 7-in. than for a 9-in. rail. While it might be argued that the weld in the 9-in. rail will give greater strength than the weld in the 7-in. rail, it is nevertheless true that as a general thing the weld on the 7-in. rail has more than sufficient strength for its purpose.

4. When repairs are necessary, a 7-in. rail affords cheaper maintenance, because less paving material must be broken away and later restored. Where there is a concrete base for asphalt pavement, this is a considerable item.

5. Seven-inch rail requires about 10 per cent less tonnage per unit length of track. If the 9-in. rail offered sufficient advantage, this question might be ignored, as the added cost might be justified, but other things being equal this item is considerable.

6. The drilling in the 7-in. rail lies more nearly along the neutral axis than in the 9-in. rail and for that reason weakens the rail less. This may seem of little consequence, but breaks through bolt holes are not unusual.

7. For such companies as have occasion to bend rail, the 7-in. rail affords greater economy on account of greater ease in bending. While the moment of inertia of the section about a vertical axis is not so much greater in a 9-in. rail than in a 7-in. rail, that about the horizontal axis is very much greater in the 9-in. rail, and this would add largely to the cost of rail bending because of the vertical set required in connection with lateral bending. Those who do not bend their own rail would therefore expect to pay more for curved rail if it were 9-in. instead of 7-in.

8. The matter of transporting rails from supply yards to the job would show considerable advantage in favor of the 7-in. rail, as to both cost and convenience of handling on account of the greater ease of loading and handling with the consequent less likelihood of accidents to men.

Advantages of 9-in. rail are:

1. While a 9-in. rail requires a deeper splice bar and more bolts than does a 7-in. rail, it nevertheless provides a stronger joint. This is important in tangent track, but is more so in special trackwork, where a similar advantage is attained when cast-in arms are used. There is no doubt that a 9-in. rail cast-in is firmer and less likely to loosen than would be a 7-in. rail. The internal joints being stronger than with a 7-in. rail, there is a further advantage tending to prevent looseness of arms. This reason has been very largely recognized any many railway companies that are using 7-in. rail for tangent track cling to 9-in. rail for use in special trackwork because of extra strength thus procured.

2. Because of the greater beam strength of the 9-in. rail there is a

better distribution of load over the supporting soil, which permits less deflection and therefore less disruption of foundation. It is not uncommon to find two pieces of track built under practically identical conditions on the same character of soil and with practically the same traffic, where the 9-in. rail stands up firmly for a great deal longer period than does the 7-in. rail. This result is due to the lesser deflection of the 9-in. rail. In the larger cities where there is greater congestion of traffic and where there is also more burrowing into the street, the additional strength of the 9-in. rail is a considerable advantage, not only because it is easier and safer to take care of while construction work is going on underneath such as sewer, conduit, water pipes and gas main work, but because after the work has been finished and restored in such manner as such work is usually restored, the 9-in. rail offers a far better support to the load than does the 7-in. because usually the excavations are not properly back filled and at the point where the excavation has been made there is often no support at all and the rail must serve as a bridge as well as a rail. Therefore when it is found desirable on account of soil, pavement, traffic or

other conditions to use a stronger rail the additional height and weight of the 9-in. rail may be well worth the additional expense.

3. Where certain kinds of pavement are concerned, the 9-in. rail offers better facilities than does the 7-in. If a 5-in. granite block is used with a 1-in. cushion of sand, there would be with a 7-in. rail only 1 in. of concrete over the tie and this 1 in. of concrete is practically useless, as it offers but very little help in bridging the space between ties. A heavy load applied between the ties often forces the concrete through, the 1 in. concrete over the ties shearing off, if it has not already become cracked and loose from shrinkage. If the granite used is of 8-in. type, obviously a 7-in. rail would not offer sufficient space for the installation.

In conclusion it is recommended that this committee be discharged and the subject discontinued for the present and until such time as there shall arise some new reason for giving it further consideration.

The report was signed by J. U. Bragg, G. H. Haldeman, R. M. Hannaford, E. S. Myers, John F. Rodgers, Oscar Williams, and H. F. Merker, chairman.

Rolling Stock Division

FOLLOWING are the subjects referred to special committees. The chairman of each special committee has met with the standing committee on rolling stock so that the reports have the advantage of joint advice and help.

Committee No. 1, Manual Review—The report has been submitted to the standing committee on rolling stock and approved by it by letter ballot and has been referred to the Executive Committee.

Committee No. 2, Motor Coaches—The report has been submitted to the standing committee on rolling stock and approved by it by letter ballot and has been referred to the executive committee.

Committee No. 3, Study of Car Equipment with Reference to Appearance, etc.—This report has been submitted to the standing committee on rolling stock and approved by it by letter ballot, and has been referred to the executive committee, which, with the elimination of the last paragraph approved same and recommended it to be published for distribution in advance and presented on the floor of the convention.

Committee No. 4, Car Lighting—This report has been completed and submitted to the standing committee, which has approved same by letter ballot. It has in turn been submitted to the executive committee, which voted to approve the report for advance publication and for submission to the membership for letter ballot on those parts recommended to be included in the Manual. The report will also be pre-

sented on the floor of the convention. Committee No. 5, Study Results of Roller Bearings for Trucks—Progress report will be presented at the Convention.

Committee No. 6, Lubrication—This report has been submitted to the standing committee on rolling stock and approved by it by letter ballot. It has been submitted to the executive committee for its action.

Committee No. 7, Suction Strainers—This report has been submitted to the standing committee on rolling stock and approved by it by letter ballot. It has been submitted to the executive committee which has approved it and recommended its presentation on the convention floor.

Committee No. 8, Side Wear Carbon Brushes—This report has been submitted to the standing committee and approved by it by letter ballot.

Committee No. 9, Noise Reduction—The report has been submitted to the standing committee and approved by letter ballot.

Committee No. 10, Gears—This report has been completed and submitted to the standing committee on rolling stock which has approved same by letter ballot. It has been submitted to the executive committee which has also approved it and recommended its presentation on the convention floor.

Committee No. 11, Current-Collecting Devices—This report has been completed and submitted to the standing committee on rolling stock, which has approved it by letter ballot. It has also been presented to the executive commit-

Committee Chairmen, Rolling Stock Division

te, which has approved it and recommended its presentation on the convention floor.

Committee No. 12, Journal Boxes—This report has been completed and has been submitted to the standing committee on rolling stock, which has approved it by letter ballot. It has also been submitted to the executive committee for its action.

Committee No. 13, Limits of Wear—The report has been submitted to the standing committee and approved by it by letter ballot.

The report was signed by J. A. Books, W. W. Brown, M. R. Hanna, J. M. Hipple, J. S. McWhirter, A. D. Whorter, T. H. Nicholl, R. B. Syth, W. G. Stuck, H. S. Williams, A. T. Clark, chairman, and R. S. Bull, vice-chairman.

Review of Equipment Section of the Manual

EXISTING standards and specifications referring to equipment, which are included in the 1926 issue of the Manual, were reviewed, and the following revisions and additions recommended:

E 1-26—Design of Brake Shoes, Heads, Keys, and Gages. To provide additional clearance in the flange groove of brake shoes, dimensions of the shoes were changed. To reduce the number of drawings in the Manual, the six standard shoes, together with heads and keys, were presented on three drawings.

E 4-23—Dimensions for Height of Platforms and Bumpers for Interurban Cars. The committee decided that standard height of platforms for interurban cars was not needed, so the paragraph on this subject was withdrawn. Also the paragraph on standard height for bumpers, which previously was specified as 43 in., was changed to read: "The standard height of bumpers for interurban cars measured from the top of the rail to the bottom of the bumper should not exceed 43 in."

E 14-25—Dimensions of A.E.R.E.A. Steel Wheels. To prevent misunderstanding, the following paragraph was added: "The hub diameters given in the tables of steel wheel designs should be looked upon merely as maximum limits to take care of eccentric bores. In the inspection and acceptance of wheels, the specification E 7-21 should govern in all cases, and wheels accepted or rejected on hub-wall thickness within the tolerances given in the specification."

The committee recommended the following addition to the tables in order to provide for bolting on pads to reduce noise in operation: "Four holes should be included in standard wheel designs for electric railway service in order to provide for the bolting on of pads to reduce noise in operation. When specified, these holes should be at least 1 in. in diameter and should be located on a radius approximately 2 in. from the inside diameter of the rim."

E 100-12—Automatic Couplers for Interurban Cars and Radial Draft Rigging. To obtain information regarding



1. F. J. Foote
2. A. T. Clark
3. W. S. Adams
4. Hugh Savage
5. R. W. Cost

6. J. C. McCune
7. W. G. Stuck
8. C. W. Squier
9. V. W. Berry
10. R. A. Hutchins

the number and different types of couplers now in service, a questionnaire was sent to all electric interurban roads. Replies from approximately 125 were received and tabulated. They relate particularly to the location and installation of couplers on cars.

It was recommended that a special committee be appointed to consider this subject and that the present specifications be withdrawn.

E 101-12—Specification for the Location of End Connections on Interurban Cars Used in Car Exchange Service. The drawing showing location of end connections was revised, and a new one submitted with revised dimensions.

E 216-26—Motor Leads. To give more information regarding the recommended practice in insulating connectors of motor leads the following paragraph was added: "They may be insulated by slipping on a piece of rubber hose with ends taped to keep out water, or a method of insulation may be used, as

shown in Fig. 5." A new drawing was submitted and included as Fig. 5.

In reviewing the various standards and specifications now included in the Manual the committee found a large number which have been taken from other associations. Revision of such specifications is very difficult. To lessen the trouble the committee recommended that when it is found desirable to adopt standards, specifications or recommend practices of other associations, committees of the Rolling Stock Division make no attempt to reproduce the full standard, but that some form of reference be used in the Manual calling attention to the specifications, standards or recommended practices, giving a brief summary as to what they include and information as to how copies of the standards may be obtained.

The report was signed by Walter S. Adams, Thomas H. Nicholl, H. S. Williams and Clarence W. Squier, chairman.

Motor Coaches

SUBJECTS assigned to this committee are:

1. Study motor coach design and consider motor coach standardization.
2. Investigate maintenance methods and inspection schedules in motor coach operation.

The study made by the committee discloses action on the part of several organizations, including the Society of Automotive Engineers and also state regulatory bodies, in the matter of adopting standard specifications for motor coaches.

There appears to be a lack of uniformity in prescribed motor coach specifications and regulations by state regulatory authorities, which is attributed to independent thought and action on the part of these bodies. In addition motor coach specifications recognized by organizations representing the industry show a similar lack of uniformity. This points to the necessity of standardization in fundamental and controlling factors, such as over-all length, width, rear and overhang, width of doors, the location of rear-end emergency doors, etc.

While the committee is of the opinion that uniformity in design with reference to certain dimensions is important and if not carried out might seriously hamper interstate operation, the rapid development of the industry makes it appear inadvisable at this time for this committee to recommend definite standards of design and construction. To do so might curb initiative on the part of manufacturers and limit the range of specifications on the part of operators in the procurement of equipment for their needs.

The committee has reviewed the work of last year's committee and indorses the philosophy of inspection on a mileage basis. This enables maintenance to be carried out on a unit basis, results in minimum time consumed for repairs and aims to avoid road difficulties.

The advent of the gas-electric motor coach has brought about the development of an inspection and maintenance schedule applicable for this type which your committee believes will be of general interest. The schedule, which is included in the report as Appendix A, is employed by a large operator of gas-electric motor coaches.

The committee recommends:

1. That the subject of motor coach design and standardization be continued and that the committee continue the work in conjunction with standards committee of the Motor Coach Division of the Society of Automotive Engineers.
2. That the committee also consider the matter of bus design from the standpoint of unit construction and accessibility to wearing parts, which is of vital importance to economical maintenance.
3. That the committee continue the subject of maintenance methods and inspection schedules and consider prescribed standards covering limits of wear of parts as a means of efficient and economical maintenance.

The report was signed by H. L. Derbink, W. H. Downey, H. C. Eddy, F. A. Klock, L. H. Palmer, A. J. Scaife, C. W. Stocks, and V. W. Berry, chairman.

Car Equipment

IN LAST year's report this committee suggested a means of bettering the external appearance of a single-end car. Recently a car has been rebuilt to embody these recommendations. New features are a tapering of the front end to give a pointed appearance and the addition of a visor over the front windows, which not only helps accentuate this but also provides a very practical means of preventing glare in the motorman's eyes.

There is a distinct trend away from the old-style slat-covered floor. In addition to the linoleum, rubber and similar types of floor covering, attention is called to composition floorings which are applied in a plastic state with a trowel. Such a type of flooring lends itself readily to the addition of cove edging, with consequent easier sweeping of corners. Such a floor may be flushed with hose and water without fear of damage to the body or equipment. Stream-line painting is very much in vogue at the present time and it is contended that its application to cars will do much to improve their appearance from an artistic standpoint as well as giving them a modish, up-to-date air. To give cars a long, low, speedy appearance the sides of the car should be broken up into two or more bands, instead of having one solid color.

A second principle which produces a long, low appearance is the avoidance of vertical lines and bands, particularly of a dark color.

A third principle is to create tapered ends, and in the case of a single-ended car to make the front end of the car look as if it were intended to be the front end of something instead of a duplicate of the rear end. While this is largely a function of the design of the car, yet this principle is bound up inextricably with the theory of stream-line painting. There is one line on the front end of a car to which little attention has been paid from the artistic viewpoint, yet its importance should be stressed. This line is the gutter over the front door. If this slopes downward toward the front, a pointed, pleasing front results, while if it slopes downward toward the rear, a much less favorable impression is produced.

The adoption of a strictly high-grade seat is recommended for both city and interurban service. The meaning of the term "high-grade seat" is intended to include a seat of the deep upholstered type with a spring or yielding back. It is recommended that the maximum height of the cushion be 17½ in. above the floor.

There is a marked trend toward individuality in seat design—that is, to make double seats resemble two seats. An example of this is the bucket type seat. Modifications of this appear in

the usual type of seat back, but with two convex curves to give the appearance of separate backs and a division of some sort between the two halves of the cushion.

Due to the difficulty in adapting the higher grade seats to double end operation and the consequent necessity for a reversible type, attention is called to a swivel operation. This allows the seat to be rotated and accomplishes the same result as the reversible seat.

It is recommended that in the selection of seat covering attention be given to the adoption of material that in texture and color will convey the impression to the public of being up to date. A black leather or imitation leather is therefore less desirable than the newer shades which are not so somber and which will not show dust as much. In the textile coverings, colors should be modern and of the neutral tints which convey a restful feeling to the passenger.

In last year's report mention was made of linen slip covers for seats as a means of creating the impression of cleanliness and modern appearance. It is also a practice that may be used to cover worn upholstery and make the sets look like new. Figures are now available to show what costs may be expected with their use. The covers on one property cost less than \$1 each and can be laundered for a cost varying from 2½ to 4 cents each. Their estimated life is approximately one year and it is stated that they may be used either side out.

It is almost universal practice in electric car construction to place the seats on the same centers as the car posts, so as to provide one entire window to each seat. In bus body construction this rule is not rigidly adhered to and the seats are spaced as desired irrespective of the distance between posts. This has been accomplished without serious adverse criticism and so establishes a precedent that may be followed in car construction where it is desired to use thicker seat backs with spring upholstery, or backs with greater pitch to increase their comfort. It also offers a suggestion for bettering the appearance of cars by the use of wider windows than those used at present. Wider windows have heretofore been discouraged on the basis that if a seat be provided for each window it would reduce the seating capacity materially, but this practice would allow almost any spacing of the posts.

During the past two years many experiments have been tried in the equipment of cars, both city and interurban, with better quality seats. The results of these tests are now becoming available and the consensus of opinion is that the provision of better seats is an entirely justifiable expenditure and attracts added patronage of sufficient volume to make it a paying venture. Attention is called to the need of the development of a type of seat that will provide the desired element of luxurious comfort and yet may be produced at a moderate price. A standardization of

at type is desirable and might help in this condition, although this is thought to be impossible of accomplishment during the present stage of development, at least it cannot be attempted until the eas of what is required become better crystallized than they are at present. It is to be noted in connection with the use of so-called de luxe cars, or cars fitted up with high-grade seats, modern floors and the many other refinements that go to make up a high-class car, that this entails greater care in cleaning than was the case in the older and less luxurious types of car. The presence of dirt in the fine car is much more noticeable and its presence is intolerable, whereas with the poorer type of car, dirt is not of as great moment, though of course always objectionable.

Next in importance to seats in the furnishing of a comfortable ride is the firmness of springs and the attendant mounting details which cause the car body to ride well or poorly. There is need for study and research to improve riding qualities. Verdict on this quality should be based not upon personal opinion but upon scientific study with the assistance of a recording seismograph.

Car riders must be given a comfortable ride, so it is of prime importance that in the handling of the cars, smooth starting and stopping be practiced. There is probably nothing more aggravating to the passenger than a jerky stop. To the end that the best may be utilized from the equipment, it is recommended that well-equipped instruction schools with competent instructors be provided to give embryo motor men the best possible training. It is also recommended that traveling checkmen be employed to see that the instruction is being put to the best use. Likewise it is recommended that a traveling mechanical inspector ride every car once a month to report on its operating condition.

The subject of car convenience, comfort and appearance is one of the most important questions before the equipment men today, as it embodies all of the essentials which go to make successful operation of a property as far as cars are concerned. Unless these features are given their proper consideration, the ride is not a salable commodity and the passenger will not give the patronage if there is any other form of transportation available. The need, therefore, is to furnish a vehicle with the air of luxury about it, which will create a desire in the public to ride in preference to the private auto.

One of the great needs of the industry is to sell its wares first to its own employees, and this means giving them proper tools with which to carry out their work and equipment to which they may point with pride. This is the basis of successful merchandising of the car ride.

The report was signed by O. H. Basquin, James A. Brooks, John A. Dewhurst, E. J. Jonas, G. L. Kippenberger, C. R. McMahon, W. R. McRae, H. S. Williams, chairman.

Car Lighting

RECOMMENDED practice in car lighting was presented by the committee, as follows:

1. The position of the normal reading plane shall be a 45 deg. plane at a height of 33 in. above the car floor at the seats. Attention is called to the fact that in measuring intensities sufficient readings should be taken to insure a fair average of the illumination throughout the car.

2. For adequate and comfortable illumination in street railway cars, an average minimum intensity of 6 foot-candles, measured on the normal reading plane, should be provided. This value of intensity may be obtained by employing the standard Mazda lamp for electric railway service with an efficient diffusing or reflecting accessory and an expenditure of 2 to 4 watts per square foot, measured between bulkheads of the car.

3. In city and suburban cars where standing passengers may cast objectionable shadows on the reading matter of those seated, it is recommended that the lighting units be mounted directly above the seats on the sides or in combination with outlets on the longitudinal center line above the aisle.

4. For interurban cars which usually carry only a seated load, it is recommended that a single row of lighting units, consisting of inclosing domes or open-type reflectors be mounted on the center line above the aisle. In a chair car where seats are arranged with backs to the windows, the above system should be augmented by side lighting, consisting of small open type or inclosing bowl units.

5. It is recommended that provisions be made for the proper illumination of entrance and exit steps. Usually one lamp, equipped ordinarily with an efficient durable metal reflector mounted above each door, will provide for safety and minimum delay.

6. To prevent reflected glare on the motorman's window at night from interior lighting units, it is recommended that a blind or an inclosing screen be placed back of the operator. A sloping glass window will also afford relief from such glare and will enhance vision.

7. It is recommended that the head lining of a car be finished in a light color to secure the greatest possible efficiency in the utilization of natural and artificial light.

A miscellaneous method and practice on car lighting was also presented which included a number of typical arrangements. The selection of a lighting fixture, exclusive of the light source, was considered largely one of individual taste. There is no reason why any efficient lighting unit cannot be clothed with a fixture giving pleasing lines and artistic proportions without seriously affecting its illuminating efficiency.

The modern open-type fixture is equipped with a holder which grips the reflector fitter evenly and firmly to minimize breakage under conditions of car vibration. The "angle of shading" of

a light source by means of an open-type reflector depends chiefly on the location of the lamp filament with respect to the lower edge of the reflector. From general observations many of the reflectors now used in such installations are of inadequate length properly to shield the light sources from the eye of passengers, or are held in fitters with improper lamp positions. It was recommended that open-type reflectors be selected with sufficient length to provide at least 20 deg. "angle of shading" when the light sources are located 7 ft. or less above the floor.

The bowl for dome fixtures employed for center mounting is usually 12 in. in diameter and is ordinarily used with a lamp or lamps not exceeding 150 watts. A greater value of wattage in this size bowl would result in a unit having excessive brightness. With the relatively low mounting height available in the electric railway car, the use of a shallow bowl will usually improve the general appearance and proportion of the installation.

Five typical car plans were presented to illustrate different lighting designs to obtain an illumination intensity of 6 foot-candles on the 45-deg. reading plane in each installation.

The requirements of intensity and distribution in lighting the seating compartments of cars can be met by employing any one of the following systems:

System No. 1. Center lighting with two 56-watt Mazda lamps or a 100-watt, 32-volt lamp, equipped with a shallow reflector recessed in the ceiling and covered by an inclosing bowl of medium or light density white glass.

System No. 2. Center lighting with a 56-watt Mazda lamp or a 50-watt, 32-volt lamp, in a medium density diffusing glass reflector of the open type.

System No. 3. Side lighting with a 36-watt Mazda lamp in a medium density diffusing glass reflector of the open type.

System No. 4. Side lighting with bare 36-watt Mazda lamps.

The report was signed by A. L. Broe, W. W. Brown, H. F. Deninger, J. P. Staples, H. A. Otis, and R. W. Cost, chairman.

Roller Journal Bearings

THROUGH a questionnaire the committee attempted to secure information setting forth results of test applications of roller bearings to car journals. The data submitted showed wide variation of results and in many cases information submitted was very meager. Quite a few experimental installations have been made in recent months and a large number of railway companies are now conducting extensive tests, the results of which are not available at this time. All electric railways now operating cars equipped with roller bearing journals are urged to keep careful record of performance, tests, etc., for the information of the committee. It was not thought advisable to present a summary of data now available, as this

might lead to premature and incorrect conclusions. It is hoped that next year the committee may be in a position to present a complete report, together with some constructive recommendations.

The report was signed by H. A. Allen, V. N. DeLamater, E. M. Lunda, K. W. McPherson, J. S. McWhirter, O. F. Packer, W. C. Sanders, W. C. Wheeler and W. C. Bolt, chairman.

Lubrication

FIFTEEN electric railway companies, three manufacturers of truck and motor equipment and two oil companies active in the lubrication of electric railway equipment were sent a questionnaire on the subject of lubrication.

Answers were received from thirteen electric railway companies, two manufacturers of truck and motor equipment and two oil companies. A summary of these replies was prepared as Appendix C of the report. It indicates general satisfaction with the present method of gear lubrication and shows that no specific standard has been adopted. Local conditions, size of the motors used and the kind of service appear to be the factors deciding the particular method used. The committee is of the opinion that this subject is one which requires constant discussion and the spread of propaganda to develop a greater interest in one of the most vital necessities in the care and maintenance of electric railway equipment.

It recommends that the following paragraph be added between the second and third paragraphs of the fourth article headed "Interurban or High Speed Service" on page 2 of Manual Section E208-26:

"It is recommended that lubricant be applied with the gears moving."

The report was signed by L. W. Jacques, Joseph F. Lamb, J. H. Lucas, A. A. Green, W. G. Stuck, chairman.

Noise Reduction

WORK of the committee for the current year started with the re-vamping of its noise-measuring apparatus, making it more rugged and at the same time adaptable to graphic recording. The second phase of the work consisted of completing the testing of railway gears for sound value, establishing the fact that the most quiet gear is the helical type with the long and short addendum spur, that the standard spur gear follows closely, and that the so-called wisdom tooth pinion produces the most noise. The third concerns the increase of noise due to spread gear centers. Upon the basis of the committee's tests it is recommended that $\frac{1}{8}$ in. be the maximum allowable spread of gear centers.

Another part of the report deals with the economic value of noise reduction, showing the results in life obtained from various amounts of wear of axle bearings and demonstrating the benefit to be obtained from closed original fits and the fallacy of allowing bearings to run almost to the point of destruction.

Tests made at Springfield, Mass., on newly developed car bodies and trucks to establish their noise-reducing value are discussed in the report. The trucks tested are of the automotive type. The tests prove that noise may be much reduced if sufficient precaution is taken.

In another part of the report appears a discussion of the noise of air compressors and mechanically operated doors. Tests show the possibility of the reduction of air compressor noise by about 76 per cent and calls attention to the need of improvement in mechanism and the maintenance of door equipment.

Resilient wheel development is also discussed. Following this is the recommendation that muffling pads be bolted to wheels and gears to help reduce the high-pitched tones emanating from them.

Two appendices of this report describe the noise-measuring device and give a bibliography of the study of noise.

The report was signed by C. Bethel, N. R. Brownier, C. A. Burleson, L. J. Davies, C. J. Ellis, F. L. Hinman, T. H. Minary, Robert M. O'Brien, H. L. Rogers and H. S. Williams, chairman.

Journal Boxes

INVESTIGATIONS indicated that it is difficult to keep the present journal thrust plates in their proper location due to the tendency of the revolving journal to raise one end of the plate. In addition the retainers for the plates in the journal boxes interfere with the proper packing of waste at the sides of the journal.

As there is no certainty that the thrust plates will remain in position and function as originally intended, it will simplify construction to omit them, thereby permitting the elimination of the retainers in the journal box and allowing the waste to be packed properly around the journal.

The committee recommended (1) That the present standards for journal thrust plates shown on pages 466 to 468 inclusive of the 1926 edition of the Engineering Manual (Manual Section E2-26) be withdrawn; (2) that the retainers for the thrust plates now included in the standard designs for journal boxes shown on pages 459 to 463 inclusive of the 1926 edition of the Engineering Manual (Manual Section E2-26) be removed from these designs; (3) that any electric railway desiring to follow steam road practice in regard to journal boxes, contained parts and axles should use the American Railway Association's Standards and Recommended Practices shown in the 1926 A.R.A. Manual, Mechanical Division; (4) that the A.R.A. Standards listed under Recommendation 3 be indexed in the Engineering Manual, giving the sections and pages in the A.R.A. Manual of Standards and Recommended Practices, issue of 1926.

The report was signed by J. D. Barnhart, C. J. Ellis, T. W. Faber, E. P. Locke, Leslie W. Richards, G. A. Tupper, C. H. Turner, H. Savage and W. S. Adams, chairman.

Limits of Wear

LIMITS of wear of the parts affecting gear centers may be divided into two classes.

1. Those parts where clearance is necessary and where wear is unavoidable, such as axle lining fit on the axle and the armature lining fit on the shaft. In these cases more attention to lubrication and closer inspection will result in less wear and the limits can be maintained by comparatively easy repairs.

2. Those parts where clearance is undesirable and wear is avoidable, such as armature bearing housing fit in frame, axle cap fit on frame, axle lining fit in housing, armature bearing fit in housing. Frequent inspection and tightening of bolts will prevent wear at these places.

There seems to have been no universal practice regarding limits of wear affecting gear centers. Some operators, while maintaining very close limits in some parts of their motors, are inclined to disregard entirely other parts of equal or even greater importance. It is thought that by definite recommendations regarding all of these parts attention may be called to the necessity of maintaining limits on all parts affected, resulting in much better operating conditions and longer life of equipment.

The committee reached the following conclusions regarding limits of wear of parts affecting gear centers.

1. Armature bearing housing fit in frame. This is a driving fit as manufactured and no clearance should be allowed in operation.

2. Axle cap fit on frame. This is a driving fit as manufactured and no clearance should be allowed in operation.

3. Axle lining fit in housing. This is a clamping fit as manufactured and no clearance should be allowed in operation.

4. Armature lining fit in housing. This is a press fit as manufactured and no clearance should be allowed in operation.

5. Axle lining fit on axle. New motors are manufactured with a clearance of 0.015 to 0.020 in. between the bore of the lining and the diameter of the axle. The maximum allowable clearance for motors under 50 hp. should be $\frac{1}{16}$ in. in diameter between the axle and the bore of the lining. The maximum allowable clearance on motors over 50 hp. power should be $\frac{1}{8}$ in. in diameter between the axle and the bore of the lining.

6. Armature lining fit on shaft. New motors are manufactured with a clearance of 0.006 to 0.013 in. between the bore of the lining and the diameter of the shaft. The maximum allowable clearance for motors under 50 hp. should be $\frac{1}{16}$ in. in diameter between the shaft and the bore of the linings. Maximum allowable clearance for motors over 50 hp. should be $\frac{1}{8}$ in. in diameter between the shaft and the bore of the lining.

The committee recommends that its conclusions be adopted by the standing committee on rolling stock as recommended practice for operators.

The report was signed by C. Bethel, F. L. Hinman, J. H. Lucas, W. R. McRae, D. F. Smith and J. M. Rosebury, chairman.

T.&T. Committees Present Experiences

Reports on bus operation, traffic and safety and service betterment outline methods followed and results obtained on many properties. Few definite recommendations are made. Bonus and award report presented at joint session with Claims Association

SUGGESTIONS rather than recommendations were the gist of the reports presented this year by committees of the Transportation and Traffic Association. On account of the broad subjects chosen, bus operation, traffic and safety and service betterment, it was thought desirable to refrain from specific recommendations and confine the reports largely to experience statements. Abstracts of these reports are given below.

Bus Operation

EFFORTS of the committee have been devoted almost exclusively to attempt to learn from the industry such lessons as might be helpful or whatever conclusions it has reached developed from the experience of railway companies operating buses. In order to get a comprehensive cross-section of the industry the committee selected 55 of the large bus operations by electric railway companies where buses were operated in conjunction with the railway systems, including not only the larger cities but also smaller systems where they were typical of their localities or states. Fifty-two surveys of bus operations were received. These surveys were further checked against the operating data furnished headquarters by more than one hundred companies, and in some instances were supplemented by the committee's inspections. The committee sought the opinion as well as the experience of the industry and consequently has not attempted a summary of figures but rather a report

1. General economics of bus operation.
2. Types and sizes of equipment.
3. Fares and fare collections.
4. Operating rules.

The fifty-two companies who replied to the questionnaire own 3,084 buses or nearly half the 7,000 buses owned by the electric railway industry and operate 563 bus routes over a route mileage of 6,731 miles divided as follows:

Kind of service	No. of routes	Miles of routes
Urban	332	1,416
Suburban	103	573
Interurban	128	4,742

About 80 per cent of these companies were quite certain their bus operations were justified. This positive answer was given by men who were experienced in the transportation business and were entirely familiar with their local situations, and can probably be accepted without any question, but apparently few, if any of them, had studied the facts sufficiently to definitely place an approximate value on the use of the bus for this service.

It is the conclusion of the committee that electric railway companies have a surprising lack of knowledge of the economics of transportation.

Of the total of 3,084 buses owned by the companies reporting 35.4 per cent were of 29-passenger capacity, 16.6 per cent were 21-passenger, 15.2 per cent were double-deck and the remainder, amounting to 38.8 per cent, were of various capacities, probably mostly 25-passenger. The trend to the use of the larger single-deck vehicle seems to be pronounced throughout the industry. As a general rule no change is made in the size of vehicle operated at different periods of the day, because usually the trouble and cost of making the change would wipe out any economies that might result from the operation of a smaller vehicle during the time of lighter traffic.

One interesting point brought out was the rather low results in passengers per bus mile prevailing on many routes. Under urban operations the maximum number of passengers per bus mile carried was 17.3; the minimum 0.37 and the average for 40 companies operating



J. V. Sullivan

such service, 3.75. On many of the routes showing a low passengers per bus mile a large size vehicle is being used. In several cases with the passengers per bus mile below this average double-deck buses were being operated. Of course there may be conditions that make it desirable or necessary to use a large vehicle for light traffic, but there is an indication from the replies to this question that more study should be given to the subject of the application of the proper size vehicle, and that economies might be realized by using a smaller and therefore cheaper vehicle under some conditions.

Under the suburban operations the maximum number of passengers per bus mile carried was 4.31; the minimum, .040; and the average for 7 companies operating such service was 2.25. Under interurban operations the maximum was 12.0; the minimum, .21; and the average for 11 companies operating such service was .268.

In addition to selecting the proper size of equipment to fit the service to be given it is necessary also to use judgment in determining the type of equipment. For general purposes, buses can be classified in three types.

- (a) Double-deck buses.
- (b) Single-deck pay-enter buses.
- (c) Single-deck de luxe coaches.

The kinds of service for which buses are now being used by transportation companies might be divided into four classes:

1. Supplementary to electric railway operation.



R. N. Graham

of what is being done universally, the trends throughout the country, if there be such, and finally, the composite thought of the industry where averages could be struck.

After completing this survey the subjects presented for particular consideration seemed to divide themselves naturally under four heads as follows:

2. Combination with electric railway service for local and express service.

3. De luxe or special route service.

4. Charter and touring service.

Practically one-half the operating companies canvassed have selected certain types of equipment which they deem of best economy to use and use them generally in their service. After carefully analyzing the figures on operating expenses of sizes and makes of buses submitted by these companies, this committee is of the opinion that experience in bus operation is still too brief for accurate observation as to differentials in cost between them.

Twenty companies of the 52 answering the questionnaire have also furnished to the association a complete record of their revenue and expenses for the year 1926. Seven of these twenty companies, or 35 per cent, had operating revenue sufficient to pay a return on the investment after meeting operating expenses, taxes and depreciation. Five of this group of seven companies were charging higher fares than were charged on associated railway lines. Of the thirteen companies which did not have any income available for a return on the investment, only six were using a higher fare than associated railway lines. Two companies, or one-tenth of this group, have been able to pay some return on the capital invested and keep their bus fares on the same level as railway fares.

Twenty-six of the 52 companies answering the questionnaire have higher fares for bus service than for car service. Fifteen of the remaining 26 which use a similar fare for both charge higher rates for certain bus service. This leaves only eleven of the 52, or about one-fifth, operating bus and rail service at a universal fare.

In contrast to the actual relation of bus and rail fares, forty-five of the fifty-two operators say the bus fares must of necessity be the higher, the opinions ranging from "slightly" to "two and one-half times." Five operators are of the opinion that bus fares and rail fares should be the same. Two were unable to answer. Guided by experience, an overwhelming proportion of the industry believes that bus fares should not be the same as rail fares. Answers to the question regarding the proper method for determining bus fares shows conclusively that the operators believe the service should be self-supporting.

Supplementary service is usually operated under the name of and co-ordinated with street railway service. Street railway fares and interchange of transfers frequently obtain. In any case, the service rendered is comparable with that given by the street railways and the fare is not materially higher.

De luxe city service in some instances parallels railway operations. The equipment used should be more elaborate and a higher rate of fare is charged than in regular service. Intercity service is distinct from the two classes previously described in that the length of route is considerably longer. Fares are usually based on a zone or mileage plan. Char-

tered service may be either of local or interurban city type and the rates are ordinarily based on the length of trip or time consumed rather than on the number of passengers carried.

Extensions to present lines and new routes into unserved territory are now being made very largely by the use of the bus. With this new type of equipment, there is the opportunity of making trial installations of the service with a fare structure entirely divorced from the basic franchise limitations on the general transportation system.

It is evident to the committee that the transportation facilities cannot be increased unless the people served and the municipal authorities can be convinced of the necessity of supplying sufficient revenue to provide a reasonable rate of return on the capital invested. In some cases this should be secured through a higher fare on the extension, adequate to cover the cost of the new undertaking. In other cases the general fare must be sufficient to supply the surplus for the purpose of covering the losses on such extensions.

Rules for the guidance of bus operators are given in an appendix.

The report was signed by J. L. Alexander, H. L. Bollum, C. H. Chapman, C. B. Cooke, Jr., E. D. Dreyfus, D. L. Fennell, S. W. Greenland, M. L. Harry, R. B. Hill, Adrian Hughes, Jr., Daniel S. Mackay, H. G. Monger, Thomas W. Noonan, E. S. Pardoe, D. A. Scanlon, Alexander Shapiro, D. A. Smith, J. L. Smith, A. T. Warner, C. V. Wood, Jr., B. W. Arnold, vice-chairman; R. N. Graham, chairman; A. R. Myers, sponsor, and Paul E. Wilson, sponsor.

Traffic and Safety

RELIEF of street traffic congestion is the subject to which the committee has devoted most attention. The report states that there has been a well-directed tendency during the past few years toward comprehensive street



H. K. Bennett

traffic surveys in a number of cities. The opportunity to reduce operating costs, increase revenue and build a better position in the community should induce railway operators to align themselves with this movement for street

traffic relief. Street railway operators not only can render much assistance in the collection of data on practices which increase congestion, and through study of efficient methods of traffic control can assist in drafting relief measures, but these operators are often best qualified to take charge of this traffic survey. Street railway executives should be known for leadership. This leadership will not be misdirected if applied to investigations to obtain a more equitable and more efficient use of public property.

Signal control and traffic restrictions should be considered together in relief



C. H. Evenson

of traffic congestion. As mechanical signal control can reduce delay by giving the proper time intervals at the intersection, so also can enforced traffic restrictions reduce congestion by opening to use the full street width and taking advantage of this time and space by reducing conflicting movements to a minimum.

Street traffic congestion may be regarded as composed of two factors: First, movement of traffic, and second temporary storage of vehicles on streets. A comprehensive system of traffic regulations must give consideration to these two types of street use.

Too often at intersections an unsuccessful search is made for traffic signal timings to handle the heavy interesting movements, while parking, which reduces by half in many instances the number of moving lanes, is unrestricted. Intersections are throats which limit traffic flow. At intersections of heavy traffic streets, where time must be divided between two or more movements the full width of street should be made available. Parking restrictions near intersections, both in principal business districts and outlying business section should extend at least 100 ft. back from the curb corners. If this distance is shorter, the few vehicles which can accumulate in the extra lanes will not require the full movement to clear the intersection. Thus to obtain the best use of such reservoir capacity at isolated intersections the restricted space should be sufficiently long to accumulate during the "Stop" period a line of vehicles which will require nearly the full movement to clear the intersection.

osely allied to parking restrictions is means of obtaining more effective street use is the desirable restriction of important or necessary movements, particularly at intersections. Movements which must give way to permit faster speed, less conflict, more effective street use and fewer accidents are chiefly left turns at some intersections and "U" turns on congested streets. We shall probably see more restriction of the right turn privilege where heavy pedestrian traffic must be accommodated. Such conflicting movements can well be referred to adjacent or near-by intersections where the conditions will permit the movements without appreciable interference to traffic. This change need not inconvenience the driver whose moment at the busiest intersection is restricted. He can plan his turns accordingly and the time saving and increased freedom of street travel will be very marked.

An effective means of reducing traffic congestion, the committee recommends:

1. A comprehensive traffic survey to gather facts on present street use and recommend methods of using street facilities to their fullest extent.

2. Traffic studies to precede installation of mechanical signal control. These observations and data should determine first the desirability of signal installation and, when signal control is justified, further study to determine the proper timing.

3. That signal-controlled intersections less than 1,000 ft. apart should be operated wherever possible as a system after proper studies are made to determine settings which will give a progressive movement through such intersections.

4. Elimination of parking on busy thoroughfares as one of the most effective means of increasing the usefulness of the streets.

5. Restrictions against left turns at important intersections and prohibition of "J" turns in mid-block, when the delay and accident hazard which results more than offsets the convenience offered by this flexibility.

The subjects of standard classification of accidents and separation of accidents into "chargeable" and "non-chargeable" groups were also considered by this committee. A summary of recommendations of the recent Chicago street traffic survey is included as an appendix to this report. It was believed that this might prove useful in other cities contemplating similar surveys.

For the T. and T. Association the report was signed by A. W. Brohman, J. I. Butler, Ralph W. Emerson, Arthur Laboury, J. P. Ingle, Richard Meriveth, Jr., J. A. Miller, Jr., W. R. Power, E. S. Rider, E. C. Spring, J. A. Stoll, A. J. Fink, vice-chairman; C. H. Evenston, co-chairman; W. H. Boyce, sponsor, and Samuel Riddle, sponsor. For the Claims Association the report was signed by Seth W. Baldwin, Neil W. Dunbar, George H. Ingles, A. G. Jack, Rev. C. Neilson, Victor T. Noonan, Edward J. Paige, John J. Reynolds, J. J. Shaley, Russell A. Sears, sponsor, and I. F. Bennett, co-chairman.

Bonus and Award Systems

BETWEEN 40 and 50 properties are using different forms of bonus and award for the reduction of accidents. It is not only the smaller companies that are included in the list. Two companies which recently have put a bonus system into use are the Brooklyn City Railroad and the Public Service Railway of New Jersey. Bonus systems are also in effect in Birmingham, Denver, Los Angeles, Milwaukee, Nashville, St. Louis and Washington.

It may be that the adoption of such a plan at a time when accidents already are at a minimum without it would constitute a mistake in judgment. A com-



G. T. Hellmuth

pany in such a situation would be interested in bonus and award only as a plan for a possible future activity when other methods for preventing accidents had been exhausted and the company was beset by mounting accident figures. Safety work is inspirational in character, and from time to time new methods must be introduced.

Objection has been made to the giving of a bonus on two grounds: (1) that the number of unreported accidents will be increased and (2) that it is wrong in principle to pay again for what should be given in return for the day's wages—viz., careful and safe operation.

As to the first objection, letters from users of the plan indicate that with the proper system unreported accidents will be decreased. As to the second objection, it is well known that a reward given for work particularly well done

is a sound business proposition. The idea is not confined to railway operation.

The Brooklyn City Railroad put a bonus plan into effect on Aug. 1, 1926, and no changes have been made in the original plan since that time. The first awards under this bonus plan were made on Dec. 15, 1926, at which time \$20,770 was paid to 1,876 conductors and motormen. This was an average of \$11.05 per man and 86.4 per cent of the conductors and motormen participated. During the current bonus year and as of June 30, 1927, conductors and motormen had earned a total bonus of \$47,365. With deductions for men leaving the service, it is estimated that the cost of the bonus for the year ending Nov. 30, 1927, will be approximately \$60,000.

For eleven months ended June 30, 1927, accidents on this system have decreased 11.5 per cent, and the severity of the accident has been greatly diminished; 62.4 per cent of all accidents are car and vehicle collisions. Conductors and motormen could have prevented and therefore are found to be at fault for 40.5 per cent of all accidents. "Blind" accidents have decreased 32.4 per cent during the eleven months of the bonus as compared with the same period of the previous year.

The bonus plan of Public Service Railway was put into effect Dec. 3, 1926. For the first five months of the year there was a falling off of 4.54 per cent in accidents per million passengers carried.

In 1918 organized accident prevention work was begun by the Tennessee Electric Power Company and has been continuously carried on ever since. For the ten years preceding 1918 the average cost of the claims department was 12 per cent of the gross passenger revenue earned. For the years 1919 to 1926 inclusive the cost has been 4.78 per cent.

Since this property inaugurated the bonus plan in connection with accident prevention work, it has been able to reduce its pull-ins from 350 to 49 per month, and its equipment is old and hard to keep up.

Details are given concerning the methods of giving bonus and awards by the companies mentioned and also those of the Milwaukee Electric Railway & Light Company, and the Los Angeles Railway.

The report was signed by B. D. Haskins, A. W. Kohler and G. T. Hellmuth, chairman.

TABLE SHOWING ACCIDENT AND CLAIM RECORDS OF TENNESSEE ELECTRIC POWER COMPANY RAILWAY DEPARTMENT

Year	Total No.	Accidents—Collisions with		Claims	Gross	Per Cent Claims to Gross
		Motor Vehicles	Cars			
1917	2,291	.....	..	\$120,010	\$672,646	17.8
1918	2,793	.....	..	152,604	860,275	17.7
1919	2,182	.....	..	66,356	857,372	7.7
1920	2,456	.....	83	77,205	1,084,653	7.1
1921	1,753	2,132	60	42,050	978,202	4.3
1922	1,634	432	19	39,161	958,132	4.09
1923	1,846	571	23	55,311	970,889	5.69
1924	1,300	515	22	59,885	1,389,418	3.76
1925	1,649	654	23	28,398	1,675,270	1.69
1926	1,583	691	52	58,733	1,735,843	3.38

Service Betterment

It was felt by the committee that the subject of service betterment divides itself naturally into two main topics:

1. Increasing speed.
2. Providing greater comfort and convenience.

The first main topic was further subdivided into two headings:

(a) Increasing speed in congested districts.

(b) Increasing speed in outlying districts.

The second main topic was subdivided into two headings also:

(a) Increasing the comfort of the car itself.

(b) Increasing the convenience of the service.

The committee suggested the adoption of a modified plan of selected stop operation, where conditions do not admit of complete stop selection. Under this plan, all stops would be available to riders for the greater portion of the day, but on the peak trips, when headways are more frequent, riding is heavier and speeds are ordinarily slower, alternate stops would not be made. These points should be designated by special pole symbols and neat metal signs setting forth clearly the hours when cars do not make the stops.

The committee urged member companies to give the matters of running time and layover time renewed study and careful analysis, with the view of obtaining the highest speeds consistent with good operation. It also emphasized the importance of selecting proper motors and gear ratios for any given service, the importance, from the speed standpoint alone, of so maintaining the brake equipment that stops can be made in the minimum distance consistent with passenger comfort.

A number of companies have devised ways of increasing surface car speeds by the operation of express cars or buses.

The most usual type of express service is where there are two parallel car lines or a bus line paralleling a car line. The committee felt that it is preferable for the street car line to take care of the long-haul business and operate as an express line, leaving the bus line a shorter route handling local business. Another type of express service which has worked out successfully in city service is the usual steam railroad or interurban railroad plan of operating expresses and locals on the same tracks. This can be done by careful scheduling and judicious selection of the "express" territory when headways are not too close and when a fairly infrequent local car headway can be given. The committee offered the suggestion that cars may be speeded up by the substitution of air whistles, electric horns or other modern warning signals for the present type of foot gong.

Special attention was given to the relationship of contact and convenience and attractiveness of service. Many problems in the sale of service have been caused by lack of contact with the cus-

tomers, the salesman and the field in which transportation is sold. It is believed that partial ignorance of exact conditions has created confusion on the part of managements in attempting to decide upon and maintain a policy which would bring about a convenient and attractive service or the proper co-ordination of bus and street car service.

Dependent on the density of population, there is need for two or more classes of service. Speed and comfort are factors in determining the need for express lines which may co-ordinate with slower urban electric railway operation. Street railway companies, however, are cautioned against making promiscuous substitutions of bus lines for rail lines. It is easy to be over-optimistic as to increased receipts from bus operation, and one cannot be too



S. E. Emmons

conservative in figuring bus operating costs. Furthermore, railway overheads continue after the abandonment of a branch line, and the railway operating expenses may not be decreased by the amount estimated. Then, too, when a railway line is abandoned, there is a loss of valuation, upon which a rate of return is figured, which probably will not be replaced by anything approaching an equivalent figure from the bus operation. Very often what appears at first glance to be a proper case for rail abandonment and the substitution of buses resolves itself into a clear-cut proposition for rehabilitation of the rail service, when all factors are given proper weight.

Most companies own several classes of passenger equipment, and a preference is shown by the riders for certain classes. A management should make every effort to increase the use of the preferred equipment and to cut down the use of less popular equipment.

On one property this matter was given careful study, and it was found possible to increase the average number of miles per day for the good cars from 80 to 90 miles, with the result that three unpopular classes of equipment totaling 134 cars were retired completely and 42 other cars were retired from regular service. The change resulted in giving the riders much better car service, gaining good will, building up receipts and reducing operating expenses

—an extremely profitable undertaking all around.

Good housekeeping is a comparatively inexpensive form of maintenance, yet the return in added attractiveness is large for the small investment. A reputation for having clean cars and buses, immaculate car houses and waiting rooms, well policed right-of-way, etc. will bring forth a very favorable public reaction and will go far toward the creation of an appearance of prosperity which will inspire confidence in the road and its management. Car painting is one of the last things to neglect, purely aside from the fact that depreciation of car bodies increases rapidly when painting is skimped, for not even the best of service can be really attractive if it is supplied with dingy, faded, unprosperous-looking vehicles.

Much can still be done toward noise reduction. Noise elimination should be considered from two angles: noises inside the car and those reaching persons not riding in the car. The first presents the easier problem. This solution is more in the nature of noise exclusion and is effected by floor coverings, insulated linings, window weather-stripping, roof head-lining, etc. The second or exterior, class of noise is much more difficult to overcome. It has to do primarily with the amount of unsprung weight, class of brake rigging, gears and condition of rail. Recent experiments in spring suspended motors, worn gear drive, etc., should be watched with the keenest interest.

In recent years the industry has added to the comfort of its patrons by giving them more comfortable seats. Longitudinal seats have been replaced almost entirely by transverse seats, except around loading areas, but there is still improper seat spacing. In the judgment of the committee it is more desirable to have a somewhat smaller number of passengers comfortably seated than to provide the few additional seats to the discomfort of all seated passengers.

New cars, in most cases, should be designed for some form of modern luxurious, deep-cushioned seats. The report warns against the assumption that because an industrial class of people are to be served good seats are warranted. Experience has shown in a number of cases that these are the very people who can be induced to ride more frequently through the medium of more comfortable service. It is generally found that luxurious seats have strong appeal to all classes of riders.

The most prominent things on the streets of most cities are the street cars and a favorable or unfavorable opinion of a city may be gained subconsciously through the exterior appearance of these cars. The same is true of buses.

The report was signed by Walter H. Burke, F. J. Denney, John A. Dewhurs, W. J. Flickinger, J. A. Greig, A. L. Hedges, R. H. Horton, E. A. Palmer, A. E. Potter, J. P. Potter, A. C. Spurr, J. B. Stewart, Jr., J. C. Thirlwall, W. E. Thompson, C. D. Smith, vice-chairman, S. E. Emmons, chairman, G. B. Anderson, sponsor, and Edward Dana, sponsor.

News of the Industry

Hearing on Madison Fares Under Way

A hearing on the petition of the Madison Railway, Madison, Wis., for a 10-cent fare was started before the Wisconsin Railroad Commission on Sept. 27. An agreement has been reached between the city and the company whereby the city will repair the track zones on ten streets at a cost not to exceed \$7,500. The company will reimburse the city at a rate of \$500 a month. Gross revenue received by the company for August was practically the same as that of August, 1926. The gross revenue was \$30,342, compared with \$30,401 for a similar month last year.

Superior Company Claims Fare Insufficient

The Duluth Street Railway, operating in Duluth, Minn., and Superior, Wis., at a hearing before the Wisconsin Railroad Commission asked for the establishment of a new fare rate base in Superior, Wis. The company set forth a valuation of \$1,225,000. It submitted figures showing that earnings have decreased and asserted that the present cash fare of 10 cents and five tickets for 30 cents were insufficient.

Transport Offer for Long Beach, Cal.

A unified system of rail-bus transportation was offered to the City Council of Long Beach, Cal., in a comprehensive plan worked out by the Pacific Electric Railway. Conceding a point insisted upon by City Manager Callahan and former City Manager Henderson, the company asks for a 7 per cent guaranteed return instead of an 8 per cent one. The offer is a revision of the program submitted on Dec. 7, 1926. The important provisions include the following: Valuation of the Long Beach system by the Railroad Commission to establish a rate base; a fare of 10 cents on all streetcar and bus lines within the City of Long Beach, tickets to be sold at the rate of eight for 50 cents good within the city of Long Beach, except that they will not be honored north of San Antonio Drive a 3½-cent fare for school children by purchase of books of 30 tickets for \$1, not honored north of San Antonio Drive; stipulation that there will be no change in the fare for two years and after that increase or lowering it according to whether the return is more or less than 7 per cent; the placing in service of a minimum of 50 modern pneumatic-tired buses a 35-year car franchise and a 20-year bus franchise; extension of rail

lines and a network of bus lines; municipal acquisition of the system at any time and payment to the city of 2 per cent of the gross receipts of the system.

D. W. Pontius, general manager of the Pacific Electric Railway, stated that if the offer were accepted a large amount of additional capital would be

necessary and it was understood that the offer would have to win the approval of the board of directors of the company. In making this offer the company proposed to buy the B. & H. Transportation Company and asked cancellation of revocable permits under which the West Side Transit Company ran buses.

Smith Report Published

Suggests fare increase with unified system for New York City and attacks waste of city-owned lines. Buses essential as feeders

TWELVE recommendations are made in the report of Charles Edward Smith, noted transit expert, called in by the city of New York to make a survey and analysis of its traction problem. Although not released by Comptroller Berry, the report was published by several of the New York newspapers.

An outstanding suggestion is given as the substitution of a flexible fare, starting at 7 cents, with four rides for 25 cents, in place of the existing 5-cent rate. Other recommendations are issuance of transfers at all points, without the payment of any extra fare; adjustment of the fixed guarantees of the elevated and Interborough lines in Manhattan; reduction of the Manhattan elevated interest rate from 7 per cent to 5 per cent; cancellation of present deficits to re-establish credits; pooling of net revenues; lowering of the city's rate of interest on its investment from 8.76 per cent to the present sinking fund rate; control of surpluses by the city and the transportation companies; appointment of a board of control to fix fares, operating allowances and other rates, this board to consist of the comptroller, Chairman of the Transit Commission and a representative of the transportation companies; a division of the surpluses, one-half to the surplus fund, one-quarter to the transportation company and one quarter to personnel; issuance of city bonds for construction, and an agreement by the cities and the transportation companies to obtain enabling state legislation.

To the war he ascribes the financial and service troubles of all the transit companies in recent years. The rapid transit systems in New York he termed a "miracle of modern science" which should be "co-ordinated into a unified system at always self-supporting fares with free transfers." Mr. Smith finds a fixed 5-cent fare unworkable.

Among the revelations in the report is the statement that the new city subway system is going to cost \$140,000,000 more than the official estimate, bringing the total to \$842,000,000 and that even

then the city will not have the needed coverage of territory. He added that the old Transit Commission's plans, which provide for extension and amplification of the existing lines and do not include city-owned new lines, could be achieved for \$300,000,000 and would accomplish approximately the same purpose with a saving of \$500,000,000. City officials were condemned for not giving relief to the transit companies in 1918 for through lack of revenue, operation has been kept in a stage which while not entirely dangerous could not be called definitely safe.

He finds that over a period of nine years the cost of carrying a passenger on the Interborough Rapid Transit Company (from 1919 to 1927) averaged 6.143 cents and adds "this fare on the Manhattan elevated and surface lines will secure improved service and relieve the companies from unfair financial troubles." This would be an increase of only 25 per cent and would correspond to a 4-cent fare before the war.

Mr. Smith considers buses essential to any well-integrated city, not taking the place of but rather supplementing the service rendered by subways, surface lines and elevated roads. The cost of buses superseding the electric railway he estimated at \$25,000,000 to \$40,000,000. In crosstown service in narrow congested streets where the lines of traffic are frequently diverted and as feeders to surface and rapid transit lines there is a wide field for buses in New York, he claims. But there is no place for them, he feels, in competition with surface lines because they cripple the service of the surface lines and ultimately stop them without being able to handle all the traffic as well, as economically or as speedily.

At the invitation of the Board of Estimate and at the personal request of Comptroller Berry Mr. Smith arrived from St. Louis last spring to study the transit situation in New York City. The engineer's report consists of approximately 30,000 words. The report will be summarized in a later issue of the *ELECTRIC RAILWAY JOURNAL*.

Sunday \$1 Ticket Popular in Boston

The Eastern Massachusetts Street Railway, Boston, Mass., has made the Sunday \$1 ticket so popular that it is now selling as many as 4,000 for a Sunday. With one of these tickets a passenger can ride all day, as much as he desires, on the Eastern Massachusetts system, back and forth on a single line, or from one end of the system to the other and back. There is no limit. Such riding has become a popular diversion in some sections. The trip one rider took from Fall River meant about nine hours of riding and would have cost about \$8 on the regular fare basis.

Vetoes Wilcox Survey—Suggests Report from Specialists

San Francisco's Mayor and Supervisors, at the height of a municipal election campaign, are involved in a bitter controversy over the appointment of Delos F. Wilcox of Grand Rapids, Mich., as an expert to survey the transportation situation in San Francisco. Mr. Wilcox was selected by unanimous vote of the Board of Supervisors and engaged at a salary of \$10,000 for two months' work. Mayor James Rolph, Jr., however, refused to approve the appointment.

In a veto message the Mayor openly declared that Mr. Wilcox is "a municipal ownership enthusiast without practical experience in the construction, management and operation of street railways." Supervisors are endeavoring to line up the fourteen votes necessary to override the veto. In the meantime the expert remains on the job.

Mayor Rolph urged in his vote of veto that instead of employing Mr. Wilcox the Supervisors select a board of three to be chosen for outstanding technical ability in the construction, operation and valuation of street railways, as well as franchise matters. He declared that the problem was one that should be studied calmly by a board of experts.

The future of San Francisco's street car operation is rather hazy at the present time. Market Street Railway franchises begin to expire in 1929 and the policy of the city as to the disposition of these franchises is still undetermined. Ardent municipal ownership advocates are in favor of the city taking over the lines of the Market Street Railway as the franchises expire and thus augmenting the municipal railway system. Others, however, who are against this policy, advocate the continuance of two competing railway systems. As yet no constructive future policy has been evolved. It was to study the situation that Mr. Wilcox was employed.

In part Mayor Rolph said:

What is required is not a further discussion of a principle already settled, but a practical demonstration by the best experts of how the physical and legal problems con-

fronting the city can be solved. The legal problems can be disposed of by the city attorney. The physical problems should be clarified by engineering experts of the greatest skill and experience. A plan out-

lined by a board of this character will receive the confidence and support of the people. I therefore recommend to your honorable board that you provide for a board of experts.

Storm Hits St. Louis Utilities

Railways and Bus Companies Unite in Disaster to Carry Stunned Passengers—United Railways Suffers Heaviest Loss, Amounting to \$250,000—Service Resumed on All Lines

WHEN the tornado which killed 89 persons, injured 1,200 others and did property damage estimated at \$15,000,000 to \$50,000,000 in St. Louis, Mo., and Venice, Madison and Granite City, Ill., on Sept. 29 had passed into history the United Railways, St. Louis; the Illinois Traction System, the St. Louis, Alton & Granite City, the East St. Louis & Suburban Railway companies and the People's Motorbus Company found that several of their main lines had been put out of commission.

The United Railways, St. Louis, suffered a loss of \$250,000, an estimate set Oct. 2 by Col. A. T. Perkins, general manager for Receiver Rolla Wells. The loss does not take into consideration passenger revenue due to the storm. For a time all the major lines of the city leading into North St. Louis were put out of commission. Right after the terrible storm struck it was believed the loss to the company would be \$600,000 or more.

Two of the company's carhouses were badly wrecked and sheds were damaged to the extent of about \$150,000. Damage to the street cars totaled about \$75,000. Eight cars housed in the carhouse at Spring Avenue and North Market Street are a total loss, while 200 other cars were damaged. The injury to overhead wires and cables will be about \$35,000, Col. Perkins estimated.

Within twelve hours the United Railways emergency forces had restored service on all but seven of the lines affected and by Oct. 1 all lines were in full operation but the Cass division, which has since resumed operation.

When the storm swept through the residential district from Kingshighway and Manchester Avenue northeastwardly several hundred thousand men and women were in the downtown offices and stores and the industrial plants that skirt the Mississippi River. Many were not aware of the extent of the storm until they endeavored to get to their homes. Every street car line leading into North St. Louis was out of service.

Practically two-thirds of the city was without railway facilities and this big load at its very peak period was thrown onto other transportation systems, especially the People's Motorbus Company and the St. Louis Bus Company, the latter a subsidiary of the United Railways.

Many from the People's company's regular forces and extra men were sent into the district swept by the twister to clear away debris, remove overhanging wires and otherwise clear the way

for the buses. That company also buses to act as ambulances.

Buses of the St. Louis Bus Company proved of the utmost value on Thursday night and throughout Friday in augmenting the handicapped street lines, while in Illinois a similar service was rendered by buses of the Blue G. Motorbus Company, subsidiary of East St. Louis & Suburban Railway during the ten-hour period in which trolley lines through the Tri-Cities to Alton, Ill., were out of service.

Several out-of-town bus lines coming into St. Louis also pressed their buses into city service and did what could to supplement the service of the car company and the People's company.

But while the service cars were being all that the traffic would bear, greatly increased tariff the regularly operated main taxicab lines and the companies did not raise their rates. However, it was very difficult to get taxicabs from the regular companies since many were used as ambulances. While the service car operators raised their rates, thousands of owners of private automobiles proved equal to the city's big emergency by carrying persons to their homes. Crawling slowly out of the downtown district many high-priced five-passenger service cars were carrying a dozen riders.

Thousands of St. Louisians were forced to walk miles to get to their homes, while others unable to walk the way did not get home until midnight. In normal times the street cars carry persons from the business sections to parts of northeast and southwest St. Louis farthest from the downtown section in ten minutes.

Baltimore Advertises for More Riders

Since being refused an increase in fare by the Public Service Commission, the United Railways & Electric Company, Baltimore, Md., has begun an increased advertising campaign, have appeared on the streets with signs calling attention to the cost of trolley riding and other advantages of using that means of transportation.

Meanwhile the company is preparing for the hearing before the commission scheduled to open Oct. 26, on its petition for a permanent 10-cent fare. L. L. Clark, counsel for the People's Motorbus Company, announced that he would submit a new schedule whereby the riders would be given a preference.

Recent Bus Developments

Fares Cut on Kansas City Bus Line

Bus fares on the Country Club express line during the non-rush period each weekday were reduced from 25 cents to 19 cents, effective Oct. 1. The reduced rate is in force each weekday between 9 a.m. and 4:30 p.m. and again at 7 o'clock at night. The 25-cent rate will be charged all day on Sundays and holidays.

The purpose of this reduction is to increase the patronage on the express line during the non-rush hours in order to make the line a paying venture, according to Fred G. Buffe, vice-president of the Kansas City Public Service Company.

Tickets at the new rate of slightly less than 20 cents are being sold at the street car dispatchers' stations, scattered over the city at important corners, and at drug stores. They may also be obtained from the public service company's central office by mail.

Bus Territory Expanded in San Diego

The San Diego Electric Railway has recently extended the scope of its bus operations by taking over the Lloyd's El Cajon Stage Line, operating between San Diego, Cal., and El Cajon, and serving intermediate points including La Mesa and Grossmont. Application for certificate of public convenience and necessity was filed with the Railroad Commission by Sutherland's Tia Juana Stages, a competing stage operator, to operate between San Diego and La Mesa, thereby serving territory which is directly in line with extension of the railway system, and it was for this reason that the railway purchased the Lloyd line and also filed counter applications with the commission. After public hearing, all applications for additional service to La Mesa were denied by the Railroad Commission, which, however, notified the sale of the Lloyd line and advocated increases in schedules to afford adequate facilities. Approximately 16 miles of bus route have been added to the system.

Equitable Grant Termed Illegal

That the bus franchise awarded to the Equitable Coach Company was illegal was the opinion expressed at the hearing by the Transit Commission on Oct. 3 by Clarence J. Shearn, of counsel for the Brooklyn-Manhattan Transit Corporation, and Max D. Steuer, of counsel for the New York Railways Corporation. The contenders attributed the illegality of the bus franchise for Manhattan, Brooklyn and Queens to the failure of Borough Presidents Julius Miller of Manhattan and Henry Bruck-

ner of the Bronx to vote for it in person.

Commissioner Leon G. Godley, who presided, suspended the taking of testimony on the company's application until the next hearing. He said he would then decide on the legal points raised. The point raised by these counsels hinged on whether or not a borough president had the power to delegate his authority and vote in the Board of Estimate to his Commissioner of Public Works.

Buses Accommodate Toledo Students

A number of variations in bus routes operated by the Community Traction Company, Toledo, Ohio, has been made effective recently to accommodate school students. Two of the express lines route one bus each way daily by way of Scott High School, a special bus collects passengers each morning in the north section of the city for Waite High School and the Broadway-Glendale bus has been routed in the opposite direction so that pupils of Harvard School may get off on the side of the River Road nearest the school. These arrangements were made through Superintendent Forsgard and Commissioner E. L. Graumlich.

At the present time 15 per cent of all operation of the traction company is by motor coach as against 9 per cent coach operation a year ago. The company has a fleet of 30 coaches and will soon probably purchase additional equipment.

Buses to Run in Hillsboro

Permission has been granted by the Illinois Commerce Commission to the Illinois Power & Light Company to discontinue railway service in Hillsboro, Ill., and substitute a line of buses. The railway system has been in operation there for twenty years.

Bus Extensions on Clay County Line

A permit to the Kansas City, Clay County & St. Joseph Auto Transit Company, a subsidiary of the Kansas City, Clay County & St. Joseph Railway, to operate stage lines between Kansas City and St. Joseph, Kansas City to Excelsior Springs and Liberty and Kansas City to Parkville, was issued by the Public Service Commission at Jefferson City, Mo., on Sept. 24. The application for and the issuance of a permit to the Kansas City, Clay County & St. Joseph Railway to operate buses was in compliance with the provisions of the new Missouri bus law, which became effective July 3, R. F. Mahan, general superintendent of the company, said. The company started the operation of buses three years ago.

Hearing for Richmond Bus Petition Continued

The Virginia Corporation Commission has continued to Nov. 16 the hearing of the Sandston Railway, Richmond, on its petition for a certificate of public convenience and necessity to operate a passenger bus service co-ordinating with the present electric railway line, which covers approximately 8 miles. The Virginia Electric & Power Company is opposing the granting of the certificate.

Buses in Lincoln Must Load at Street Car Safety Zones

Following several months experiment of permitting the buses operated by the Lincoln Traction Company, Lincoln, Neb., to take on and discharge passengers at curb stations reserved for stops, the City Council has passed an ordinance requiring them to load and unload at the old street car safety zones. Where none of these is now marked off reservations will be made. The ordinance applies only in the congested districts and was found necessary because of the difficulties the old way added to handling traffic. This will affect 21 stops. Buses will be stopped and started on intersection signal, but traffic is permitted to pass to the right of a bus where such bus has come to a stop at a safety zone to take on or discharge passengers.

Continuance of Line in Cincinnati Won

The deluxe coach service on Reading Road, Cincinnati, Ohio, operated by the Cincinnati Street Railway, which was to have been discontinued on Oct. 1, will be continued for another month with single fares still at 25 cents, but tickets at five for \$1. In response to a questionnaire sent out by the company 79 out of 100 replies expressed satisfaction with the schedule.

Buses Succeed Cars on Pennsylvania Line

The West Penn Railways, Pittsburgh, Pa., announced on Oct. 3 that railway service connecting Oakdale, Noblestown, Sturgeon and McDonald would be abandoned with the last run on Saturday night, Oct. 15.

Bus service operated by Penn Bus Lines will begin at 5:30 a.m., Sunday, Oct. 16. It is planned that 21-passenger, city-type, Yellow coaches will be used in this operation. The same schedule service is offered as that now given by the railway cars.

Wisconsin Interurban Uses Bus

Interurban service between Plymouth and Elkhart Lake has been abandoned by the Wisconsin Power & Light Company, Madison, Wis. Bus service has been substituted. Six trips will be made daily.

Financial and Corporate

Messrs. Miller and Crosby New Directors at Oakland

Two new directors have been elected to the board of the Key System Transit Company, Oakland, Cal. The new men are Robert W. Miller, a son of C. O. G. Miller, former president of the company, and F. H. Crosby, a representative of J. Barth & Company, brokers, who now control a majority of Key System stock. Mr. Miller replaces John S. Drum, well known San Francisco banker and president of the American Trust Company, who gave the pressure of banking business as the reason for his resignation. Mr. Crosby succeeds Lester S. Ready, former president of the Key System, who resigned that office recently to become vice-chairman of the board of directors and who now has entirely severed connection with the railway.

Reorganization Plans in St. Louis Approved

The Missouri Public Service Commission on Oct. 1 announced at Jefferson City that it had approved the reorganization plans of the United Railways, St. Louis. No finding of value was made in its order, the commission merely stating that on the showing made there was sufficient property of the United Railways to justify the issuance of the securities asked by the St. Louis Public Service Company, which has purchased the railway properties. Approval of the state commission was necessary before the new company could issue its securities under the plan of reorganization.

The funded debt of the new company will include \$30,300,000 United Railways first general mortgage 4s due July 1, 1934; \$6,000,000 United Railways first general mortgage 4s, due July 1, 1934, held as collateral for \$5,000,000 short term loan; \$4,500,000 City & Suburban Public Service Company first mortgage 5s, due July 1, 1934. Grand total funded debt \$40,800,000, with annual interest charges of \$1,677,000. Stock to be issued by the company will include 73,193 shares preferred stock of St. Louis Public Service Company. This stock will bear \$7 a share cumulative dividends, or a total annual interest charge of \$512,351. Also 343,645 shares of St. Louis Public Service Company non-par common stock.

In its order the commission expressed the opinion that the reorganization plan was complete and had many commendable features, not the least of which were the substantial reductions made in the bonded indebtedness and the amounts of the annual fixed charges. Further, that it could not be doubted that the termination of the receivership and the

reorganization of the system would result in benefit both to the public and the owners of the property.

Transportation Revenues on Brooklyn City Lines Increase

For the fiscal year ended June 30, 1927, the Brooklyn City Railroad, Brooklyn, N. Y., reports gross revenues from transportation of \$11,460,584, an increase of \$61,210 compared with the previous year. Other operating revenue amounted to \$191,175, a decrease of \$87,366, the decrease being due to the cancellation of the contracts with the Brooklyn-Manhattan Transit Corporation under which it had previously leased certain of the company's car houses, shops and other properties and changes resulting from the sale of the general office building. These facts were disclosed by H. Hobart Porter, president, in the 73d annual report to the stockholders.

Operating expenses were \$9,326,056, an increase of \$362,952 compared with the previous year. Since 1919 the methods of accounting have generally followed those which were in effect at the termination of the lease. Much consideration has been given to this subject, and as of July 1, 1926, radical

INCOME STATEMENT OF THE BROOKLYN CITY RAILROAD

For the Year Ended June 30

	1927	1926
Passenger revenue.....	\$11,460,569	\$11,399,283
Other car revenue.....	15	90
Total transportation revenue	\$11,460,584	\$11,399,373
Advertising and other privileges.....	99,999	96,666
Rent of land and buildings..	19,153	126,526
Rent of tracks and terminals	53,402	54,527
Sale of power.....	17,784	*
Miscellaneous revenue.....	834.7	820
Total operating revenue..	\$11,651,759	\$11,677,915
Operating Expenses		
Maintenance — Way and structures.....	\$1,361,543	\$1,327,310
Equipment.....	1,177,232	1,216,427
Power.....	1,119,829	1,047,848
Operation of cars.....	4,306,739	4,219,640
Injuries to persons and property.....	†854,157	636,747
General and miscellaneous expenses.....	506,554	515,129
Total operating expenses.	\$9,326,056	\$8,963,104
Net operating revenue....	\$2,325,702	\$2,714,810
Taxes assignable to operations.....	714,541	768,707
Operating income.....	\$1,611,161	\$1,946,103
Non-operating income.....	72,493	92,854
Gross income.....	\$1,683,654	\$2,038,957
Income Deductions		
Interest.....	\$512,492	\$500,810
Rent of cars and tracks....	25,044	79,275
Other deductions from income.....	25,529	36,135
	\$563,066	\$616,222
Net income.....	\$1,120,587	\$1,422,736

*Sale of power amounting to \$13,345 was deducted from operating expenses for the year to June 30, 1926.
†For 1927 actual expenses. For 1926 \$173,438 additional charged to casualty and insurance reserve.

changes in the accounting methods, particularly the methods of accruing the reserves for replacement of way and structures and equipment, were adopted, with the approval of the directors, so that the charges for maintenance as between 1927 and 1926, shown in the income statement, are not comparable. The cost of power shows an increase for the year of nearly \$72,000 compared with 1926. The Brooklyn City Railroad purchases its power, under a long term contract, from the Brooklyn-Manhattan Transit Corporation, the price being based on the actual cost of the power to such company. In the past year large expenditures for maintenance and repairs have been made at the Williamsburgh power plant and to this fact the increase is largely due. The operation of cars showed an increased cost of approximately \$87,000 due to a higher rate of wages paid and bonuses awarded for operation of cars without accidents referred to later.

ACCIDENT CASES HAVE BEEN REDUCED

The actual increase in the payments for injuries to persons and property over 1926 was \$43,971 as, in addition to the amount shown in the 1926 income statement, the reserve for such purpose was drawn upon during that year for \$173,438. For some years prior to 1926 there was a constant accumulation of accident cases, which during 1927 has been materially reduced.

The reduction of \$54,000 in income deductions under item of rents was due to the fact that during the early portion of the fiscal year 1926 a considerable amount was paid for rental of cars, which was later obviated by the delivery of its newly purchased cars.

The report explains the status of the proposed general and refunding mortgage plan which was denied and states that as of the date of the report the amount of the outstanding loans had been reduced from \$800,000 to \$200,000.

A proceeding instituted by the company against the receiver of the Brooklyn Heights Railroad, which has been pending for some years, to recover the net earnings of the property of the Brooklyn City Railroad between July 14 and Oct. 18, 1919, has been finally adjudicated in favor of the Brooklyn City Company, which has benefited by the receipt of a net amount approximating \$100,000.

A bonus plan was adopted on Aug. 1, 1926, under which all employees operating their cars for certain periods without an accident receive a bonus. Since this plan has been in operation the number of accidents has decreased 13 per cent.

On the subject of buses the report mentions the granting of a franchise to the Equitable Coach Company for the operation of bus lines in the Borough of Brooklyn. Many of the routes covered by the Equitable are directly competitive and parallel to the car lines of the Brooklyn City Company and Mr. Porter promises that officers and counsel will appear before the commission in opposition.

Personal Items

Thomas W. Wilson President at Wilmington

At a meeting of the board of directors of the companies held on Sept. 29 Thomas W. Wilson was elected president of the Wilmington & Philadelphia Traction Company, Wilmington, Del., of the subsidiary railway and bus companies in both Delaware and Pennsylvania. He was also re-elected general manager. These companies recently came under the control of Stevens & Wood, Inc., through purchase of the stock of the American Electric Power Company from the American Gas & Electric Company.

Mr. Wilson was for many years associated with the International Railway, Buffalo, N. Y., first as chief engineer and for seven years as general manager. He held that position until 1912, when he removed to Wilmington, Del., to become vice-president and general manager of the Wilmington & Philadelphia Traction Company. Immediately after his graduation from Lehigh University he entered the engineering department of the Pennsylvania Steel Company. He remained there several years, leaving to become engineer of the Charleston City Railway, Charleston, S. C.

He is a member of the board of directors of the American Electric Power Company and of its various controlled companies in Delaware and Pennsylvania. He is a past-president of the New York State Railway Association and for many years has been closely identified with the American Electric Railway Association and the Pennsylvania Street Railway Association. He is also identified with many financial, commercial and social organizations in Wilmington and Philadelphia.

The new president was born in New York City in 1872. At the outbreak of the Spanish-American War he enlisted in the Eighth Pennsylvania Volunteer Infantry and served as topographical engineer of the Second Army Corps until mustered out at the end of the war.

Mrs. Denman and Chamberlain Removed to Chicago

J. Denman, president of the Tri-City Railway & Light Company, and his assistant, W. I. Brown, are moving their headquarters from Davenport, Iowa, to Chicago, Ill. William Chamberlain, vice-president and general counsel of the United Light & Power Company, which controls the United Light & Railways, will also move to Chicago with Assistant Humphrey. May points, both east and west, which Mrs. Denman and Chamberlain must visit frequently are more accessible from Chicago than from Davenport or

Cedar Rapids. In Chicago their headquarters will be in the United Light financial and executive offices. No changes in personnel or management are involved in this move, the engineering and operating offices remaining in Davenport as heretofore.

F. H. Crosby Vice-President at Oakland

F. H. Crosby, who recently became a director of the Key System Transit Company, Oakland, Cal., will also serve as vice-president. He will be chief aid to President Alfred J. Lundberg. Mr. Crosby, a representative of J. Barth & Company, brokers, who now control a majority of the Key System stock, is known in the field of public utilities through his connection with a number of independent telephone companies.

"High Power" Savage Over There

The intrenchment of the American Legionnaires in the affections of Pershing, Premier and Pope is attributable in great part to the persuasive powers and winsome ways of Howard Paul Savage, a Mid-Western railway man. Mid trumpets and torches, shouts and songs, he and his buddies are marching through Europe renewing friendships at Armentières and bowing reverential heads in Flanders Fields. When he communes appealingly with the dead at Suresnes or issues orders for furloughs in Montmartre, one wonders whether this American son of toil is making history for the American Legion or whether the Legion is making history for its retiring commander. For in this genial, gray-haired, 42-year old member of the American Expeditionary Forces is another fulfillment of dreams dreamed in the land of promise. Even the most visionary would never have seen in the young man who entered electric railway work in 1913 on the Metropolitan West Side Elevated Railroad of Chicago as track foreman an important factor in re-establishing and restoring friendly relations between the old and the new worlds.

Late in 1926 "High Power" Savage, as he was affectionately known on the "L," was made assistant general manager of the Chicago, North Shore & Milwaukee Railroad at the same time that John F. Egolf was made general manager. He had been serving the Chicago Rapid Transit Company as general superintendent of maintenance of way following a promotion from the position of track engineer.

With the outbreak of the war he secured a leave of absence and obtained a commission in the 55th Engineers, serving in France from July, 1918, until

July, 1919. On his return to civil life he resumed his position with the Rapid Transit Lines in accordance with the policy of all utilities under the management of Samuel Insull and associates. Immediately on his return he formed Chicago Elevated Post, No. 184. He was the first commander of that post and was a post state commander of Illinois. Conspicuous among his achievements in Legion affairs have been his activities in securing the soldiers' bonus, in increasing Legion membership and in planning a sound financial basis for all posts. It was because of his tireless efforts and notable accomplishments for that organization that the great honor of national commander was conferred upon him at the annual convention of the American Legion on Oct. 15, 1926, in Philadelphia. When he returned to Chicago a mighty throng turned out to meet him. There will no doubt be a vast crowd to meet him when he returns to America, greater in number and louder in acclaim than the greeting he received in Chicago a year ago. At that time Bernard J. Fallon, vice-president of the Chicago Rapid Transit Company and official spokesman of the occasion, called Col. Savage "a credit to Chicago and a credit to the nation, the type of man Chicago needs." The spokesman for the coming occasion can do no better than reiterate these sentiments.

May the diamond-studded gold key to the Hotel des Nations Americaines be his perpetual passport to the countries of Europe and may the cross of the federation bestowed upon him in Brussels motivate him in "carrying on" for the North Shore road and for his stalwart buddies.

William H. Hodges, Vice-President of Byllesby Engineering

"The father of customer-ownership," William H. Hodge, has been elected a vice-president of Byllesby Engineering & Management Corporation and appointed a manager of a newly created sales and advertising department of that company at its Chicago headquarters. The sales and advertising department will have general charge of the development of new business and advertising at all of the Byllesby utility properties, which now compose one of the larger groups of these enterprises under unified management in the United States.

Mr. Hodge has been connected with the Byllesby organization since 1910 as manager of the advertising and publicity department. He had a prominent part in the development of the customer-ownership plan of financing by utility companies and in their public relations and commercial activities.

GEORGE J. BAKER, superintendent of the Buffalo & Erie Railway, Fredonia, N. Y., was made general manager on Oct. 1. He entered the service of the Buffalo & Lake Erie Traction Company, the predecessor of the Buffalo & Erie Railway, in 1902 as a conductor on the city lines in Buffalo.

Manufactures and the Markets

Platform Adopted by National Association of Manufacturers

Seventy-five members of the Platform of the Platform of American Industry Committee, called together by the National Association of Manufacturers, met recently in the Waldorf-Astoria Hotel, New York, and adopted the following fourteen planks for incorporation in the national platform to be submitted to both the Republican and Democratic parties next year. The planks are as follows: Government and business, taxation, regulation of combinations, employment relations, transportation, immigration and naturalization, international relations, tariff, foreign trade policies, merchant marine, Federal Reserve Bank system, waterways development, flood control and agriculture.

The fourteen planks will be drawn up by as many sub-committees working under a general drafting committee of eleven men from various parts of the country. The fourteen subcommittees will be appointed in the next fortnight. John E. Edgerton, president of the National Association of Manufacturers, was chosen chairman of the general committee. The drafting committees will shape up the various planks and report their conclusions at the annual convention of the manufacturers to be held in Chattanooga, Tenn., October 25, 26 and 27.

Secretary Davis Misunderstood on Indiana Coal Situation

The bituminous coal strike was discussed by President Coolidge and his advisers Sept. 13 at the first Cabinet meeting to be held following the return of the Chief Executive from South Dakota. The verbal statement of this discussion was misinterpreted by some of the daily newspapers into an announcement that went beyond the facts stated. It was stated verbally at the White House, following the Cabinet meeting,

that Secretary of Labor Davis had reported to the President that developments in Illinois indicate a "strong probability" of the strike being settled in that state soon. It also was stated that the Secretary had reported 55 per cent of the mines of Indiana operating under the old Jacksonville agreement, which was interpreted as meaning that the strike was "55 per cent settled in Indiana." The President was informed, it is understood, that there is a large tonnage of bituminous coal above ground, which would indicate no danger of a shortage of supply, and that there is nothing in the soft coal price situation to indicate a shortage of supply.

Huge Storage Battery Switching Locomotive

State Line Generating Company, Hammond, Ind., has just placed in service the largest storage battery locomotive in the world. It is capable of pulling a 1,500-ton train and its total weight is 100 tons.

The locomotive, built by the General Electric and the Electric Storage Battery Companies, has all the advantages of an electric locomotive, but does not require an overhead trolley or third rail for its power. The manufacturers claim that it is noiseless and smokeless in operation and can accelerate quicker and move a heavy load much faster than other types of switching locomotives. Its huge storage battery, weighing 39 tons, the largest ever manufactured for this purpose, will deliver 1,000 hp. to the driving motors. This power is equivalent to 1,579 six-volt batteries such as used for radio purposes, or is sufficient to crank 1,600 automobiles simultaneously. A motor-generator set installed in the cab will permit the charging of the battery from a 2,300-volt circuit in the plant.

Westinghouse Awards War Memorial Scholarship

Awards were recently made to two Pittsburgh and two New York boys in the 1927 War Memorial Scholarship of the Westinghouse Electric & Manufacturing Company. The scholarships, established in memory of the Westinghouse employees who lost their lives in the World War, carry a fund of \$500 a year and are good for a period of four years.

The winners in the 1927 contest were: H. L. Bunker, Jr., son of H. L. Bunker, rate setter, East Pittsburgh Works; P. J. Glaister, tester, East Pittsburgh Works; M. T. Ayres, son of M. C. Ayres, foreman of dial markers, Newark Works, and A. L. Kine, son of R. R. Kine, salesman, New York

office. Successful contestants were selected on a basis of mental, physical and social activities.

Ten Semi-Steel Cars Being Built for Boston Elevated

The ten cars ordered by the Boston Elevated Railway, Boston, Mass., on Aug. 3 from the Laconia Car Company, Laconia, N. H., as announced in the Aug. 20 issue of the JOURNAL, are to be delivered during the 40-day period between Dec. 1, 1927, and Jan. 10, 1928. They are to be placed in service in South Boston and will replace the old box cars now in use there.

The cars, with a seating capacity of 48, are being built at a cost of approximately \$12,000 each. They are of the one-man, two-man, double-end, double-truck type, having a total weight of 31,460 lb. and a length over all of 45 ft. 0 in. The body is of semi-steel construction with end doors and has an arch roof. The seating arrangement includes four longitudinal and sixteen cross seats, with a spacing of 29 1/2 in. The painting scheme is to be yellow.

Operating equipment includes four G.E. 264-A inside-hung motors, G.E. K-71 control and Westinghouse air brakes with variable load attachment.

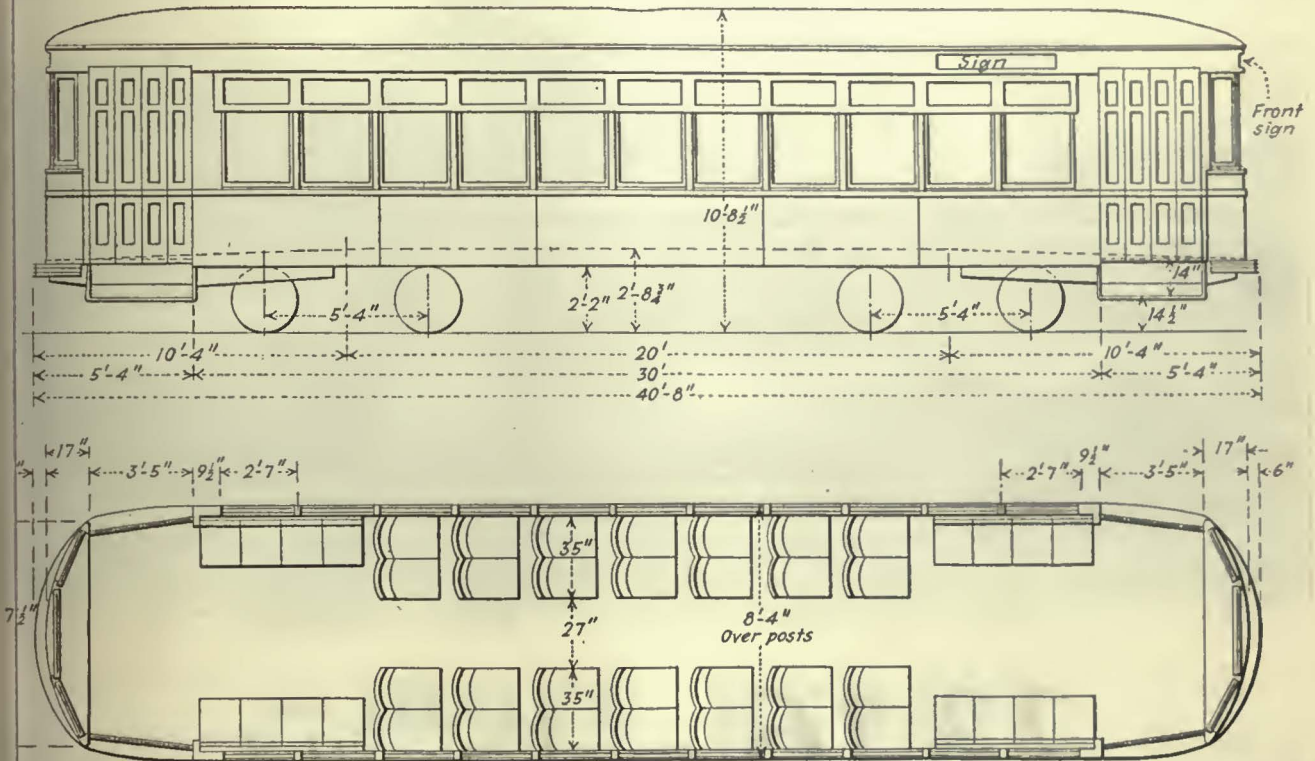
The official specifications are as follows:

No. of units.....	10
Type of unit.. One-man, two-man, motor, passenger city, double end, double truck	
Seating capacity.....	48
Builder of car body.....	Laconia Car Company
Date of order.....	August 3, 1927
Date of delivery..Dec. 1, 1927, to Jan. 10, 1928	
Weights:	
Car body.....	13,800 lb.
Trucks.....	8,700 lb.
Equipment.....	8,960 lb.
Total.....	31,460 lb.
Bolster centers.....	20 ft. 9 in.
Length over all.....	45 ft. 0 in.
Length over body posts.....	30 ft. 11 1/2 in.
Truck wheelbase.....	5 ft. 2 in.
Width over all.....	8 ft. 6 1/2 in.
Height, rail to trolley base.....	10 ft. 7 1/2 in.
Window posts spacing.....	31 1/2 in.
Body.....	Semi-steel
Roof.....	Arch
Doors.....	End, folding
Air brakes.....	Westinghouse, variable load attachment
Armature bearings.....	Plain
Axles.....	Pittsburgh Forge & Iron Company
Compressors.....	DH-6
Conduit.....	Flexible
Control.....	General Electric K-71
Couplers.....	Malleable iron sleeve
Destination signs.....	Keystone
Door mechanism.....	National Pneumatic Company
Energy-saving device.....	Railway Improvement Co.
Fare boxes.....	Johnson
Finish.....	Flood-Conklin
Floor covering.....	Wood
Gears and pinions.....	General Electric spur
Glass.....	Double thick
Hand brakes.....	National staffless
Hand straps.....	Rico
Heat insulating material.....	Salamander
Heaters.....	Consolidated Car Heating Company
Headlights.....	Dersel
Headlining.....	Bronze and malleable iron
Journal bearings.....	Plain
Journal boxes.....	Steel casting
Lamp fixtures.....	Weber No. 61900
Motors.....	Four General Electric 26-A, inside hung
Registers.....	International single
Roof material.....	Wood and canvas
Seats.....	J. G. Brill Co.—4 longitudinal
Seat spacing.....	29 1/2 in.
Seating material.....	Wood slat
Slack adjusters.....	M-1
Steps.....	Folding
Step treads.....	Wood universal tread nosing
Trolley catchers.....	Earl
Trolley base.....	Ohio Brass
Trucks.....	Taylor, type LRE
Ventilators.....	Garland
Wheels, type.....	Steel, 26-in. diameter
Wheelguards.....	Wood life guards on trucks

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

Metals—New York		Oct. 4, 1927
Copper, electrolytic, cents per lb.....		12.90
Copper wire, cents per lb.....		15.25
Lead, cents per lb.....		6.25
Zinc, cents per lb.....		6.00
Tin, Straits, cents per lb.....		59.50
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.....	\$4.175	
Somerset mine run, Boston, net tons.....	1.80	
Pittsburgh mine run, Pittsburgh, net tons..	1.95	
Franklin, Ill., screenings, Chicago, net tons	1.875	
Central, Ill., screenings, Chicago, net tons..	1.625	
Kansas screenings, Kansas City, net tons...	2.70	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.....	\$5.55	
Weatherproof wire base, N. Y., cents per lb.	5.20-5.70	
Cement, Chicago net prices, without bags...	2.05	
Lined oil (5-bbl. lots), N. Y., cents per lb..	11.2	
White lead in oil (100-lb. keg), N. Y., cents per lb.....	13.75	
Tarpetine (bbl. lots), N. Y., per gal.....	\$59.0	

50 More for Montreal!



Fifty units of this type are now being built for the Montreal Tramways by the Canadian Car & Foundry Company. Delivery is expected in September. Aluminum alloy will figure largely in their construction.

There will shortly be delivered to the Montreal Tramways fifty new two-man, city type, single-end cars equipped with

“Peacock” Staffless Brakes

Reg. U. S. Pat. Off.

Only last year this company placed in service a like number of new cars, similarly equipped. These new cars, weighing 36,000 lbs. and built by the Canadian Car & Foundry Co., seat 44 passengers—the last word in modern car design.

May we tell you why this Company, and nearly all the purchasers of new cars in Canada and the United States, repeatedly specify “Peacock” Staffless Brakes? Their many advantages are a revelation to new users and the reliable standby of properties that have once used them. Write today.



The
“Peacock”
Staffless

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.

Safeway Six-Wheelers on Cumberland Lines show high mileage with low operating costs



23.16 *per bus mile!*

Operating cost per bus mile

	Cents
Superintendence of Plant and Equipment..	0.42
Maintenance (body and chassis).....	3.86
Tires and tubes.....	1.46
Fuel	2.36
Lubricants	0.26
Garage supplies and expenses.....	0.85
Superintendence of Transportation.....	0.28
Driver's wages	2.98
Street men and inspectors.....	0.40
Transportation expenses.....	0.94
Ferries and tolls.....	1.29
Printing and advertising.....	0.37
Depreciation	3.06
General office expense and salaries..	0.67
Other general expenses	0.11
Rent of rolling stock.....	1.27
Insurance	1.44
Taxes and interest.....	1.14
Total cents	23.16

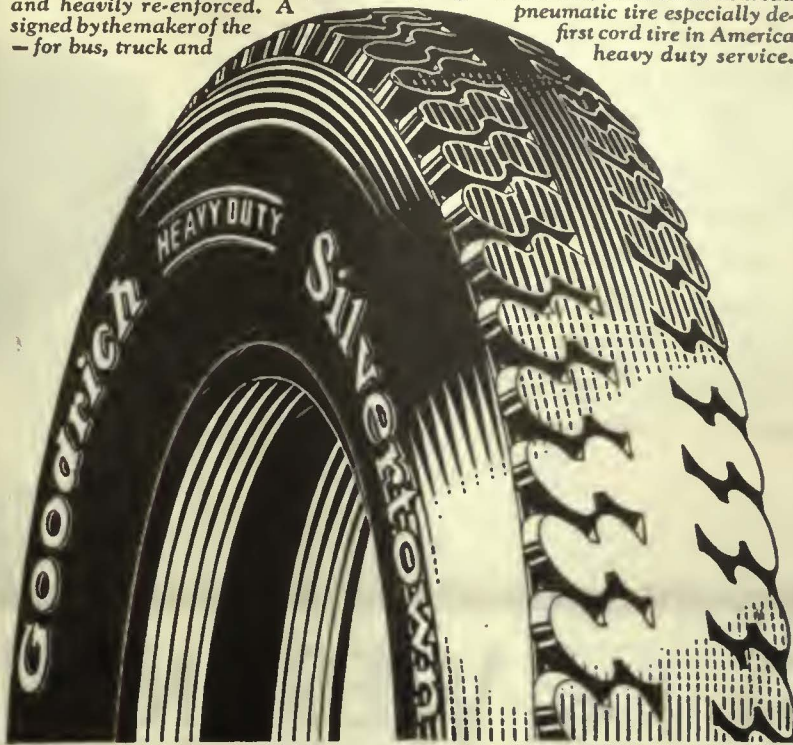
IN this South Jersey operation Six-Wheelers on certain runs are averaging over 350 miles per day—or 100,000 miles per year per bus. Seven vehicles have operated 200,000 miles each. And three repeat orders from this company is further proof of the ability of Safeway Six-Wheelers to deliver high continuous mileage at low operating cost.

THE SAFEWAY SIX-WHEELER

THE SIX WHEEL COMPANY, 1800 W. LEHIGH AVENUE, PHILADELPHIA, PA.

Manufacturers of De Luxe, City, and Double Deck Type Six-Wheel Coaches

Super dimensions—special rubber compound. Extra tough, heavy duty, anti-skid tread. Long-wearing, "non-rippling." Sidewalls, same stock as tread and heavily re-enforced. A pneumatic tire especially designed by the maker of the first cord tire in America— for bus, truck and heavy duty service.



— more profit than you think!

The whole matter of using tires on buses is a matter of profit. Without them—no profit is possible. With them—profits depend upon the tires you use.

Goodrich Heavy Duty Silvertowns bring profits at every turn. Profits from savings in mileage costs. Profits from reduction in tire-changing delays. Profits from the reputation for promptness which they help to build for the bus lines which use them.

THE B. F. GOODRICH RUBBER COMPANY, Established 1870, Akron, Ohio
In Canada: Canadian Goodrich Company, Kitchener, Ontario

Goodrich

HEAVY DUTY

Silvertowns

HIGH PRESSURE OR BALLOON

AIR—and air *alone* can absorb and thus practically eliminate road shocks and vibration.

These two destructive forces cost truck and bus operators who ignore them hundreds of thousands of dollars every year in unnecessary maintenance expense and repair bills—



GRÜSS
Sleeve Type
AIR SPRING



WESTINGHOUSE
Piston Type
AIR SPRING

THE SHOCK ELIMINATORS FOR TRUCKS-BUSES-PASSENGER CARS



AIR Springs float the bus or truck chassis on cushions of air. These air cushions absorb road shocks and vibration, prevent twisting and wrenching of frame, eliminate shifting of load and damage to cargo, insure supreme riding comfort regardless of road conditions.

Thousands of truck and bus operators in all parts of the world have found the savings thus effected make air springs the greatest dividend payer they have in connection with their equipment.

The CLEVELAND PNEUMATIC TOOL COMPANY
Cleveland, Ohio



The LATEST

in **MOTOR COACHES**

---and, Operators say, the

MOST PRACTICAL

Popularity Proved



6 *Cylinder Engine* **4** *Speed Transmission* **4** *Wheel Brakes (Lockheed Hydraulic)*

GRAHAM MOTOR

SOLD BY DODGE BROTHERS

by **M**ounting **S**ales

Graham Brothers 6-cylinder motor coaches win immediate favor—operators express their enthusiasm most convincingly by buying them

Wherever Graham Brothers 6-cylinder motor coaches have been shown the reception accorded them has been most enthusiastic. They have attained instant popularity with operators and public alike.

Numerous orders are being received from present operators of the 4-cylinder coaches. So satisfactory and profitable has been their experience with Graham Brothers equipment that they are buying the new coaches with complete confidence.

Those already in service are delighting owners with the smooth, flexible, abundant power from the new 6-cylinder engine—with the operating advantages of the 4-speed transmission, with the 4-wheel brakes (Lockheed Hydraulic) and the riding ease afforded by the 3-stage progressive type springs. They are showing a low operating cost.

Operators are saying of this new coach —“everything a motor coach should be or have.”

\$4045 \$4060 \$4290

12-Passenger
Parlor Coach
(f. o. b. Detroit)

21-Passenger
Street Car Type
(f. o. b. Detroit)

16-Passenger
Parlor Coach
(f. o. b. Detroit)

BROTHERS COACHES

SALES EVERYWHERE

COMPLETE UNIT

Purchasers of Graham Brothers Motor Coaches get the complete unit—chassis and body—from one source. There is no division of responsibility.

The complete coach is built by Graham Brothers—assurance of fine materials and workmanship and correctness of design and engineering.

The complete coach is sold by Dodge Brothers Dealers—saving the purchaser time and money and eliminating the confusion attendant upon scattered buying.

The complete coach is serviced by Dodge Brothers Dealers—everywhere.

GRAHAM BROTHERS

Evansville — **DETROIT** — Stockton
A DIVISION OF DODGE BROTHERS, INC.
GRAHAM BROTHERS (CANADA) LIMITED—TORONTO, ONTARIO

Operators everywhere are swinging to the General *Heavy Duty Cushion Tire* because of freedom from Blowout, Breakdown and Base Separation, which is by far the biggest factor in economy of tire operation.

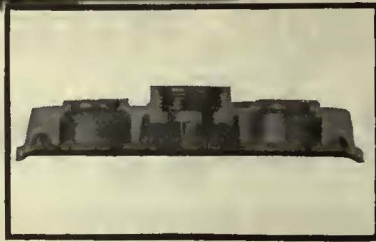


-better buy
Generals NOW
than buy and buy

The
GENERAL
TIRE

—goes a long way to make friends

Think of MILEAGE when you
pick your batteries



High-quality rubber jars and covers — and semi-soft sealing compound to keep everything tight. The result is that Willard jars and covers come through mile after mile of rough going, perfectly sealed and doing their share toward uninterrupted battery service. Even sudden temperature changes won't affect Willard sealing compound.

WILLARD STORAGE BATTERY CO.
CLEVELAND, OHIO

Whatever stops a bus from
making miles stops that bus
from making money. And even
the slightest crack in the
battery case, or the slight-
est imperfection in the seal
between battery jars and
covers, may be the cause of
lost mileage -- lost profits
-- lost good will.

F. A. Willard

Willard Batteries



Its sheer cut beauty belies its **STRENGTH**

A beautiful job.

There's no other way to describe it. From cowl to rear bumper, from front step to rear seat, exterior and interior—the Fitzjohn body is as inviting as the costliest limousine and as comfortable.

Passengers sense this. Small wonder then that Fitzjohn bodies not only draw passengers, but help build up profitable bus operation.

To the operator, Fitzjohn offers a bus body of enduring strength and maximum bus hours in

service, under road, weather or traffic conditions at their worst.

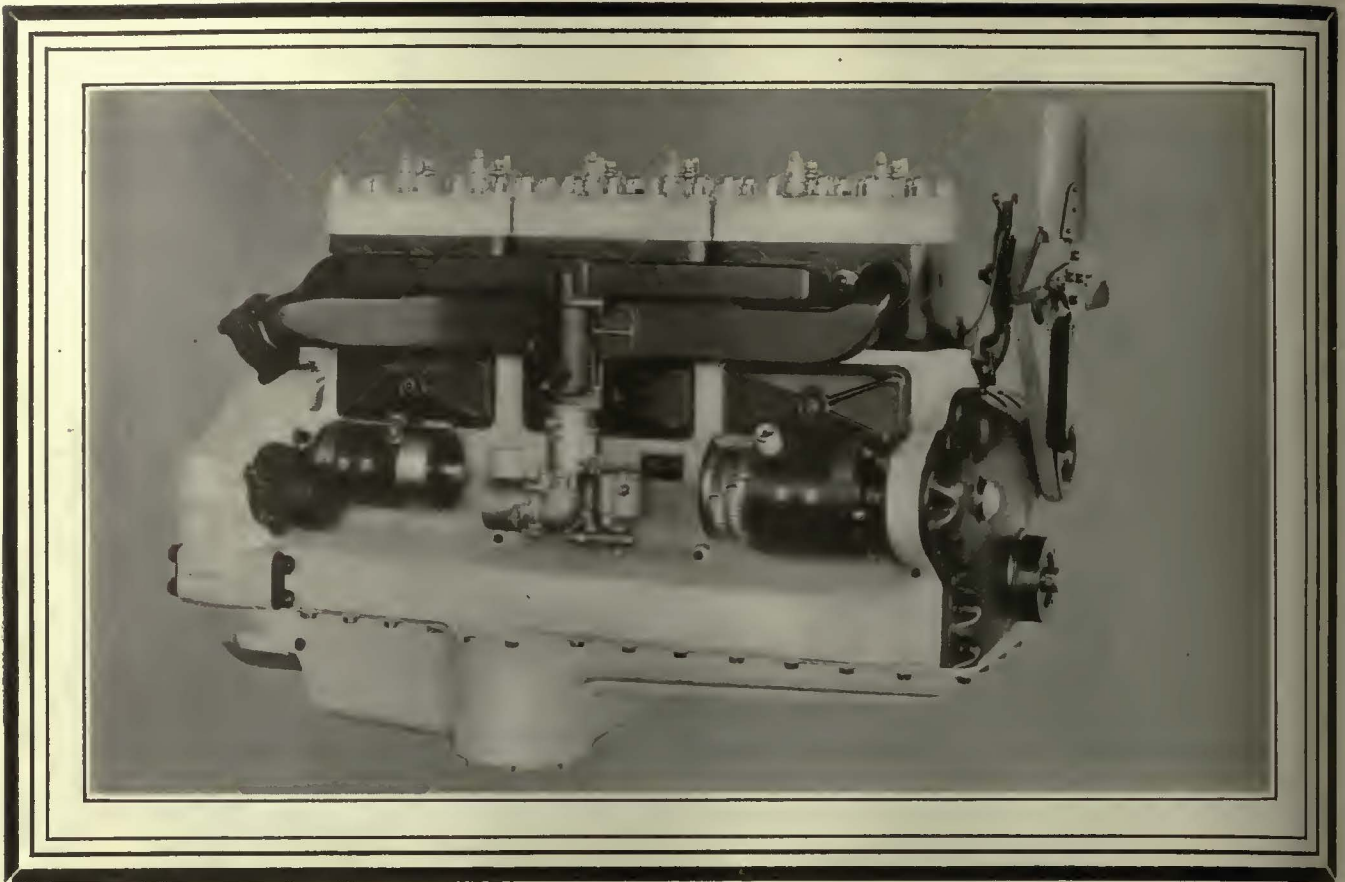
And in beauty of coach work, Fitzjohn presents a finish which in durability matches the ruggedness of construction of floor, framework, roofing and siding.

Specify Fitzjohn bodies, city or de luxe type, for any chassis in your next bus order. The same enduring strength and beauty is inherent in every job.

Fitzjohn

MANUFACTURING COMPANY

Muskegon, Michigan



There's Always a "Kick" in the Battery!

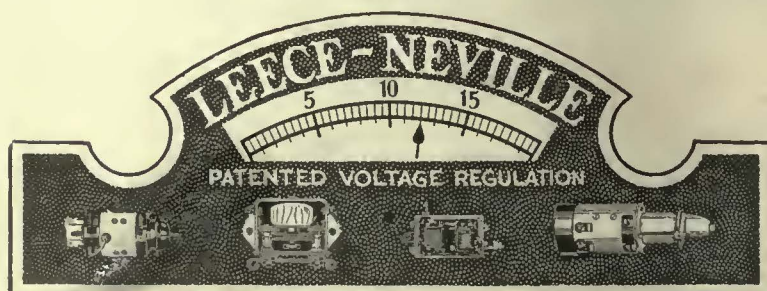
So
Waukesha Uses
LEECE-NEVILLE
Patented Voltage Regulation

Starting and lighting worries cease to exist when motor coaches are equipped with Leece-Neville Patented Voltage Regulation. There's always a "kick" in the battery!

Correctly charged for all conditions, Leece-Neville equipped batteries thrive on hard work. Records of 125,000 miles without removal for repair are not unusual.

Long life is inherent in batteries hooked up with Leece-Neville Patented Voltage Regulators. Motors start readily under severest service. Lights burn brightly and steadily at all times.

That's why manufacturers of the better motors and motor coaches specify Leece-Neville Patented Voltage Regulation as standard equipment.



THE LEECE-NEVILLE
COMPANY
5353 Hamilton Ave.
Cleveland, Ohio

Every year,
at the Show, you can
find somebody's idea of
a better dual wheel
- - - but every year,
at the Showdown, you
find only Budd-Michelin

BUDD

WHEEL COMPANY, Detroit





The Brooklyn City Railroad Company uses a fleet of 19 White Trucks in construction and maintenance work.

First Place in Electric Railway Construction and Maintenance Service

Construction and maintenance is a vital part of Electric Railway operation. For years White Trucks have been the outstanding choice of Electric Railways in every section of the country.

Dependability of service and economy of operation are responsible for the fact that, today, over 200 Electric Railways are using White Trucks in a wide variety of service.

White's position of leadership in the Electric Railway Field is due primarily to its long record of efficient, economical and dependable service. Added to this is the quick adaptability of White Trucks to every kind of construction and maintenance work that has made them an indispensable part of Electric Railway operation.

51 Electric Railways operate 2,109 Whites in fleets of 10 or more

American Power and Light Company.....	42	Los Angeles Railway Corporation.....	22	Rio de Janeiro Tramway, Light and Power Co.	10
Boston Elevated Railway Company.....	138	Louisville Railway Company.....	17	Saginaw Transit Company.....	34
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THE WHITE COMPANY, Cleveland

WHITE TRUCKS

and WHITE BUSES

“Richmond Service Is Good”

Use 93 Whites in Unified System



One of a fleet of 93 White Busses in the Service of the Virginia Electric and Power Company

THE Virginia Electric and Power Company, in co-ordinating bus and rail transportation, advertises, and justly so, that “Richmond Service is Good.” By acquiring numerous independent bus lines, coupled with the purchase of a large amount of new equipment, the company has put into effect a complete plan of transportation unification in the cities of Richmond, Norfolk, Petersburg and Portsmouth. Together with other equipment, 93 White Busses are used.

In projecting its unified bus and rail transportation system the company was convinced that motor busses are an essential part of city and intercity transportation; that both electric cars and busses can and should help and supplement the other.

The company's cars and busses during 1927 will carry more than 100,000,000 passengers. Nearly 1,000,000 passengers were carried by bus alone in Norfolk the first month under the reorganization plan.

Busses are considered invaluable because of the

help they render in the development of suburban areas and in augmenting city service. They are flexible and permit additions or changes in accordance with their capacity for developing profitable operations. Unified transportation is looked upon as a form of insurance on original investment.

The Virginia Electric and Power is one of numerous companies that have found White Bus operation profitable. White Busses and Trucks are used by hundreds of independent operators and by more than 200 steam and electric railroads.

THE WHITE COMPANY, *Cleveland*

WHITE BUSES

FOURS AND SIXES

At the Convention—



you saw
them all—

now
buy your choice

MASSACHUSETTS MOHAIR PLUSH

The railroad standard for over 35 years

You saw all the various materials for modern car upholstery at the Convention. Now you know that you can't do better than plush!

Passengers riding on plush are supported on myriads of little springs

—the utmost in ease and luxury. Furthermore, the newest patterns and colorings provide all you could want in luxurious practical upholstery for every type of service. Specify Plush in your next order.

Quotations and samples on request.

MASSACHUSETTS MOHAIR PLUSH CO.

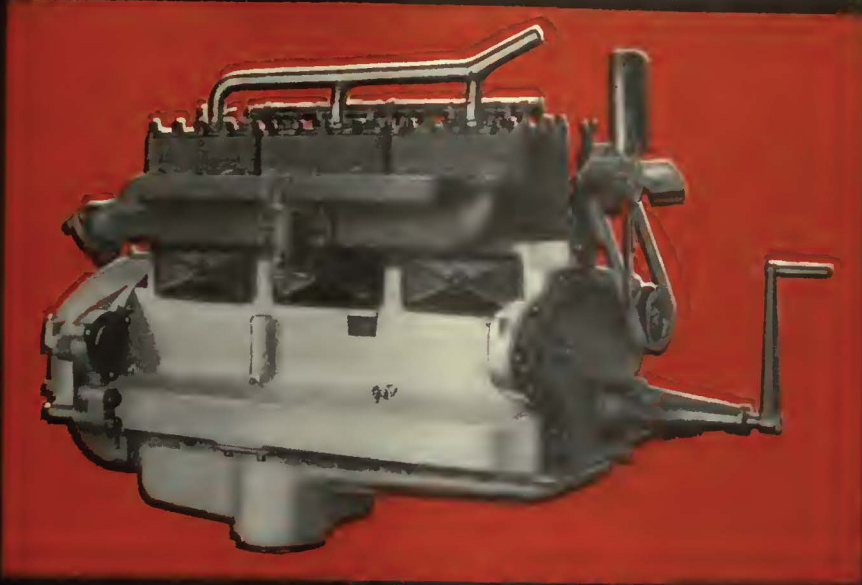
Main Office: 80 Federal Street, Boston, Mass.

Makers of BAY STATE PLUSH

New York Agent:
Sisson Supply Co.
1845 Grand Central Terminal,
New York City

Western Agent:
Midgley & Borrowdale
1822 McCormick Building
Chicago, Illinois

Models "6-AB," "6-HB" and "6-QB"



Heavy Duty Waukesha Six Cylinder Bus engine built in three sizes, 80, 100 and 120 Horsepower. Used in such parlor coaches as Versare, C. H. Will and Fageol. Described in Bulletin No. 592.

Model "6-KS"

This is an intermediate size of Waukesha Heavy Duty Six Cylinder engines, developing 75 horsepower and suitable for parlor coaches up to 18 or 20 passenger capacity such as built by Fageol. Described in Bulletin No. 628.



Model "6-XL"

For the "Twin Coach" two of these specially designed 50 horsepower six cylinder Waukesha engines of this type are used. Full description in Bulletin No. 625.



To those who did not see these engines at the A. R. E. A. Convention, we will be pleased to forward any of these Bulletins in which you are interested.

A-765-LC

AUTOMOTIVE EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY

Waukesha

(Eastern Sales Offices: Eight W. 40th St., New York City)

Wisconsin

Exclusive Builders of Heavy Duty Automotive Type Engines for Over Twenty Years

Comfortable seats

—and H & K Seats provide



No. 900-D

No. 900-D—all leather double stationary chair with deep individual seat cushions and divided back. For buses and interurban cars.

No. 900-D—double chair without arm rest. For city type cars.

No. 392-A—double Walkover seat with divided spring edge back and double deck spring edge cushion. For city service.

No. 392-A—double Walkover seat with plain spring back and double deck spring edge cushion. For city type cars.

No. 392-EE—finest type Walkover seat with extra high three part head-roll. For interurban service.

No. 900-D—combination plush and leather double stationary chair with deep individual seat cushions and divided back. For buses and interurban cars.

H & K seats are made in types and styles for every class of service.

Send for the H & K Catalog to get complete descriptions.



No. 900-D
(without armrest)



No. 392-A
(with divided cushion and back)

Hale and
Kilburn

SEATS

Have rider appeal most comfort in every type of service

EVERY day it becomes more apparent that if electric railways are to compete on an equal basis with other forms of transportation, they must provide service that has *rider appeal*. And there's no stronger appeal than luxuriously comfortable seats.

Hale & Kilburn Seats are designed primarily to provide this passenger comfort. But they are also strong, durable and graceful—a distinct asset in selling a service to the public.

They are the result of more than fifty years of seat building experience applied to the seat problems of the modern electric railway car.

One of our representatives will be glad to consult with you at your convenience.

HALE & KILBURN COMPANY

General Offices and Works:

1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., 30 Church St., New York.
Hale & Kilburn Co., McCormick Bldg., Chicago.
E. Thornwell, Candler Bldg., Atlanta.
F. Bodler, 903 Monadnock Bldg.,
San Francisco

T. C. Coleman & Son, Starks Bldg., Louisville
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 46 Front St., Portland, Oregon



No. 900-D



No. 392-BE



No. 392-A
(with plain cushion and back)



Cincinnati is using "Globe" transfers



THE Cincinnati Street Railway Company operates 48 lines of street cars and coaches, with inter-transfer.

To facilitate the rapid movement of passengers and to guard against abuses of transfer privileges, the Company adopted the Globe P. M. Coupon feature.

'Globe P. M. Transfers' simplify and insure proper fare-collection to the fullest possible extent by their safeguards against round-tripping.

Our representative will co-operate with you in working out your specific problems.

Specialists
for half a
century

Globe

TICKET COMPANY

112 North Twelfth Street
PHILADELPHIA

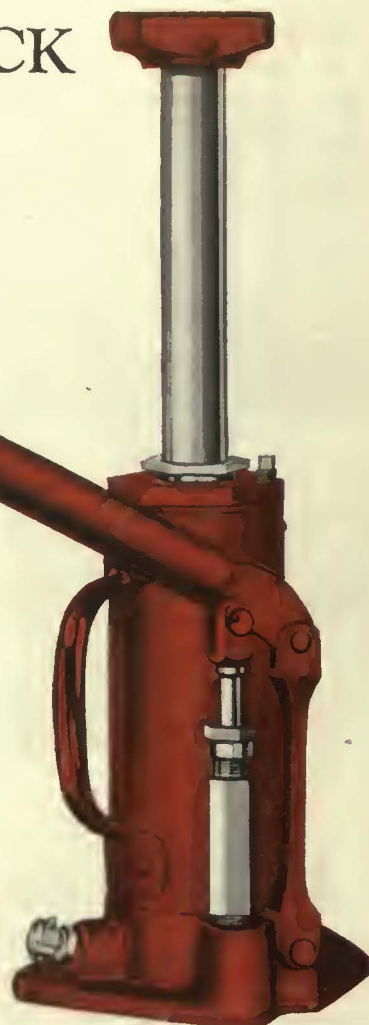
NEW YORK BOSTON BALTIMORE CLEVELAND LOS ANGELES

The MOTORTRUCK JACK

for Heavy Trucks and Fleets



Lifts
Load and all
an easy one-man job



The "Motortruck"

3 models, lifting from 9-in. to 14 1/2-in., 11-in. to 17 1/2-in., 11-in. to 18-in. heights

ONE tire change without removing the load, pays for the Blackhawk "Motortruck"—a sturdy, rugged jack built for years of hard work. Earns its cost, repeatedly, in time-saving, dependable service.

Lifting the most heavily loaded, giant-sized truck is an easy one-man job. The 7-ton or 12-ton Motortruck Jack is low enough to go under any truck when tire is flat. It lifts high enough to put on the inflated spare easily.

Any length handle stroke raises the load. Lowering is automatic—turning release valve with handle lowers load without pumping. Operator controls the speed. The whole job is one-man capacity—and absolutely safe.

Details and prices of the complete Blackhawk line (1 1/2 to 60 tons capacity), and list of important truck and fleet owners using Blackhawk Jacks, will be gladly sent to you.

BLACKHAWK MFG. CO.

Dept. E. U., Milwaukee, Wisconsin

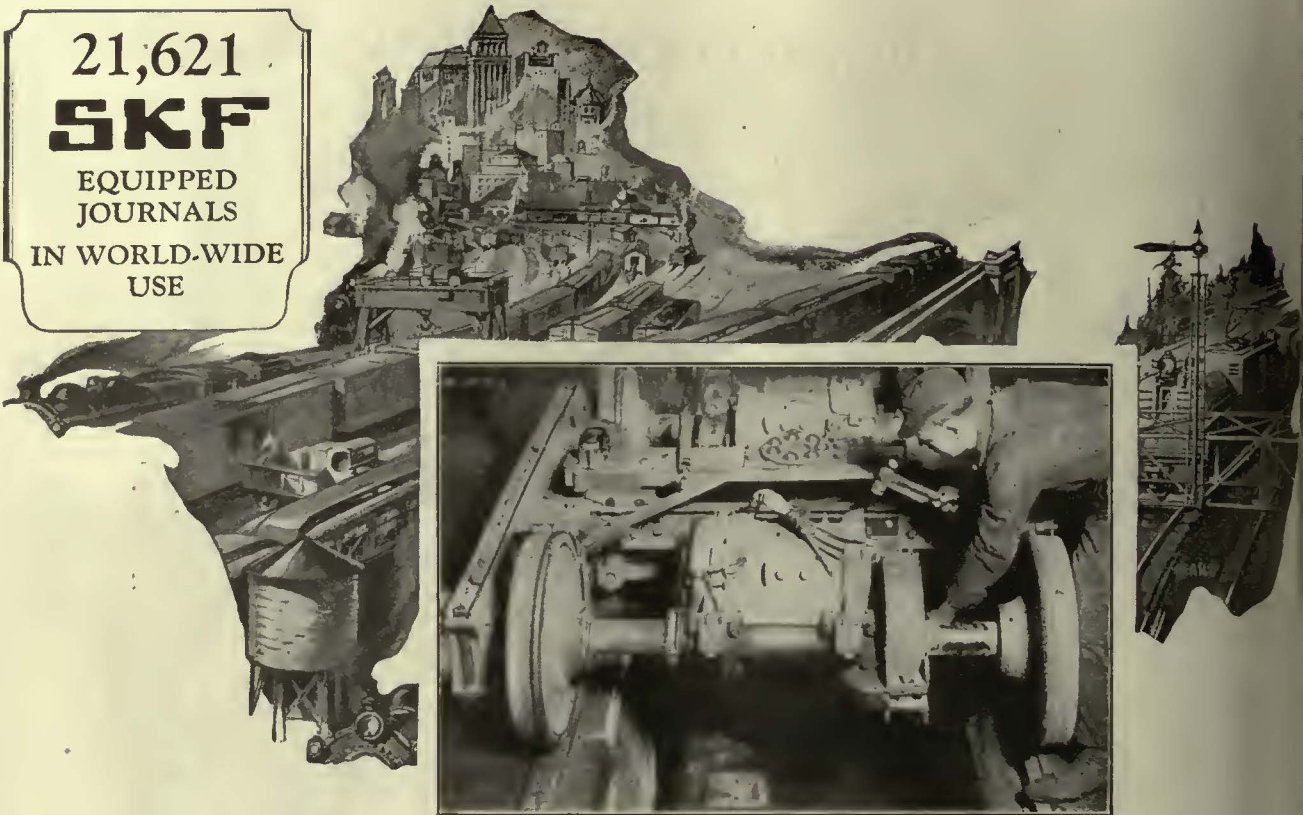


The "Motorcoach"

for busses and speed delivery fleets, lifts seven tons. Can be placed under low chassis for tire changes. Collapsed 8 1/2-in. high. Extended 16 1/2-in. high. Short strokes and long handle permit easy operation by one man, regardless of overhang or platform. Neither passengers nor load need ever be disturbed.

BLACKHAWK JACKS HYDRAULIC OIL-POWER

21,621
SKF
 EQUIPPED
 JOURNALS
 IN WORLD-WIDE
 USE



SKF-Equipped Journals and Motors Please Public and Save for Management

“THE public be pleased” plus material operating advantages and economies are valid reasons why leading street railway companies are adopting SKF Journal Bearings for trucks and SKF Ball and Spherical Bearings for electric motors.

Thousands of miles of service have proved the long-life and ruggedness of

SKF Bearings. Shock loads, thrusts from rough or uneven track, these have little effect on the easy running qualities of SKF Bearings. On motors, they maintain original clearances, initial efficiency and reduce electrical troubles to a minimum. Misalignment of pinions and noisy gears are also eliminated.

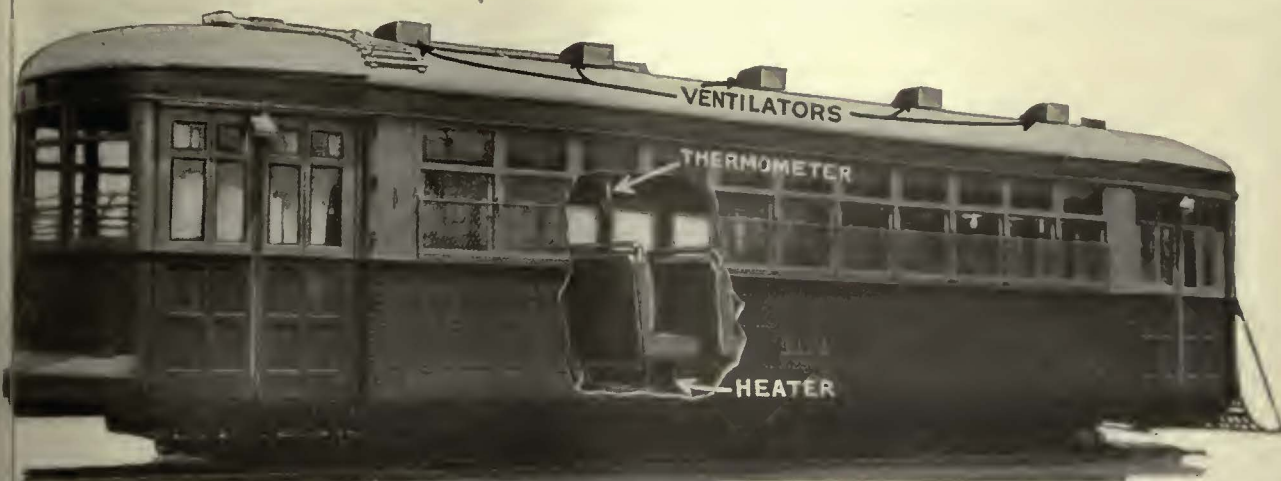
SKF INDUSTRIES, INCORPORATED, 40 East 34th Street, New York N. Y.

1906



Ball Bearings

Roller Bearings



Railway Utility Equips 715 Cars at Kansas City

The Kansas City Public Service Company has gone a long way to insure comfort for its riding public in the rehabilitation schedule on 715 of its cars. Among other equipment specified for the modernizing of its cars are:

Utility Compensating System of Natural Ventilation

Utility Thermometer Control of Car Temperature

Utility Electric Car Heaters

Let us figure with you on your requirements, either for new equipment or for modernizing the existing facilities.

Address nearest office:

Railway Utility Company

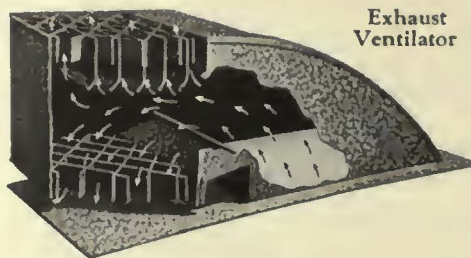
2241 Indiana Avenue, Chicago

Branch Offices: New York, Detroit, Denver
St. Louis, Montreal



Intake Ventilator

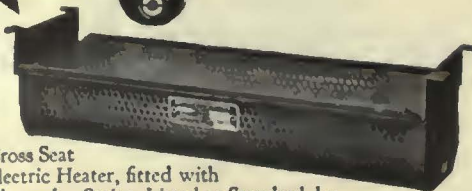
Compensating System of Natural Ventilation keeps the air in the car pure and wholesome



Exhaust Ventilator



Thermometer Control keeps the air in the car at uniform temperature, avoids spread of contagious disease by preventing overheating of car.



Cross Seat Electric Heater, fitted with Chromalox Strips. Listed as Standard by Underwriter's Laboratories. Delivers 100 per cent output for electric energy input.

A SERVICE

The Standard Oil Company (Indiana) offers the services of its staff of trained lubrication engineers.

A member of this staff will be glad to visit your plant and after familiarizing himself with the particular conditions under which your machinery operates, he will recommend the grades of oils and greases and the correct methods of application which will keep your equipment running at peak efficiency.

The profits you make depend, to a large degree, upon the efficiency with which your machinery operates. Long periods of faultless operation increase your profits. But it is only through the use of proper lubricants that you can hope to receive this type of service.

The oils and greases made by this company are the highest quality and dependability that present day knowledge and skill can produce. Every grade of

Standard Oils and Greases

is made with scientific accuracy to insure the best possible lubrication when used according to the recommendations of our engineers. No matter how modern or how complicated your equipment may be, there is a lubricant in the line of Standard Oils and Greases that will exactly suit the lubrication needs of each unit.

To avail yourself of the services of our lubricating engineers does not obligate you, and you are free to follow their recommendations and suggestions as you see fit.

Write or phone our nearest branch office. We will send an engineer to consult with you regarding the proper lubrication of your equipment.



STANDARD OIL COMPANY

(Indiana)

910 South Michigan Avenue

Chicago, Illinois

VERSARE

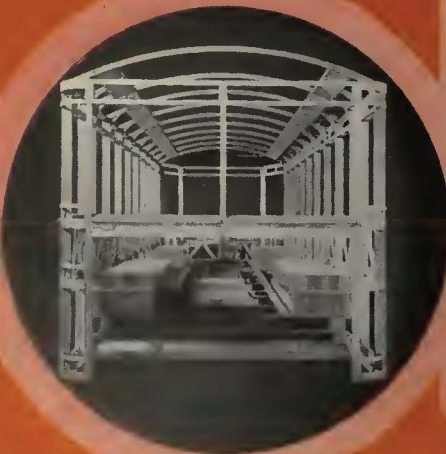
*interprets the
Convention's
Message*

!

**Meeting
the requirements
of better transportation
in the great majority
of American cities**

Comfort—Capacity

A “happy medium”
perfectly co-ordinated



The **VERSARE** Six-Wheel Rail Unit

1. Weighs only 13,500 lbs.
2. Built entirely of Duralumin and light alloy steel.
3. Four wheel, single motor automotive type drive bogey in rear. Two wheel automotive type single motor drive axle in front.
4. Patented *Versare Equalizer*— floating ease in riding.
5. All body sections interchangeable with standard replacement units.
6. Drive truck and motors removable complete in half an hour.
7. High speed with safety.
8. Maximum passenger capacity with exceptional comfort. 32 seated, 32 standing.
9. Silent operation.
10. *Westinghouse Standard Motors*, control and safety air brake equipment. Internal band brakes.
11. Highest quality standard equipment throughout.

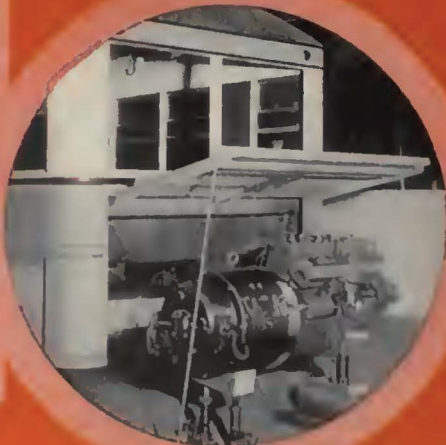
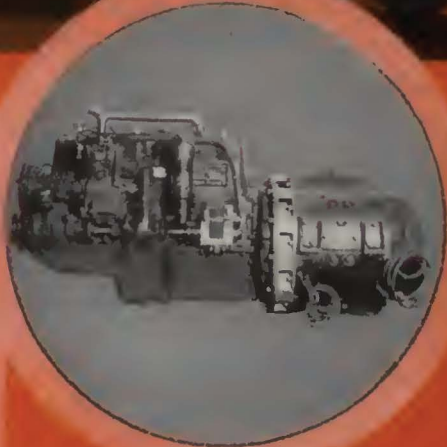
—Speed and Safety

combination in two
transportation units



The **VERSARE** Six-Wheel Highway Unit

1. *No chassis.*
2. *Duralumin rigid truss construction in accordance with railroad practice.*
3. *Body maintenance practically eliminated.*
4. *Unit Power Plant mounted at rear. Quickly removable without crane.*
5. *Radiator and fan units separate from power plant. Easily removed from side of body.*
6. *No engine heat, oil or gas fumes can enter body.*
7. *Body built of interchangeable units identical with those of the eight-wheel vehicle.*
8. *Versare Hercules-Westinghouse gas electric drive. Two 33-hp. vehicle traction type motors.*
9. *Turning circle of 56 feet.*
10. *Electric brake. Westinghouse air service brakes and mechanical emergency brake.*
11. *Versare Patented Equalizer at rear drive axles— floating ease in riding.*



Details of VERSARE design that form the basis of a NEW standard in operating economy - - -

No. 1

How Versare engineers have practically eliminated body maintenance - - - - -

At least one installation of Versare transportation units has completed between 125 and 150 thousand miles of service with absolutely no body maintenance of any kind.

Transportation men will agree that this is a record. How has it been accomplished?

Briefly, Versare engineers have developed and perfected an entirely new method of body building based on the girder-like truss construction well-known to railway designers. Both the rail and highway units are built of standard interchangeable sections under this plan, and by making use of the

most recent developments in light-weight Duralumin alloys it has been possible to use sections of generous proportions while drastically reducing the total weight of the structure.

Versare Units in service immediately strike the observer as being perfectly rigid. The usual rattles and squeaks do not develop. Windows and doors operate smoothly and quietly after years of running. There is, indeed, practically no depreciation as at present understood, and even after the vehicle is finally written off the books, the Duralumin commands an excellent scrap price.

**VERSARE CORPORATION
Albany, N. Y.**

VERSARE

The Economical Quick and Improved
DeVilbiss Way of Refinishing

Cuts Maintenance Costs



to lowest
possible
point

Completeness and dependability of DeVilbiss Spray-finishing Equipment for every street railway car and bus painting requirement—advantages and economies derived from its use—vast experience and resources of DeVilbiss organization, ALL were demonstrated and explained at the great A.E.R.A. meeting just held in Cleveland.

It has been definitely proved that every operator of passenger carrying equipment can make highly profitable use of this quick and improved finishing or painting method.

Now let DeVilbiss engineering and service forces go further (1) in studying your individual finishing problems and (2) in outlining the unit of spray-finishing

equipment that will adequately and economically meet your individual needs.

Winter is at hand. It takes great toll of paint. Now is the time to prepare and protect. Consider the full value of speed of operation—of improvement in quality of work—of elimination of shop congestion—of better working conditions—of greatly cut maintenance costs, when your refinishing is done the DeVilbiss way. Let us work with you. Address—

THE DEVILBISS COMPANY
272 Phillips Ave. TOLEDO, OHIO

New York
Indianapolis
Cincinnati

Philadelphia
San Francisco
Milwaukee

Chicago
Pittsburgh
Minneapolis

Detroit
Cleveland
St. Louis

Windsor, Ontario

DeVilbiss
Spray-finishing System

For more than 35 years the name DEVILBISS has stood for practical, honest and dependable products



S P E C I F Y —

For
 Assured Safety
 Lower Maintenance
 and
 Longer Service



STANDARD STEEL

Philadelphia, Pa.

CHICAGO

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B
 POR



STANDARD"

WHEELS
 ARMATURE SHAFTS
 AXLES
and
 SPRINGS

WORKS COMPANY

York: Burnham, Pa.

ES:
 MON

SAN FRANCISCO

ST. PAUL



PITTSBURGH

MEXICO CITY



A Remarkable Piece of Steel

THE Empire New Process Bolt is one of the most remarkable pieces of metal in the world. Manufactured in millions on wonderful automatic machines and shipped to all parts of the world, the marvel is that every one of these millions is just as accurate, held to just as close

limits as every other one and the tensile strength is unvaryingly in excess of 80,000 lbs.

Such uniformity of accuracy and strength is characteristic alone of Empire New Process Bolts owing to the special machinery and processes

invented, controlled or adapted by this company. The strength and lasting qualities of all manufactured products using Empire New Process Bolts are automatically increased over such products using ordinary bolts. Yet there is no difference in price.

Samples for testing will be furnished to responsible concerns.



This is the shadow of an Empire New Process Bolt Thread as shown on the Chart of the Screw Thread Comparator.

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY PORT CHESTER, N.Y.

Branch Office: Scripps Building CHICAGO	Branch Office: General Motors Bldg. DETROIT	Branch Factory: ROCK FALLS, Ill.	Strimple & Gillette 160 Jackson Street SEATTLE	Maydwell & Hartzell, Inc. 158-168 Eleventh Street SAN FRANCISCO
-----------------------------------------------	---------------------------------------------------	----------------------------------------	------------------------------------------------------	-----------------------------------------------------------------------

Makers of Bolts, Nuts and Rivets Since 1845



This is the shadow of the thread of a hardened and ground gauge, as shown by the Screw Thread Comparator.

EMPIRE

Threads of Gauge-Like Accuracy



New Process BOLTS

Over 80,000 lbs. Tensile Strength



The DIFFERENTIAL CAR

is more than just a dump car

it is a

METHOD

Track built by the Differential Method is economically built.

The Differential Method is the Approved Method of More Than 66 Railways—

AT THE CONVENTION You Saw

THE DIFFERENTIAL CAR

THE DIFFERENTIAL LOCOMOTIVE CRANE CAR

THE CLARK CONCRETE BREAKER

THE DIFFERENTIAL BODY—3-WAY DUMP

You saw them work.

You could visualize them at work on your road.

Now: Let us give you figures showing actual savings in time and labor by representative roads using the differential method.

The
DIFFERENTIAL
STEEL CAR CO.

FINDLAY, OHIO



The Differential Body—3-Way Dump

VIZABLED G
 PATENTED
SAFKAR
 TRADE MARK REG.
SAFSTEP

Get 'Em On and Off Safely

Whether they "step lively" or lag—whether they "watch their step" or not—whether they have "spike heels" or others—they'll get on and off safely if your cars have "Safkar Safsteps."

Slip-proof, miss-proof, all-steel, non-slipping in all weathers, "Safsteps" will cut your car step accidents 90%—beside reducing your maintenance costs in substantial degree.

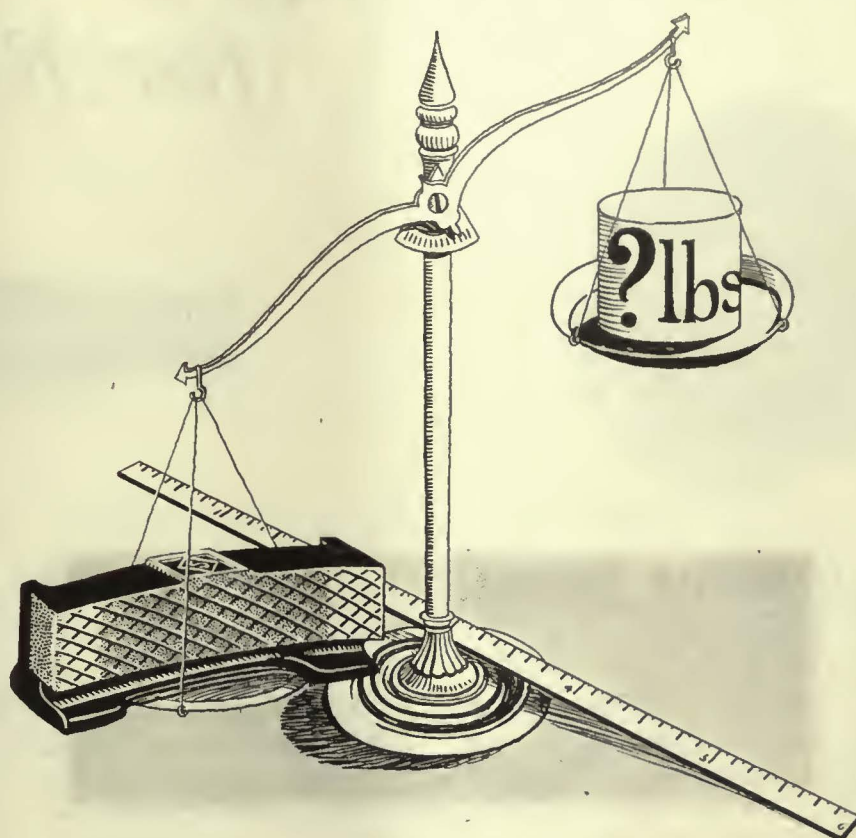
Ask us for Bulletin D-28



IRVING IRON WORKS CO.
 LONG ISLAND CITY, N.Y. U.S.A.

Established in 1902

ATLANTA GA BALTIMORE MD BIRMINGHAM ALA BOSTON MASS BUFFALO N.Y. CHICAGO ILL CINCINNATI OHIO
 CLEVELAND OHIO DALLAS TEXAS DENVER COLO DETROIT MICH EL PASO TEXAS HAVANA CUBA HOUSTON TEXAS
 INDIANAPOLIS IND KANSAS CITY MO KNOXVILLE TENN MEXICO CITY MEX MILWAUKEE WIS MINNEAPOLIS MINN MONTREAL P.Q
 PHILADELPHIA PITTSBURGH PA ST. LOUIS MO SAN FRANCISCO CAL SALT LAKE CITY UTAH SEATTLE WASH SCRANTON PA UTAH



What Do Your Brake Shoes Weigh In Foot Pounds?

Were they measured by "dead weight," all brake shoes of an equal weight would be of equal value. But their worth depends upon foot pounds of work and American Brake Shoes *deliver* more work per pound of metal. Their value, therefore, rises to a point outdistancing all difference in price and returning lower brake shoe costs in electric railway service.

"Best by Test"

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

**30 CHURCH ST., NEW YORK
332 S.O. MICH. AVE., CHICAGO**

BETHLEHEM RAIL

for Electric



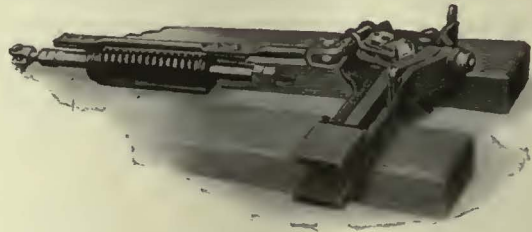
Ore to Finished Trackwork

All materials, rails, plates, bars, forgings, castings, bolts, etc., are made in Bethlehem Plants—from ore to finished product under Bethlehem constant supervision.

Great care and attention is given to special layouts. Before shipment layouts are assembled to make sure that they will correctly meet conditions in the field.

The fitting up work is done under roof where workmen are shielded from inclement weather, thus enabling them to do accurate work.

Bethlehem manufactures all types of frogs, switches, crossings and special layouts for Electric and Steam Railways; also mine track.



*Parallel Throw Switch Stand
Model 1222—43/4-in. high*



Center Rib Base Plate



Abbot Base Plate

BETHLEHEM

RAILWAY PRODUCTS

railways

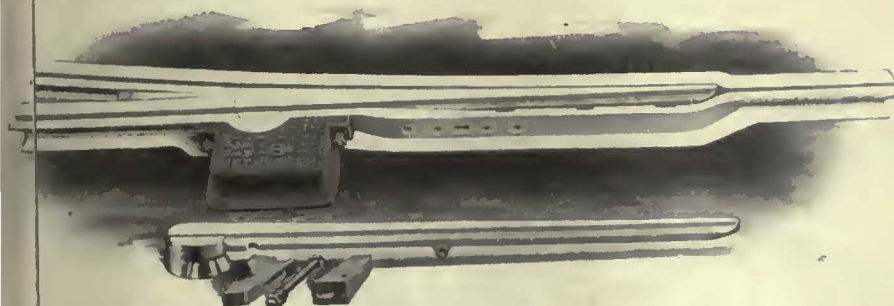


Bethlehem Track Specialties include:

Special Trackwork; Tee and Girder Rails; Special Splice Bars for Welding; Machine Fitted Joints; Abbott and Center Rib Base Plates; Tie Rods; Bolts; Pole Line Material; Rolled Steel Wheels and Forged Axles.

Special Trackwork and Layouts

Catalog Sent on Request.



Solid Manganese Tongue Switch, Design 905



New Century Switch Stand Model 51-B

BETHLEHEM STEEL COMPANY *General Offices: BETHLEHEM, PA.*

District Offices: New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Buffalo
Cleveland Cincinnati Detroit Chicago St. Louis San Francisco Los Angeles Seattle Portland

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

BETHLEHEM

—and the reports all read
“Fort Pitt Springs O.K.”

For more than 20 years on leading railway properties, reports have read “Fort Pitt Springs O.K.” Thus they have reduced maintenance costs and have cut down idle car time in the repair shop—which means more hours of actual service out on the road.

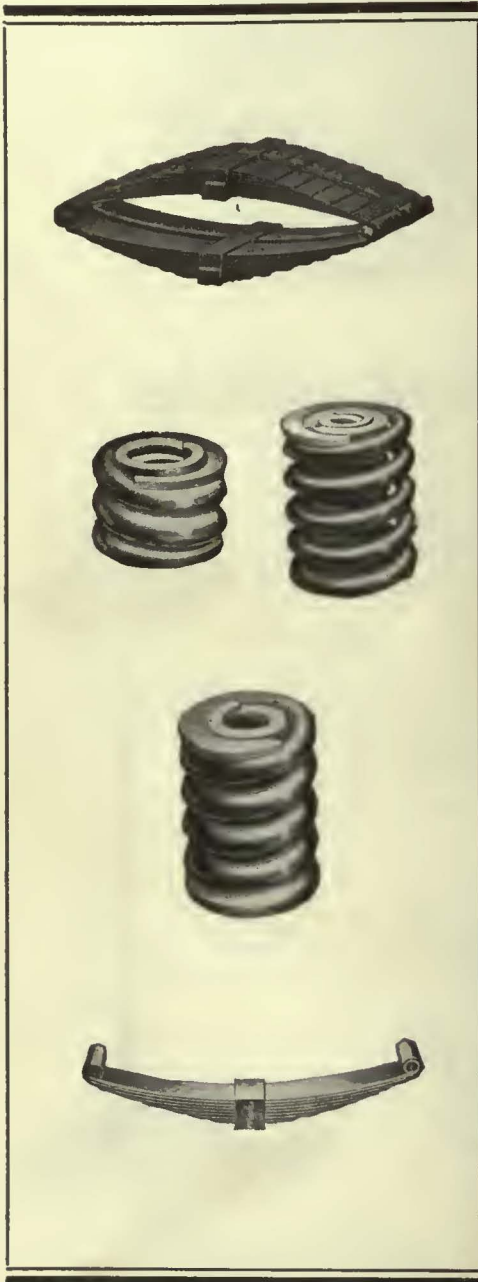
And Fort Pitt Springs will increase your revenue by increasing your patronage because of their quiet, comfortable-riding qualities.

Among our many items are—

Full Elliptics for Car Trucks; Half Elliptics for Locomotive and Cars; Special Types of Quarter, Half and Three Quarter Elliptics for Electric Railway Service. Drawbar Springs, Equalizer Springs, Extension Springs.

*Quotations on request. Prompt shipments guaranteed.
 Ask for our Catalog and Specification Book.*

Fort Pitt Spring & Manufacturing Co.
 Pittsburgh, Pa.



**FORT
 PITT**

More Miles of Service per dollar invested

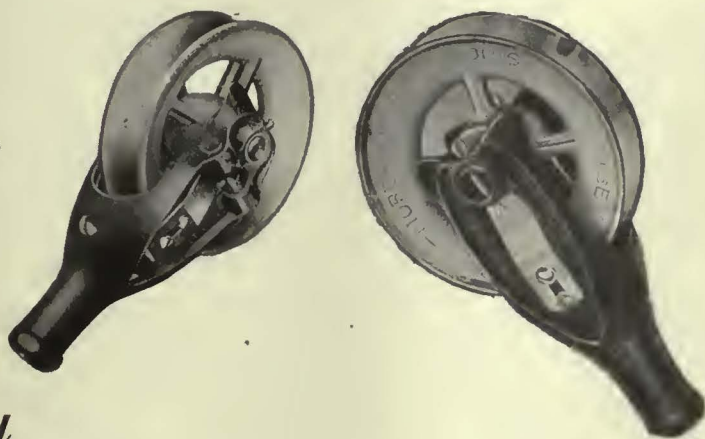
More-Jones Quality Products cut down maintenance requirements and make better service possible. Both large and small traction systems can profitably standardize on these products. In figuring operating costs it is easy to see that More-Jones Quality Products are

“lowest in ultimate cost and highest in net efficiency.”

The uniformity of More-Jones Quality Products is known wherever used and can be depended upon.

Why not have the benefit of More-Jones experience in making quality electric railway equipment.

Trolley Wheels and Harps



“Tiger” Bronze Axle and Armature Bearings



Let us
give you
complete details
and prices



M-J Armature Babbitt

More Than 50 Years of Service

MORE-JONES QUALITY PRODUCTS

NATIONAL BEARING METALS CORPORATION

St. Louis, Mo.

RAILS

NEW AND RELAYING



1 ton or 1000

Sooner or later you will need rails and accessories for new sidings, extensions or track repairs. When you do, you will want them in a hurry! Order from FOSTER—the only Warehouse in the U. S. where you can get complete track equipment, rails and accessories, 1 ton or 1000 tons, shipped within 1 to 24 hours after receipt of order. Quality always guaranteed—prices that do make a difference.

L.B.FOSTER COMPANY
PITTSBURGH ~ CHICAGO ~ NEW-YORK

If you have ever run a real gear test, and
You have followed it through until you
Know how long the different grades last, then
Relative Gear Quality

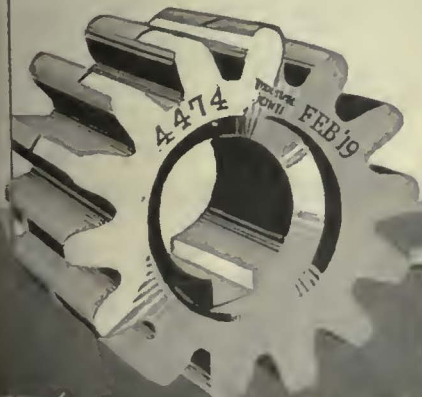
Will cause you to specify

“Tool Steel” Quality

We have available figures and data
compiled from comparative tests
which prove this statement.

The Tool Steel Gear & Pinion Co.

CINCINNATI, OHIO



The Standard of Quality

TOOL-STEEL QUALITY
GEARS AND PINIONS

The steadily growing



TROLLEY WIRE

Hitenso C
(High Strength Bronze)

Hitenso A
(Medium Strength Bronze)

Anaconda Tin Bronze
(High and Medium Strength)

COPPER WIRE AND CABLE

Bare and Weatherproof

Messenger and Guy Wire

Lead Sheathed Cable
Paper Insulated

Varnished Cambric Cable

Lead Sheathed or Braid Covered

ANACONDA

Responsibility of WIRE

AMONG those electric railway companies which have blazed the trail in modernization, there is hardly one whose lines do not show progressive improvement in overhead construction and maintenance.

Wire has shouldered a steadily growing responsibility. Not only has traffic become heavier, but operating speeds and public standards of safety have been raised with the growth of transportation needs. Wire must be more dependable, longer-wearing, and more accurately fitted to its applications, than ever before.

Anaconda Wire Products come to you backed by the experience and resources of the largest and most complete copper-producing organization in the world. Six wire mills offer a coast-to-coast service unequalled for promptness and dependability. Responsibility for the efficiency and economy of your modernized overhead distribution system could not be placed in more capable hands.

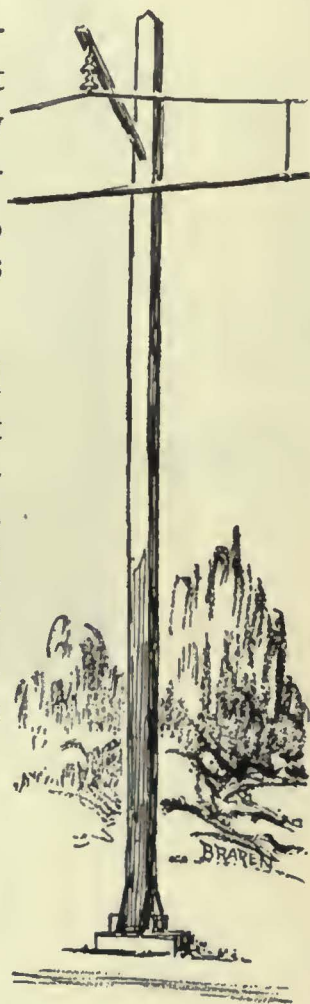
ANACONDA COPPER MINING COMPANY

THE AMERICAN BRASS COMPANY

Rod, Wire and Cable Products

General Offices: 25 Broadway, New York

Chicago Office: 111 West Washington St.



ROLLEY WIRE

What's Become of All the Wires?



*"Elreco" Combination Railway and Lighting Poles, St. Petersburg, Florida.
Note contrast between new "Elreco" poles and old wooden poles about to be removed.*

Gone, Never to Return!

Progressive companies realize that a confusion of poles and wires at the curb line are unnecessary and unsightly.

Replace them with Elreco Tubular Steel Poles, mounting modern lighting units. Elreco poles provide lightest weight, greatest adaptability, finest appearance, least maintenance, lowest cost.

Elreco combination railway and lighting poles permit inconspicuous stringing of wires at the top of poles. Underground conduits are eliminated, a tremendous saving in cost.

Consult us. Our entire facilities backed by twenty years' experience are at your disposal. Address—

The Electric Railway Equipment Co.

2900 Cormany Avenue

30 Church St., New York

Cincinnati, Oh

*"After all—
it's the Setting
that counts!"*



Only by the magic of complete relaxation may the golfer realize a perfect drive. Lang craftsmanship has built into a bus body the happy faculty for delivering its passengers soothed and rested — there's good will!

LB

The Sterling Mark on Bus Bodies

LANG BODIES

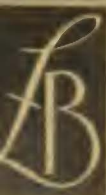


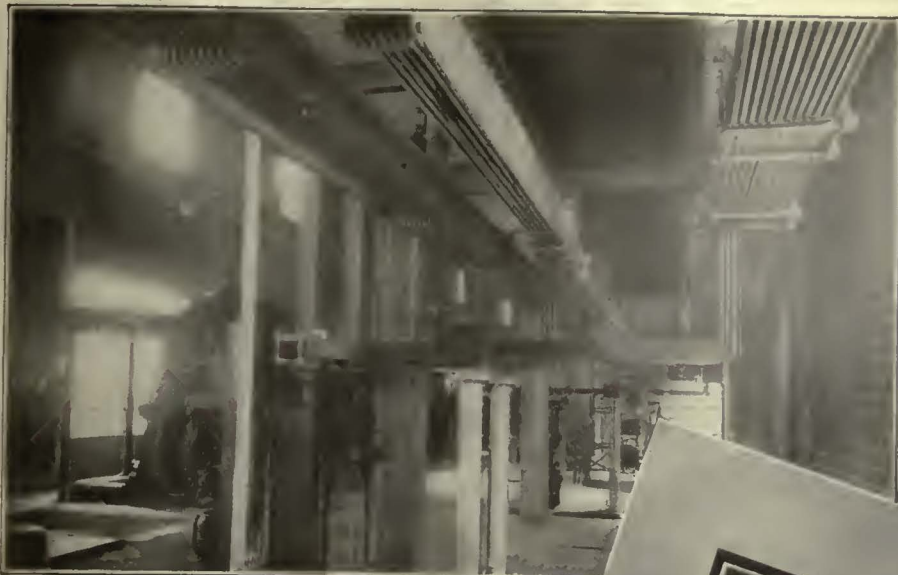
The Sterling Mark on Bus Bodies

LANG BODIES invite complete relaxation. Passengers yield instinctively to the soothing influence of the deeply upholstered seats and the many other refined appointments. Miles slip away with velvet smoothness. Long journeys

are made in comfort and safety. By surrounding passengers with every comfort and luxury, Lang Bodies help build revenue. By building strength into every detail of mechanical construction, years are added to body life.

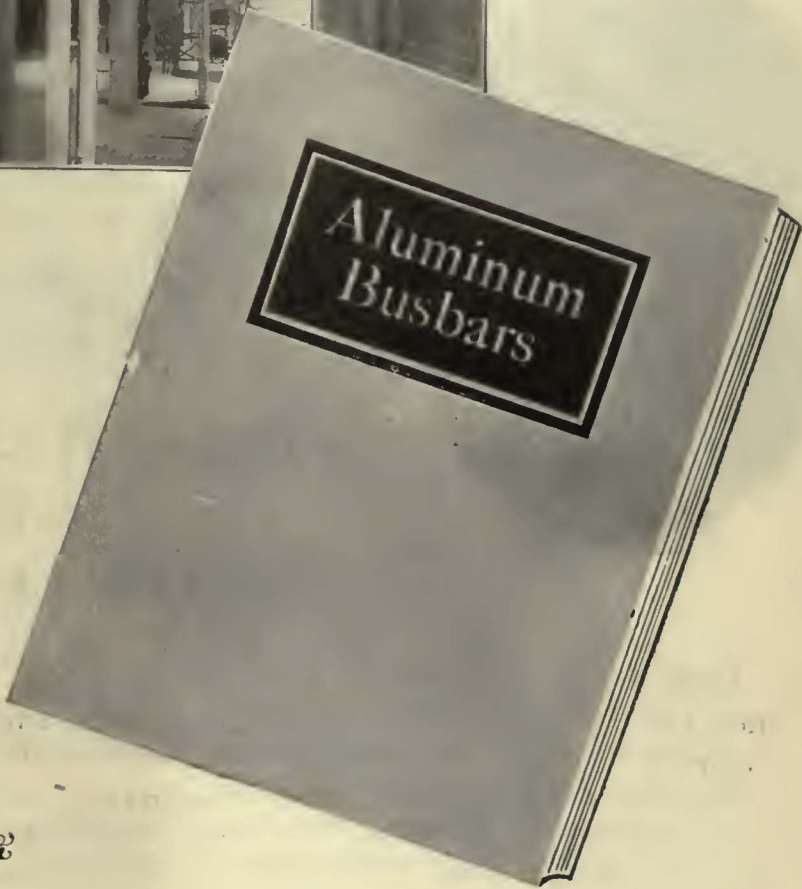
THE LANG BODY COMPANY, CLEVELAND, OHIO





24,000 Ampere Aluminum Bus Line showing connections to circuit breakers.

An interesting subject for Electric Railways and Industrial Stations using large blocks of power.

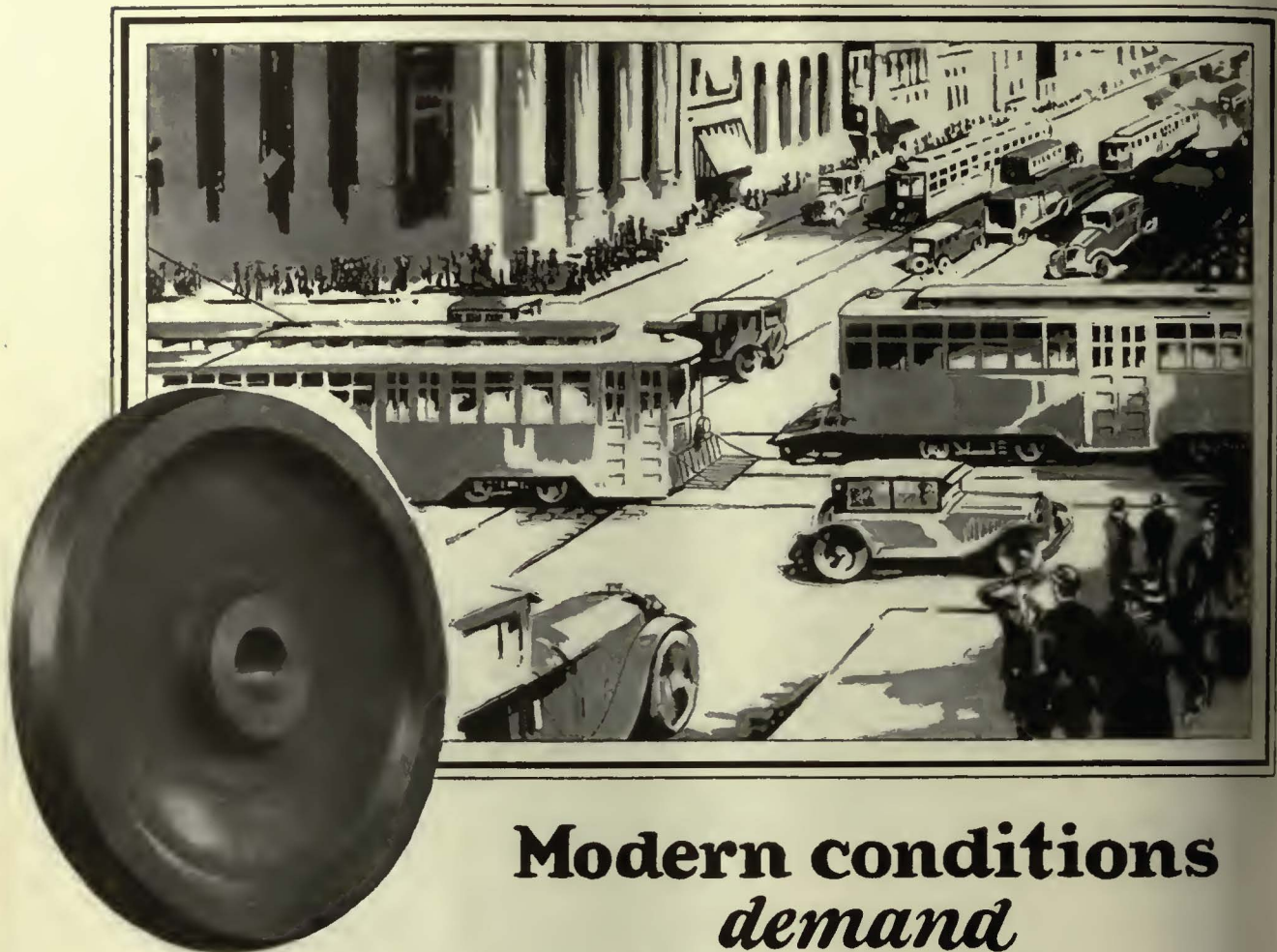


A new booklet

ALUMINUM BUSBAR

Send for your copy of this booklet which is just off the press. It is a brief text book containing the information required by designing engineers, including: Carrying Capacity, Joints, Deflections and Stresses; Specifications and Tables. Sent post-paid on request, no charge.

ALUMINUM COMPANY of AMERICA
 2303 OLIVER BUILDING - - - PITTSBURGH, PA.



Modern conditions *demand* modern equipment

Traffic conditions today are not what they were fifteen or twenty years ago. Equipment suitable then is now inadequate. Bigger cars, heavier loads, constant stopping and starting throw an ever increasing burden on equipment. Wheels bear the brunt of this burden.

Carnegie Wrought Steel Wheels assure high resistance to the wear and tear of modern traffic conditions. Wrought Steel is obtained through rolling and forging. A 10,000-ton hydraulic press (twenty million pounds!)

forces the defects out of the steel—insures a homogeneous structure, free from sand spots, blow holes, or other irregularities that might cause trouble. The rolling process rolls the mileage into the steel—mileage to spare. It is this extra mileage that makes Carnegie Wheels such an economical investment.

Before you invest in new wheels, investigate Wrought Steel. A catalogue will be sent at your request. Or one of our engineers will call, if you wish.

CARNEGIE STEEL COMPANY

General Offices • Carnegie Building • 434 Fifth Avenue

PITTSBURGH PENNSYLVANIA



\$2.67 per year per pole!



Amcreco creosoted southern yellow pine poles on a Georgia Power Company line.

ONE large utility operator with many miles of creosoted southern yellow pine pole lines, most of them Amcreco, reports an average annual saving of \$281.98 per mile of pole line.

The average span of this company's lines was 105.6 poles per mile, and the average saving per pole was \$2.67!

Figure what such savings would mean on your lines. Your spans and conditions are no doubt different, and the savings might be less, but—they *might be more*.

A utility engineer with extensive pole line experience has figured the first cost and annual charges per mile on several types of wood poles for various spans. On a 200-ft. span, for example, he finds the annual charge for creosoted yellow pine to be 13% less than for the next lowest-priced competitive pole.

Careful engineering study before building your pole lines will save you money. Our nearest office will assist with information and quotations without obligating you.

- SALES OFFICES**
 332 So. Michigan Ave.
 Chicago
- 350 Madison Ave.
 New York City
- 401 W. Main St.
 Louisville, Ky.
- Brunswick, Ga.
- Bogalusa, La.

AMERICAN CREOSOTING COMPANY

COLONIAL
CREOSOTING
COMPANY
INCORPORATED



GEORGIA
CREOSOTING
COMPANY
INCORPORATED

LOUISVILLE ~ KENTUCKY

ERJ 10-8-Gray



Commuters and Commutators

The movement of both depends in many cases, on the commuting efficiency of Stackpole Brushes — those little blocks of carbon that are one of the biggest factors in dependable electric railway operation today.

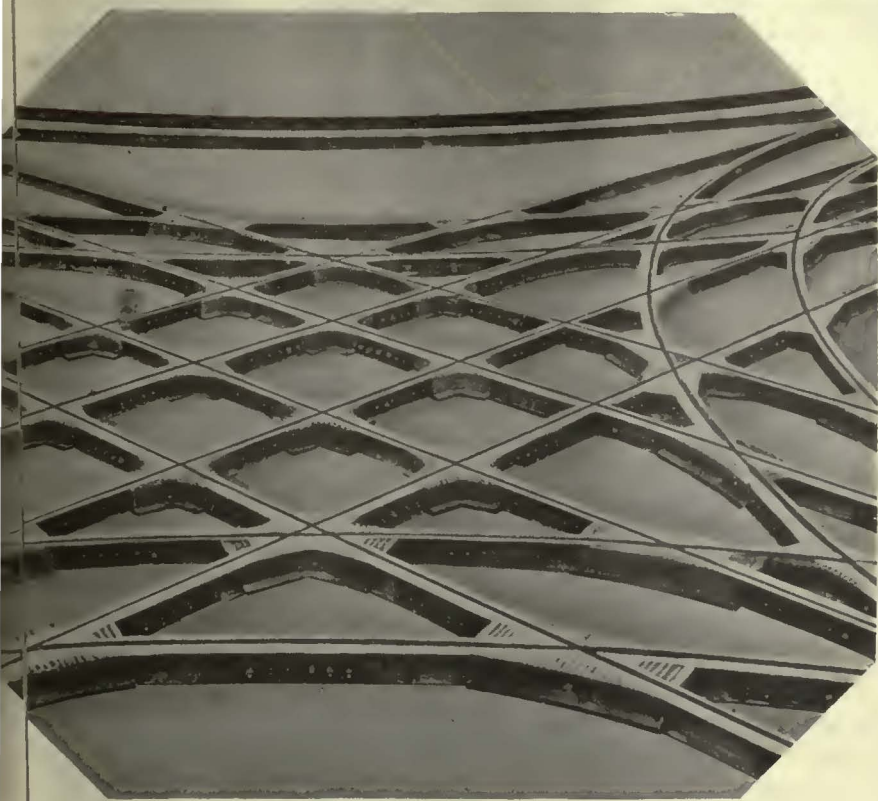
Scientifically balanced combinations of carbon give Stackpoles a smooth velvety contact that's easy on the commutator yet mechanically strong enough to give long brush life. This perfect balance between mechanical and electrical characteristics in carbon brushes is the result of twenty years of specialization by Stackpole Engineers.

Why not specify a product of specialization — Stackpole Brushes — it pays.



STACKPOLE CARBON COMPANY
St. Marys Penna.

Stackpole carbon brushes



THOUSANDS of cars rumbling over Buda trackwork have testified to the quality of this equipment. Buda trackwork and equipment has been meeting the test of service for forty-seven years—is meeting it today. Buda is always an assurance of quality and service.

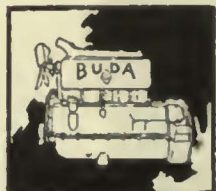
THE BUDA COMPANY
HARVEY (Chicago Suburb), ILL.



Track and Bonding Drill



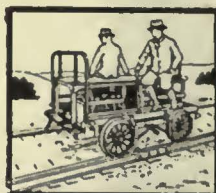
Track Jack



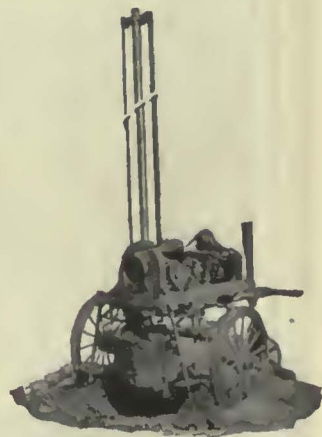
Bus Engines



Crossing Gates



Electric Trucks



**BUDA-HEBRON
POST HOLE DIGGER**

The Buda - Hebron Earth Drill, powered by the well-known Buda gasoline power plant, digs in clay, shale, hardpan, etc. as easily as in loam, and cuts the cost of erecting poles to a very appreciable extent.

Toncan Lasts Longer

Use It For Permanence

CORRUGATED iron culverts have the mechanical advantages of safe shipment; easy handling; low installation costs and strength to carry any reasonable load.

Added to these, culverts of Toncan Iron have the crowning quality of permanence.

Toncan Iron builds up its well-known resistance to corrosion and erosion by the inclusion of copper and molybdenum. These elements give the naturally resistant iron a still further protection against weathering and corrosion.

For permanence at reasonable cost, install Toncan Iron culverts.

CENTRAL ALLOY STEEL CORPORATION, Massillon, OHIO
World's Largest and Most Highly Specialized Alloy Steel Producers
Makers of Agathon Alloy Steels

Cleveland	Detroit	Chicago	New York	St. Louis
Syracuse	Philadelphia	Los Angeles	Tulsa	
Cincinnati		San Francisco	Seattle	



Following are the makers of Toncan Culverts.

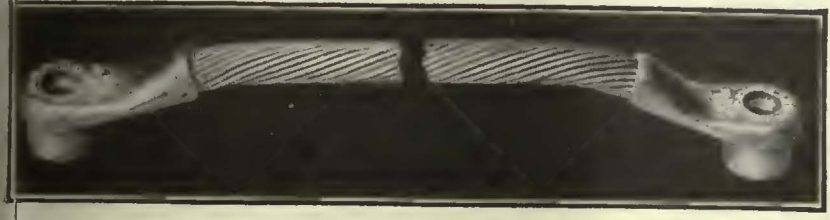
Write the nearest one:

- The Berger Mfg. Co., of Mass.
Boston, Mass.
- The Berger Manufacturing Co.
Dallas, Texas
- The Berger Manufacturing Co.
Jacksonville, Florida
- The Berger Manufacturing Co.
Minneapolis, Minn.
- The Berger Manufacturing Co.
Philadelphia, Pa.
- The Berger Manufacturing Co.
Roanoke, Virginia
- The Canton Culvert & Silo Co.
Canton, Ohio
- The Firman L. Carswell Mfg. Co.
Kansas City, Kan.
- The Pedlar People Limited,
Oshawa, Ontario, Canada
- Tri-State Culvert Mfg. Co.
Memphis, Tenn.
- The Wheat Culvert Co., Inc.
Newport, Ky.

TONCAN **COPPER**
MO-LYB-DEN-UM **IRON**

American Steel and Wire Company

A Bond of the Past

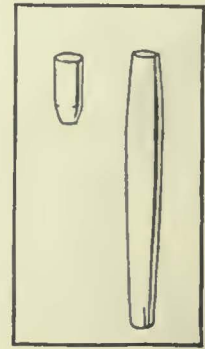


- of the Present - and of the Future

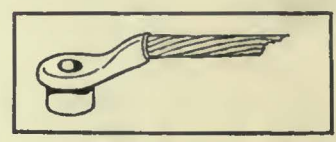
Various types of bonds have been developed to simplify installation without sacrificing performance, but none have met with greater favor than the Pin Terminal Rail Bond.

No cumbersome machinery or special tools are required to install this type of bond. A few blows from a hammer and the rail is efficiently bonded:—as simple as driving a nail. The only requisite for a lasting contact is a clean hole of proper size.

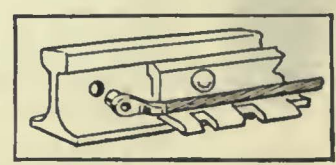
For the future:—high electrical conductivity and simplicity of application, assure extension of the use of Pin Terminal Rail Bonds.



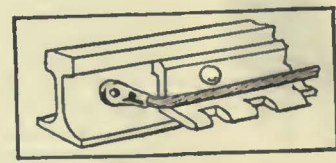
The pin and taper punch



The bond



The bond in position for application. Drive the taper punch through, then the permanent pin.



The bond installed. What can be easier?

SALES OFFICES

- | | | | | |
|------------------------------------------|---------------------------------------------------|--------------------------------------|-------------------------------------------|--------------------------------------------|
| CINCINNATI . . . 208 So. La Salle Street | ST. LOUIS 506 Olive Street | NEW YORK 30 Church Street | ATLANTA 101 Marietta Street | WILKESBARRE Miners Bldg. |
| CLEVELAND Rockefeller Bldg. | KANSAS CITY 417 Grand Avenue | BOSTON 185 Franklin Street | WORCESTER 94 Grove Street | DALLAS Praetorian Bldg. |
| DETROIT Foot of First Street | OKLAHOMA CITY First National Bank Bldg. | PITTSBURGH Frick Bldg. | BALTIMORE 32 So. Charles Street | DENVER First National Bank Bldg. |
| CINCINNATI Union Trust Bldg. | BIRMINGHAM Brown-Marx Bldg. | PHILADELPHIA Widener Bldg. | BUFFALO 670 Ellicott Street | SALT LAKE CITY Walker Bk. Bldg. |
| INDIANAPOLIS—ST. PAUL | MEMPHIS | | | |
| Archde. Nat'l Bk. Bldg., St. Paul | Union and Planters Bank Bldg. | | | |



ROL-MAN

Truck and Car Parts

for Brooklyn and Manhattan Transit and Philadelphia Broad Street Subway Cars

Repeated shocks under heavy loads. Continuous grinding wear under heavy pressure. Little or no lubrication. These are the causes of rapid depreciation of truck and car parts, with a consequent loss of service, labor and revenue due to repeated pull-ins for repairs and renewals.

This is an efficiency age and efficiency means economy. It is not difficult to figure savings in dollars by the use of ROL-MAN parts to avoid the above losses.

For several years past, the Brooklyn-Manhattan Transit Corporation has used ROL-MAN Manganese Steel truck and car parts for replacement of carbon-steel in existing equipment, such as pedestal and journal box liners, bolster and transom chafing plates, and similar parts where excessive wear had occurred.

The sixty-seven three-car articulated units recently built for the B.-M. T. represent a great forward step in development of transportation. As a result of their past experience with ROL-MAN every point of abrasive or frictional contact on these cars is protected with ROL-MAN Manganese Steel Wear Plates. The total movement between journal boxes and pedestals is limited to 1/16 in. in either direction and it is a significant fact that the liners on these parts and nearly all others are face riveted in place. This, in the light of their past experience, as this road has never removed a manganese steel plate when once applied.

The Philadelphia Rapid Transit Co. has also made test installations of ROL-MAN and as a result the 150 cars now being built for the new Broad Street Subway are fully protected against wear by the most extensive use of ROL-MAN parts made to date.

ROL-MAN parts are long-lived because they resist wear. In fact, their resistance to abrasion actually increases as they become toughened and hardened under repeated impact and friction. Consequently, they last for years and require a minimum of attention. Think what that means to you in keeping your cars out on the lines earning dividends rather than in the shops eating up profits.

You will notice, too, since the wear on ROL-MAN Parts even over a period of years is almost imperceptible, that cars equipped with them have less vibration and consequently operate with much less noise.

ROL-MAN PARTS

- Journal Box and Pedestal Gibs or Liners
- Bolster and Transom Chafing Plates
- Bolster Hanger Wear Plates, Axles and Supports
- Bolster End Wear Plates
- Side Bearing Wear Plates
- Brake Rod Chafing Plates
- Buffer Wearing Plates
- Sector Bar Liners
- Draw Bar parts for car bodies
- Motor Nose Bearing and Wear Plates

A request from you will bring our Engineer of Railway Equipment to discuss the possibilities with your Mechanical people.

USED BY

- Brooklyn-Manhattan Tr. Corp.
- Denver Tramway Corp.
- Eric Railroad Co.
- Hudson & Manhattan R. R. Co.
- Indianapolis St. Railway Co.
- Newport News & Hampton Rwy., Gas & Electric Co.
- New York Rapid Transit Corp.
- Phila. Rapid Transit Co.
- Sacramento Northern Railway Co.
- Steuernville, East Liverpool & Beaver Valley Traction Co.
- Pacific Electric Railway Co.
- Houston Electric Company
- Eastern Mass. Street Railway Co.
- Washington, Baltimore & Annapolis Electric R. R. Co.
- Phila. Broad St. Subway
- Illinois Power & Light Corp.
- West Penn Railways

MANGANESE STEEL FORGE CO.

Richmond St. and Erie Ave.

Philadelphia, Pa.

MANUFACTURERS OF ROL-MAN ROLLED MANGANESE STEEL PRODUCTS

NEW YORK
30 Church St.

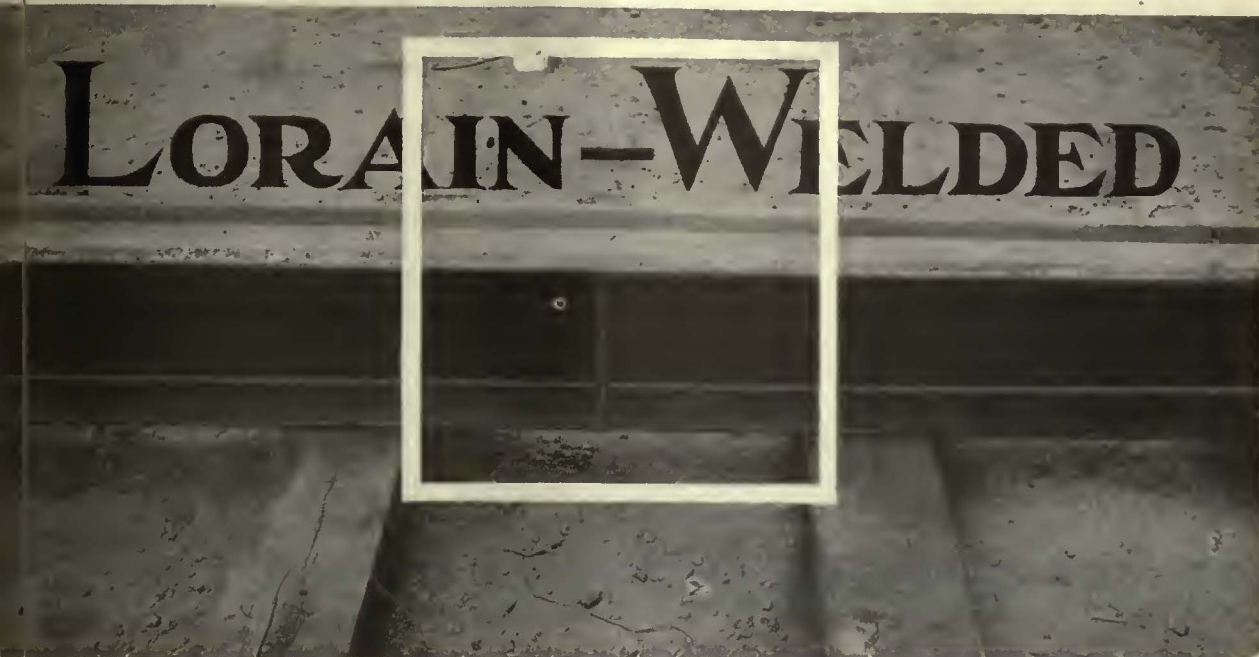
PITTSBURGH
Oliver Bldg.

DETROIT
Lexington Bldg.

CHICAGO
Old Colony Bldg.

LOS ANGELES
320 S. San Pedro St.





1,497,000 WHEEL PASSES! (OFFICIAL BUREAU OF STANDARDS TEST)

This is a tremendously effective demonstration of the endurance and wearing qualities of The Lorain method of "Weld-Forging." Each blow of the test represents the shock of a car wheel at a bad joint. If Lorain Joints were bad, they would still stand many times the traffic abuse of other joints.

But—The Lorain Method, employing the "Forge-while-hot" system, finishes off joints which to all appearances and effects are but points in a perfectly smooth, one-piece rail.

Is it economical? Figure it out, with our help. The job is quickly done, and the joint is the strongest part of the rail!

The Lorain Steel Company

General Offices: Johnstown, Pennsylvania

Sales Offices:

Atlanta Chicago Cleveland Dallas New York Philadelphia Pittsburgh

Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Seattle, Portland, Los Angeles

Export Representatives: United States Steel Products Co., New York

LORAIN

SPECIAL TRACKWORK—GIRDER RAILS—SWITCHES, ETC.



*Above—Concrete Signal Tower,
Southern Pacific Railroad,
Oakland Pier, California.*

*At left—Interior view of Con-
crete Signal Tower, Oak-
land Pier, California.*

To Guard Life and Property

RAILROAD OFFICIALS realize the folly of gambling with the safety of life and property. They insist upon the most efficient traffic control systems that human ingenuity can devise.

Signal towers of *portland cement concrete*—durable, fire-safe and economical—offer the *utmost* protection to the control equipment upon which safety and continuous operation depend.

PORTLAND CEMENT Association
Concrete for Permanence CHICAGO



Bird's eye view of Plant and Storage yard.

Prettyman Preserved Forest Products now on the market

Our large modern Shipley designed pressure treating plant was completed and began operating September 8th. We carry large stock piles, poles, ties and timbers, operate our own mills enabling us to make prompt shipment.

CREOSOTED

Railroad Cross-ties, Switch Ties, Bridge Timbers, Construction Timbers, Mine Timbers, Lumber, Piling, Poles, Posts, and other Forest Products.

Also manufacturers of Southern Yellow Pine, Cypress and Hard Woods. Owning 60,000 acres of timber land, insuring our source of supply of raw material.

Excellent Rail and Water Shipping Facilities

Your inquiries solicited, cost estimates cheerfully furnished. A trial order will convince you that the quality of our product and our service is unequalled.

Eastern Sales Agents

NEW ENGLAND WOOD PRESERVING COMPANY, INC.

Chamber of Commerce Building, Boston, Mass.

350 Madison Avenue, New York, N. Y.

J.F. Prettyman & Sons

Wood Preserving Plant
Charleston, S. C.

Wm. Wharton Jr. & Co.

Incorporated

Announces

The New Wharton Solid Manganese Steel Crossing

(Patented)

Scientifically designed from data determined by Beggs' Deformeter Method. (Using elastic models to determine stresses)

Results checked according to Polarized Light Method by Prof. Sayre.

Designed to meet particular conditions of speed, curvature, angle and load.

Plant: Easton, Pa.

SALES OFFICES:

Boston
Philadelphia

Chicago
Pittsburgh

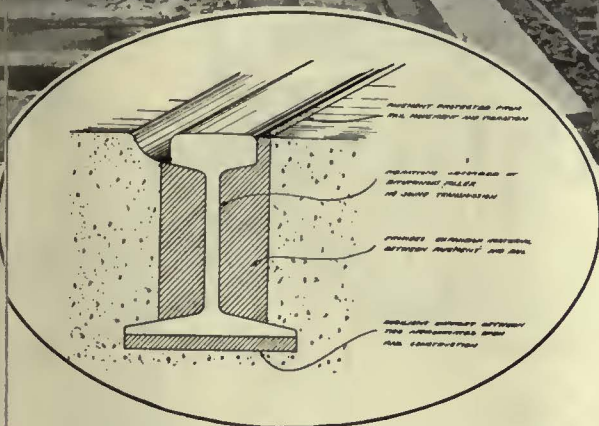
El Paso

Montreal
San Francisco

New York
Scranton



Installing Serviced Rail Filler, Sioux City, Iowa



**Sound-Deadening the
"Serviced Way"
Means Real Pavement
Protection—Longer Rail
Life—and Economy in
Installation and Maintenance**

Serviced Advantages

Recent researches on the use of bituminous rail filler have definitely shown its advantage over the other types of filler and standard construction in numerous localities now include the installation of such a material.

Serviced Rail Filler is effective in the following ways:

- Sound deadener
- Waterproofing for rail
- Protection for pavement due to expansion and contraction
- Resists weather and traffic action
- Economical installation

The base is a high grade blown petroleum asphalt selected for its resiliency, weather-resistance, and low temperature susceptibility. The material is uniformly reinforced by fine fibre saturated felt which adds to its strength and reduces brittleness. The mixture of asphalt and felt forms the waterproofing matrix for the partially saturated cellular filler which gives Serviced Rail Filler its remarkable sound-deadening qualities.

The correct proportioning and perfected processing of these carefully selected materials it has been possible to produce a superior type of track insulation.

Serviced Rail Filler meets the most rigid requirements for proper track insulation. Its unusual sound-deadening qualities are due to its carefully proportioned bituminous construction—a construction that also insures water-proofing for the rails, protection to the pavement due to expansion and contraction, resistance to weather and traffic action, and low installation and maintenance costs.

Write us today for detailed information on this superior type of track insulation.

SERVICISED PRODUCTS CORPORATION

Factory and General Offices

6051 W. 65th Street

Monadnock Bldg.,
Chicago, Ill.

SALES OFFICES

Dime Bank Bldg.,
Detroit, Mich.

Chicago, Illinois

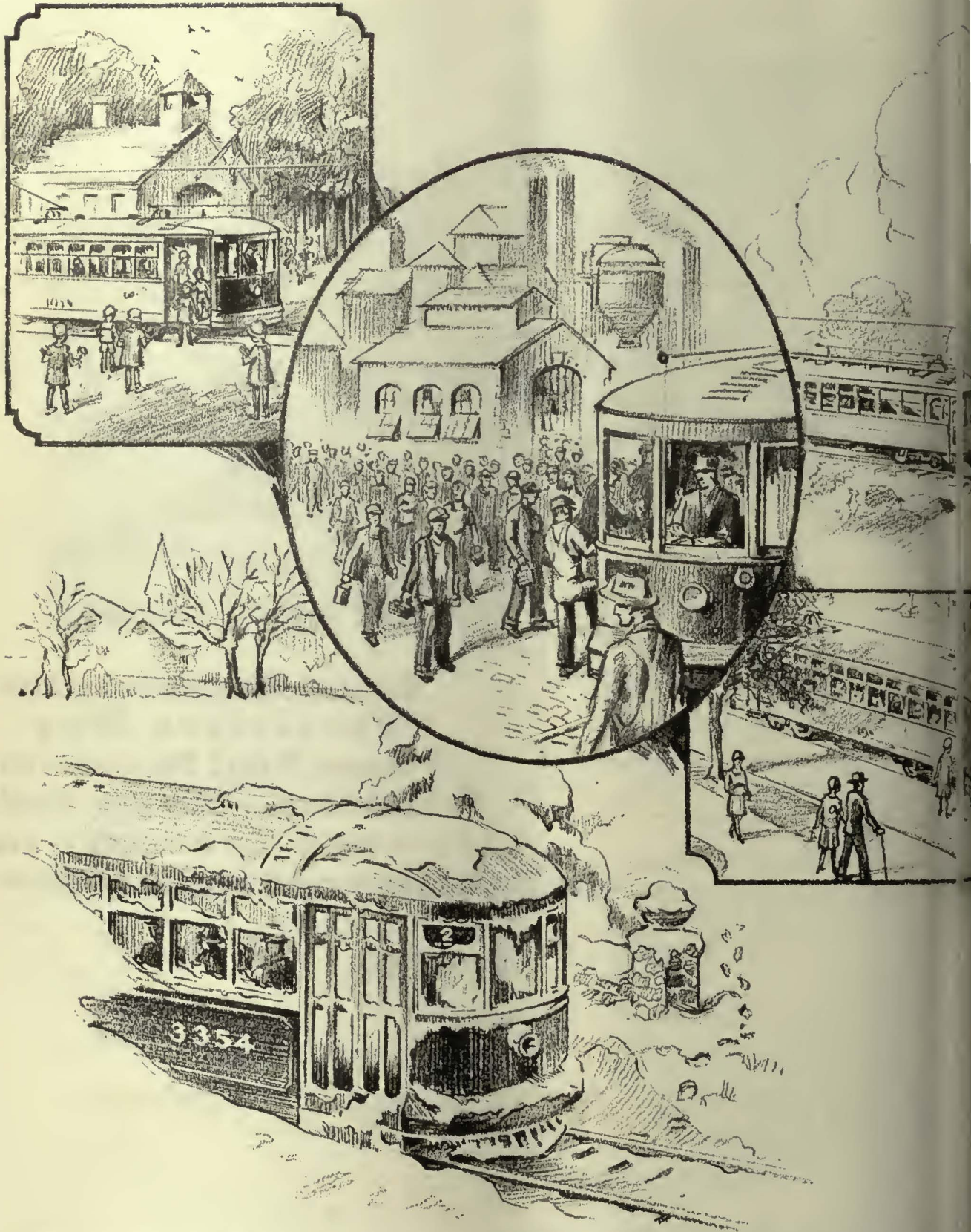
Bankers' Trust Bldg.,
Philadelphia, Pa.

DISTRIBUTORS AND DEALERS IN PRINCIPAL CITIES

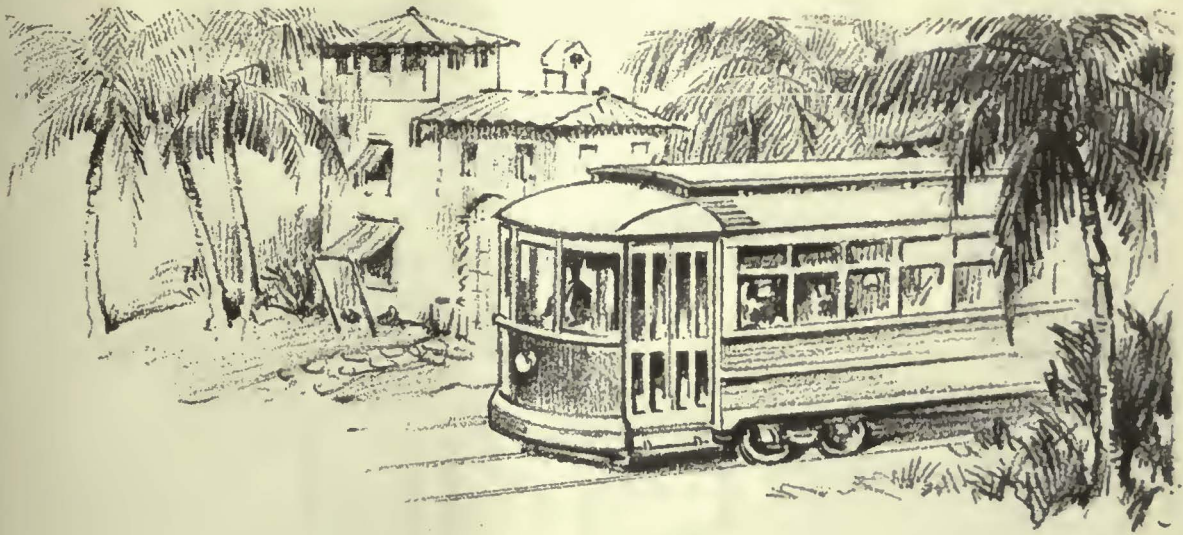
Your inquiries addressed to any of these offices will be referred immediately to our representative in your district.

SERVICISED
PAT. OFF. © 1918
REG. U.S.

RAIL FILLER



Car Card Advertising



Electric Railway Service has established itself as an essential in American community life. Year by year the industry grows and justifies and confirms our original confidence in its stability. Our faith in the future of the Electric Railway has led us to build up and sustain an asset on which the operating companies can rely.

Barron G. Collier

INCORPORATED

CANDLER BUILDING - NEW YORK

almost everywhere!



Chilled Tread Wheels

*Cost less per ton mile and
carry a service guarantee*

Better Every Year

A slogan and a fact based upon definite laboratory and foundry programs



A. R. A. Standards

650-lb. wheel for
30-ton cars
700-lb. wheel for
40-ton cars



58 Plants

Daily Capacities

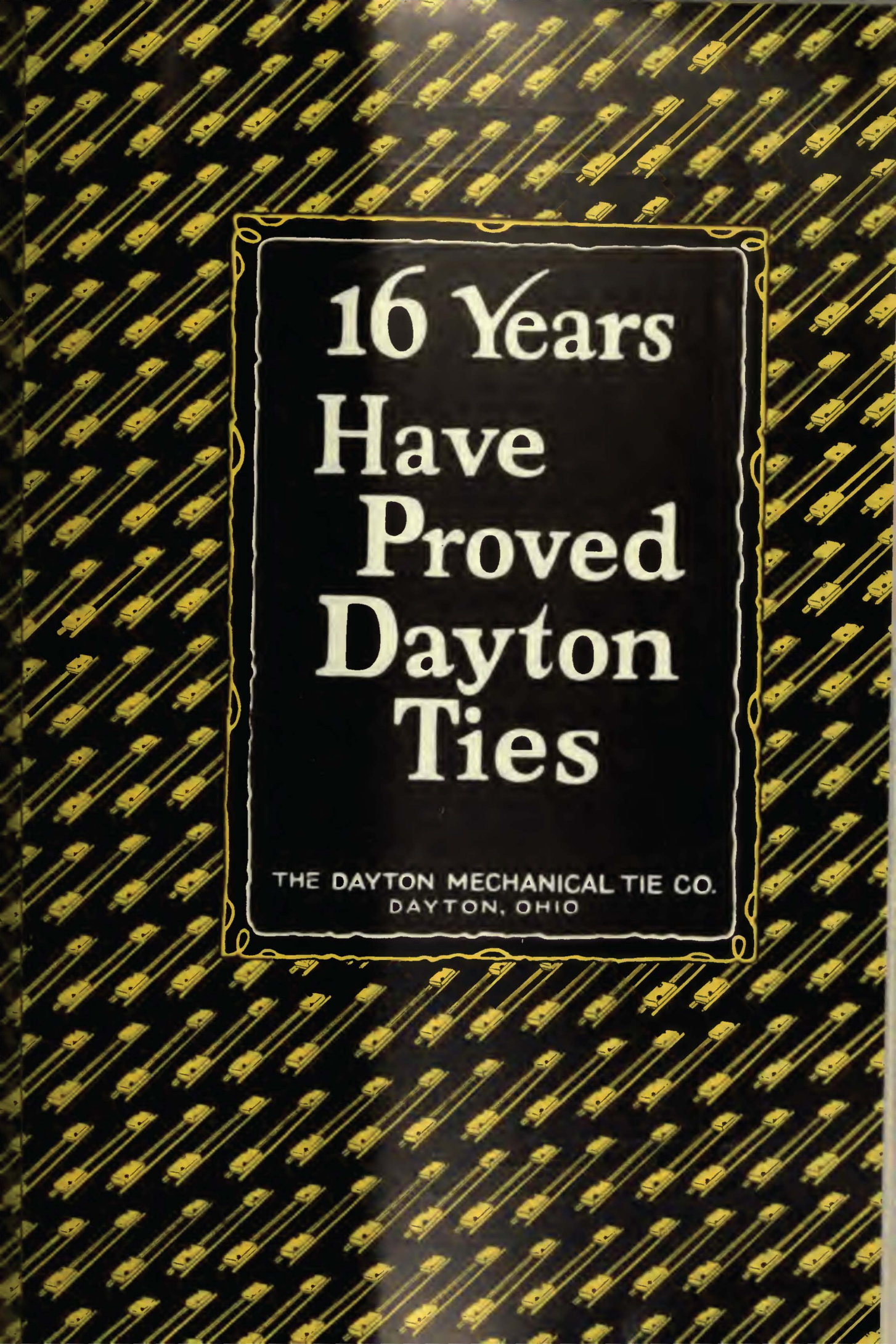
**20,000
Wheels**



A. R. A. Standards

750-lb. wheel for
50-ton cars
850-lb. wheel for
70-ton cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCORMICK BUILDING · CHICAGO



**16 Years
Have
Proved
Dayton
Ties**

THE DAYTON MECHANICAL TIE CO.
DAYTON, OHIO

16 Years Have Proved Dayton Ties

In the 16 years we, and the electric railways, have been studying Dayton Ties, no need for change in the basic principles has become apparent. In the tie itself, not a single weakness has shown up. This, we believe, is almost unprecedented in the history of manufacturing.

Track laid on Dayton Ties stays smooth—for years and years—we don't know how many—we haven't been in business that long.

We feel that this record demonstrates conclusively that we have *the* cure for track troubles.

The widespread use of Dayton Ties—now in nearly 150 cities throughout the United States—the way in which engineers keep on using them after they have once been tried, shows that the industry appreciates their excellence.

Dayton Tie Track is always Smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO





One of the Grand Rapids cars utilizing HASKELITE roofs and interior linings and PLYMETL side panels.

The 1927 Coffin Award Winner pioneered with HASKELITE and PLYMETL

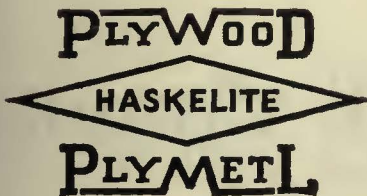
THE Grand Rapids Railway Company, announced last Tuesday as the winner of the 1927 Coffin Award, was one of the first Electric Railways to realize the magnitude of the economy possible through the use of HASKELITE and PLYMETL in light-weight cars.

The actual saving in weight by the adoption of these materials was 134 pounds for the HASKELITE roof and interior lining, and 435 pounds for the PLYMETL side panels, a total of 569 pounds per car.

In a recent letter from Mr. L. J. DeLamar, Vice-President and General Manager, regarding these cars, he says they have been watching them very carefully and are well pleased with their service.

These plywood products are making savings for scores of other Electric Railways, including every one of the companies that has been given the Coffin Award since it was established in 1923.

Why not write today for the blue-print booklet showing applications in street car and bus construction?



HASKELITE MANUFACTURING CORPORATION

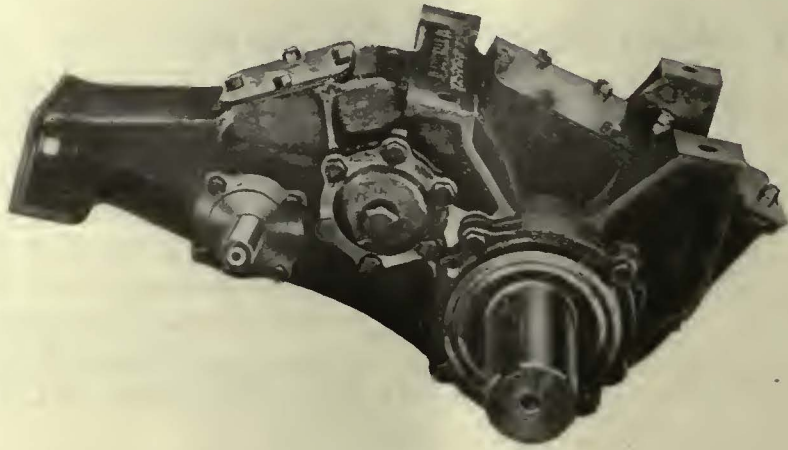
133 West Washington Street, Chicago

RAILWAY REPRESENTATIVES:

Economy Electric Devices Co., 37 W. Van Buren St., Chicago
Grayson Bros., 600 La Salle Bldg., St. Louis, Mo.

George E. Watts, 1523 Candler Bldg., Atlanta, Ga.
Railway & Power Engineering Corp., Toronto, Ont., Can. ERJ10-8Gray

Two Developments of To the Electric The WN Drive for Electric Cars



Light and compact the WN Drive with its high ratio of speed reduction allows the use of high speed motors in electric car service. The result is a smaller initial investment, greater efficiency, lowered maintenance costs, and smooth, quiet operation.

Heat treated and hardened helical gears mounted on Timken Roller Bearings enclosed in an oil-tight aluminum case makes the WN drive the most revolutionary development in the street railway industry in the past decade.



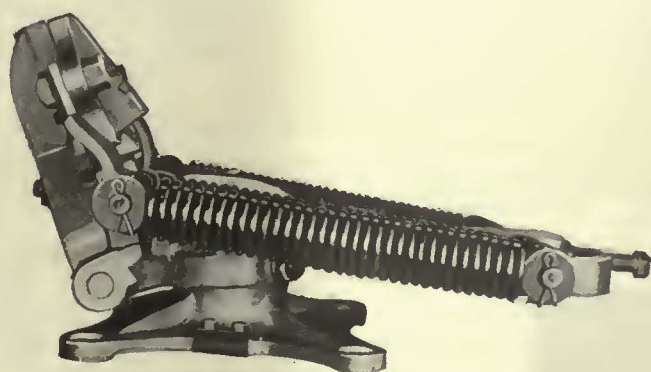
R. D. Nuttall Company

All Westinghouse Elec. & Mfg. Co. District Offices are Sales Representatives

Nuttall

Tremendous Importance Railway Industry

The Aluminum Trolley Base



This aluminum trolley base is the lightest base we have ever built. It weighs but 67 pounds. The base swivels on double race Timken Roller Bearings, it is provided with hardened steel wearing parts, and it requires lubrication but once in each six months.

This base is highly sensitive, it swivels freely, and it will follow the trolley wire unerringly. Dewirements will be reduced to a minimum, and the lighter, freer turning base will cause less wear on the trolley wire and other overhead.

Pittsburgh, Pennsylvania

Electric Railway Products. In Canada, The Lyman Tube & Supply Co., Montreal

Nuttall

Poor lubrication at 2 cents a mile —the best at $\frac{1}{4}$ to $\frac{1}{2}$ cent

Hundreds of operators of buses, trucks and taxicabs are paying four to eight times more for inefficient lubrication than they need pay for the very maximum of bearing protection.

Based on the generally accepted fact that poor lubrication is responsible for 75 to 80% of all automotive repairs, and for a great reduction in the useful life of the motor, it can be easily proved that the extra wear and tear resulting from the continued use of dirty, diluted oil costs 400 to 1000% more than the oil itself.

For example, if, because of inefficient lubrication, your \$6000 vehicle runs but 100,000 miles as against a possible 150,000 miles with good lubrication you

have lost one third of your investment or \$2000. In other words, poor lubrication has cost you \$20.00 per 1000 miles—2 cents a mile—plus actual oil costs.

Those who have thoroughly studied the subject will tell you a simple way to keep oil costs and repair cost low and at the same time get the greatest possible mileage out of a motor vehicle. It is just this: fill your crankcase with the best oil you can buy regardless of its cost—drain frequently—thoroughly purify the drainings and use again like new oil.

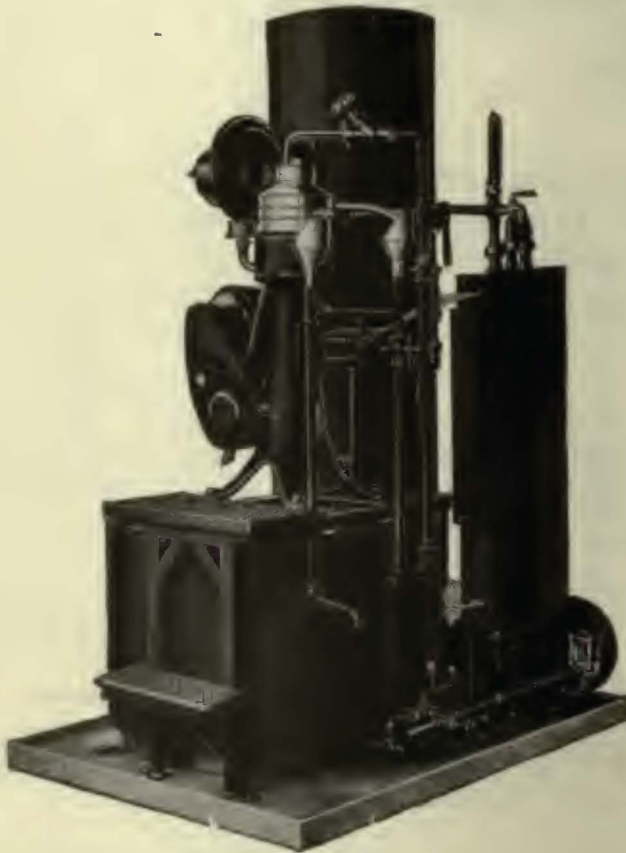
This brings lubricating costs back where they belong—at $\frac{1}{4}$ to $\frac{1}{2}$ cent a mile—probably where most operators *think* they now are.

The De Laval Crankcase Oil Reclaiming Outfit enables you to do this. It renews old oil at a fraction of its cost—removes carbon and other impurities—restores its viscosity—its ability to lubricate and resist heat—makes it still more economical to use the best oil and change every few hundred miles.

This Outfit has passed the rigorous tests devised by several of America's leading engineering organizations. Of still greater importance, it has passed the test of actual commercial operation in many garages. Lubrication engineers declare that the efficiency of De Laval reclaimed crankcase oil is fully equal to that of the original oil as it comes from the refinery and the experience of users bears this out.

If you operate 15 or more vehicles it will pay you to write for further information.

Ask for Bulletin 108-R.



THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 600 Jackson Blvd., Chicago
DE LAVAL PACIFIC COMPANY, San Francisco
ALFA-LAVAL CO. Ltd., 34 Grosvenor Road, London, S. W. 1.

DE LAVAL

Centrifugals

Lasting Strength Counts Big When Storms Rage

LASTING strength is the outstanding feature of *International Creosoted Pine Poles*.

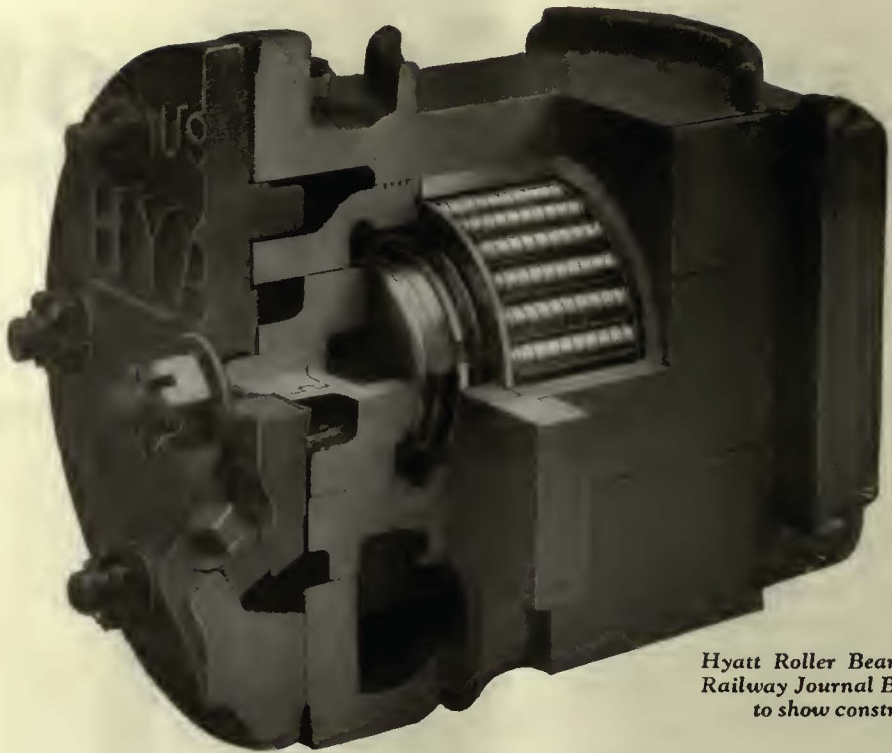
There is no gradual decrease in strength due to decay or weakening due to birds or termite attacks. When storms rage and the greatest strains come, they are conquered by the full strength of Yellow Pine—the strongest of pole woods.

When you build your line — build with *International Creosoted Pine*.

International Creosoting & Construction Co.
General Offices—Galveston, Texas

*International Creosoted Pine Poles
in Signal Service on the Big Four
near Indianapolis, Ind.*

International Pressure Creosoted
Yellow Pine Poles



Hyatt Roller Bearing Electric
Railway Journal Box cut away
to show construction.

Economy plus SAFETY with Hyatt Roller Bearings

THAT modern bearings are productive of increased saving has been established. Through fourteen years of service in the electric railway field Hyatt Roller Bearings have demonstrated that such bearings are reliable, safe and trouble-free also.

A Hyatt equipped car operating over a most exacting interurban route in the middle west has a record of well over 200,000 economical miles with minimum bearing attention.

Definite evidence such as this, accrued through actual performance, has led many traction companies to specify Hyatt Roller Bearings. Thus

it is that the largest single order for anti-friction equipped cars to date, placed by a Southern property, specified "Equipped with Hyatt Roller Bearing Journal Boxes."

Hyatt Roller Bearings reduce oiling and maintenance cost, and lower the peak load demand. Their operation adds to passenger comfort through quicker starts, easier acceleration, and smoother riding, all of which paves the way to increased patronage.

To realize the utmost in bearing performance, and to be sure that the performance will be consistently dependable, specify Hyatt Roller Bearings.

HYATT ROLLER BEARING COMPANY
Newark Detroit Pittsburgh Chicago Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

The Economy of Electric Fare Registration

"The cost of this electrical combination does not exceed that of manual installation of the same type of register. ."

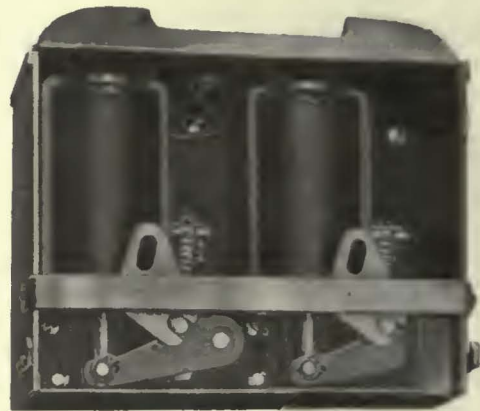
The lost motion of hand registration by the operator is eliminated. Considerable economy in the speed and handling of fares and passengers is the result. The R-11 International Double Register has, for many years, been the accepted standard for mechanical operation. Our B-12 electric back has been developed to a point where a million fares have been registered with no noticeable wear on the working parts. These backs are operated by Solenoids operating on line current of 350-650 volts D.C. but this operating current is not broken in the register back. This circuit is completed by the F-14 foot switch, a fast switch combining small size, maximum insulation, and minimum arcing.

Single fare registers, backs, and switches may also be had in these same general types.

Full details furnished on request



R-11 Double Register



B-12 Electric Back



E-14 Electric Foot Switch

The International Register Company
15 South Throop St., Chicago

*Where Selection is
decided by
Performance*

**"NATIONAL" TUBULAR
STEEL POLES**
Predominate

EXPERIENCE has taught many valuable lessons in the selection of poles for trolley lines, electric lighting, telephone, telegraph, and signal systems. Perhaps the lessons of greatest value are those which resulted in the policy of choosing poles for long life, reliability, and, especially, for safety. The recognized safety (dependability) of "NATIONAL" Tubular Steel Poles is a consideration of first and ultimate importance as evidenced by the extensive use of "NATIONAL" Poles throughout America.

Wherever the factors of safety, strength and appearance dominate, it will pay you to specify "NATIONAL" Poles. Made by the largest manufacturer of wrought tubular products in the world, with facilities for meeting a wide range of specifications in pole construction.



NATIONAL

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

20th CENTURY METHODS

Applied to Woodworking and Metal Trim Problems

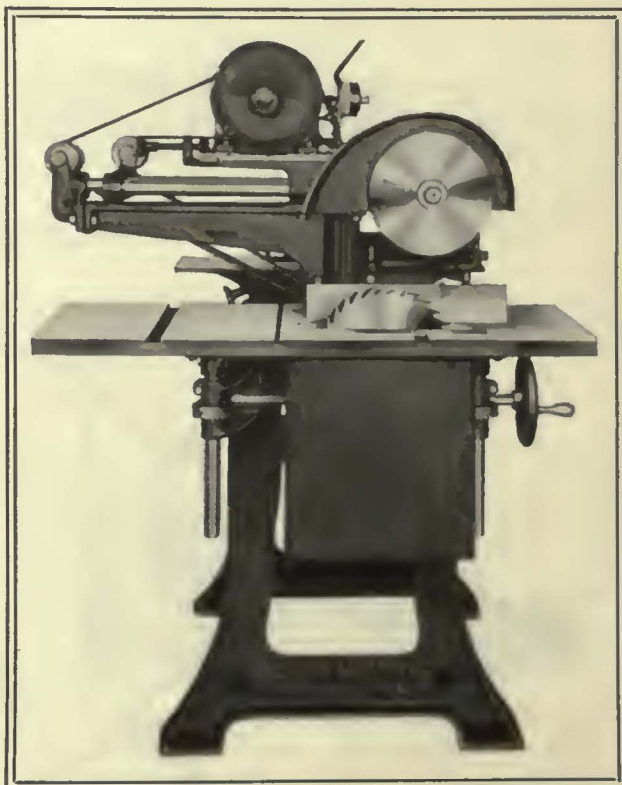
What One Satisfied User Writes Us:

“ Referring to your inquiry relative to performance of the circular saw which we purchased recently, wish to advise that this saw has been most satisfactory.

Our Finishing Department advises that on steel moulding for inside car trim we can make as many as 75 cuts per hour. One saw is used without resharpening for ten hours on most of the mouldings. The cost of resharpening is \$.70.

One man can cut as much moulding in one hour as he previously did by hand in ten hours, producing much better surfaces and better fits. ”

This concern is nationally known for its excellent car and bus bodies



— Become definite assets to railway and bus shops

USED BY THESE REPRESENTATIVE ORGANIZATIONS:

- J. G. Brill Co.
- Pennsylvania R. R. Co.
- Chicago, Milwaukee & St. Paul R. R. Co.
- Illinois Central R. R. Co.
- American Car & Foundry Co.

... and there are many definite reasons for this. The 20th Century Woodworker successfully performs the functions of five standard machines.

It will cross-cut at any angle. With it, you can do Ripping, Jointing, Boring, Dadoing, Plowing, Sanding, Mitering, Rabbeting, Tenoning, Grinding, Stair-Routing, Shaping—you can make Jack Rafters and Moulding. In fact, its uses are almost unlimited.

This machine takes but little space and is almost instantly made ready for any operation. Furnished with gasoline or electric drive. Easily made portable.

You can capitalize the versatility and economy of the 20th Century Woodworker. Adapt it to your problems . . . now!

TWENTIETH CENTURY SALES AGENCY

1321 Arch Street, Philadelphia

Write for illustrated booklet explaining how you can save money with this machine.

CONSOLIDATED DOOR OPERATORS

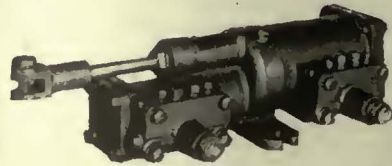
Door operating equipment for every type of car and bus

*Pneumatic and Electro-Pneumatic Control
and automatic treadle operated doors*

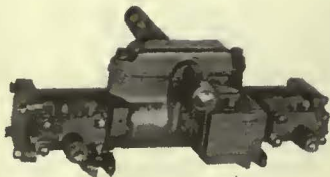
Special Safety Features



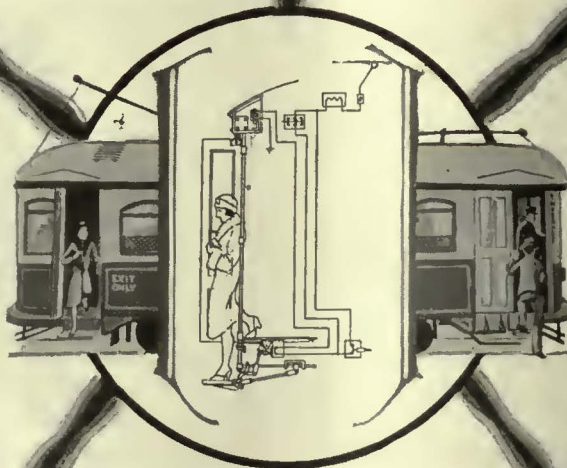
Standard Gear Type Folding Door Engine.



Differential Door Engine — direct drive.

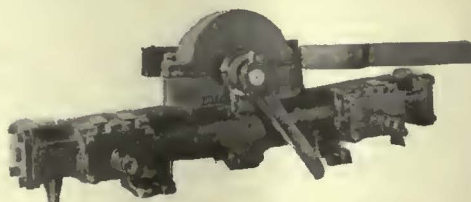


Standard Gear Type Door Engine for sliding doors operated through jack shaft.



Standard Gear Type Differential Door Engine for buses.

Consolidated Automatic Treadle Operated Doors.



Standard Gear Type Door Engine for large sliding doors.

**Maximum Service—
Minimum Attention**



Standard Gear Type Door Engine for small or medium sized sliding doors.

**Maximum Safety—
Minimum Parts**

Over 20 years' experience in door operating engineering is at your service

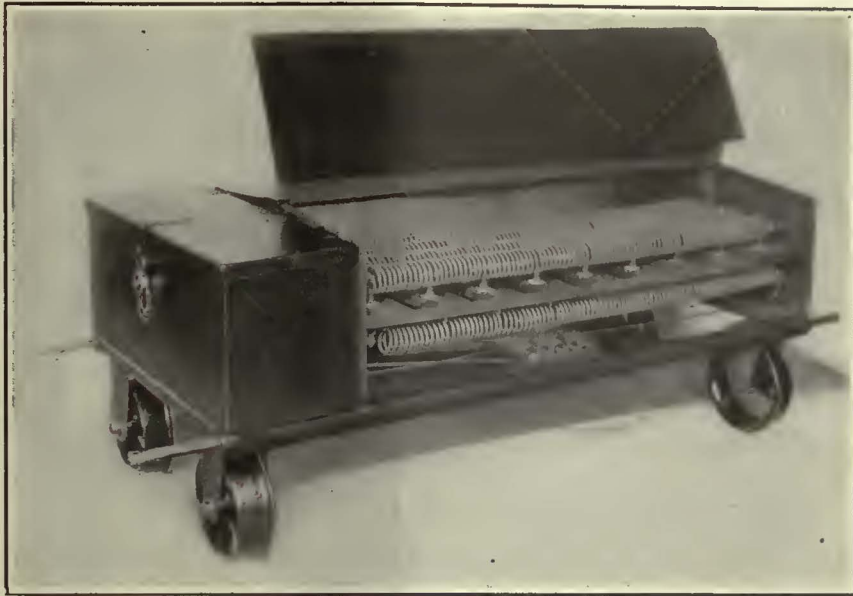
CONSOLIDATED CAR-HEATING CO.

NEW YORK

ALBANY, N. Y.

CHICAGO

An Innovation!



New SBR *All-In-One Brazed Bonding Outfit*

A complete brazed bonding outfit *in one unit*—ample storage space for all bonding equipment—simple—portable—a real bonding innovation—that's the new Erico SBR.

There are a lot of new variations. Resistance wire wound on 2 in. diameter mandrels—maximum ventilation, no overheated wire, no burned out coils.

Frequent spacing of supports adds strength to coils—no sagging.

Pure mica insulates coils from frame—is unaffected by conditions of moisture or heat. An improved method, electrically

efficient, mechanically right, insulates wheels from tracks.

Convenient receptacles at the rheostat's side provide correct current regulation at high or low voltages. And—

The entire frame is covered with a rust proof coating, impervious to weather or changes in operating temperature.

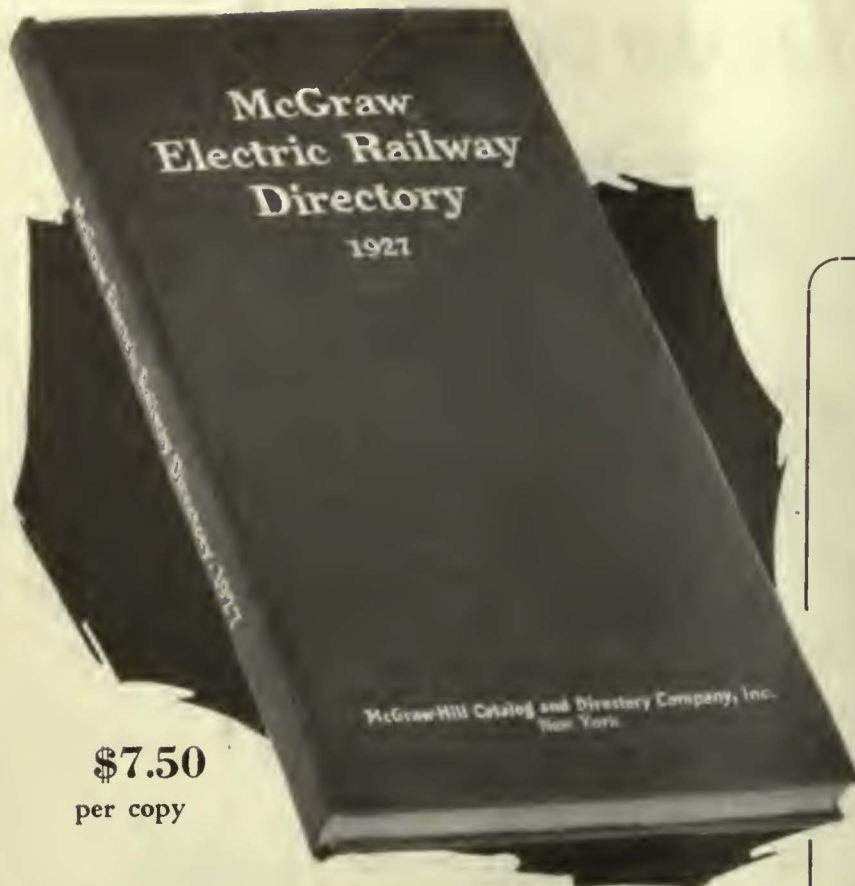
For ease and speed of handling, portability, low cost operation, the new SBR distances any bonding outfit yet produced. Investigate. For details and prices, address —



The
Electric Railway Improvement Co.

1070 E. 61st Place,

Cleveland, Ohio



\$7.50
per copy

New Edition Now Ready!

The standard reference authority of the Electric Railway Industry now available in a new, completely revised edition. Brought up to date from data gathered by direct contact with the more than 1,300 companies listed.

Arranged in a new type style affording greater legibility and quicker reference.

Other improvements include the *geographic* listing of all Holding Companies which are indicated by a star (*) in the body of the book, as well as in the complete *alphabetical index* of electric railway companies. All towns reached by each road are shown both under the company listing and in their proper alphabetical position. Reference to any town thus gives you the data on all properties in that town, together with the names of all officials also located there.

If you haven't sent in your order for the new Edition—fill out the convenient memo on this page and mail it today!

PARTIAL LIST OF CONTENTS

A complete directory of the electric railway companies in the United States, Canada, Mexico and the West Indies.

Names and addresses of officials and principal department heads, including purchasing agents, master mechanics, supt. of power plants, etc.

Names of subsidiary bus companies.

Names of principal communities reached by each company.

Names and addresses and officers of affiliated holding or controlling companies and lists of properties controlled by each.

Location of repair shops.

Location and the total capacity of power plants.

Mileage of the road, owned, leased and trackage rights.

Gage of track.

Number and kind of cars used.

Number of buses operated.

Number of garages, capacity and their location.

Rates of fare.

Transmission and trolley voltages.

Officers and executive committees of Electric Railway Associations.

Commissioners and principal assistants of National and State Railway and Public Utility Commissions.

Alphabetical list of electric railway officials, giving company connections.

McGraw Electric Railway Directory,
475 Tenth Ave., New York.

Gentlemen:

Please send _____ copies of the 1927
Edition to

Company _____

Address _____

Attention of _____



Let Somebody Else Do The Testing!

You can't afford to test tape *on your own jobs*. Such experimental work should be done by the maker at his own expense, *before* the tape is offered for sale.

When you wind Acme Tape into a job you can be certain of this!

**For Safety Use Acme
Varnished Cambric Tapes**

Electrically and Physically Tested for

- DIELECTRIC STRENGTH
- DIELECTRIC CONSTANT
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- INSULATION RESISTANCE
- POWER FACTOR
- FLEXIBILITY
- RESISTANCE TO TEAR
- TENSILE STRENGTH
- RESISTANCE TO OILS
- ACIDS AND GASES
- RESISTANCE TO IMPREGNATING COMPOUNDS

Acme Varnished Tapes are furnished in widths of $\frac{1}{4}$ inch and wider, and in rolls of continuous length without splices. Special widths and finishes supplied on order. Write for catalog 3-J for your files.

ACME WIRE PRODUCTS

THE ACME WIRE CO.
Main Office and Plant, New Haven, Conn.

Branches

New York, 52 Vanderbilt Ave. Chicago, 427 West Erie Street
Cleveland, Guardian Bldg.

Shuler Front Axles



For: MOTOR BUSES

Unseen—

Yet Conspicuous

the FRONT AXLE must be of proven merit to perform *satisfactorily* in Motor Coach service.

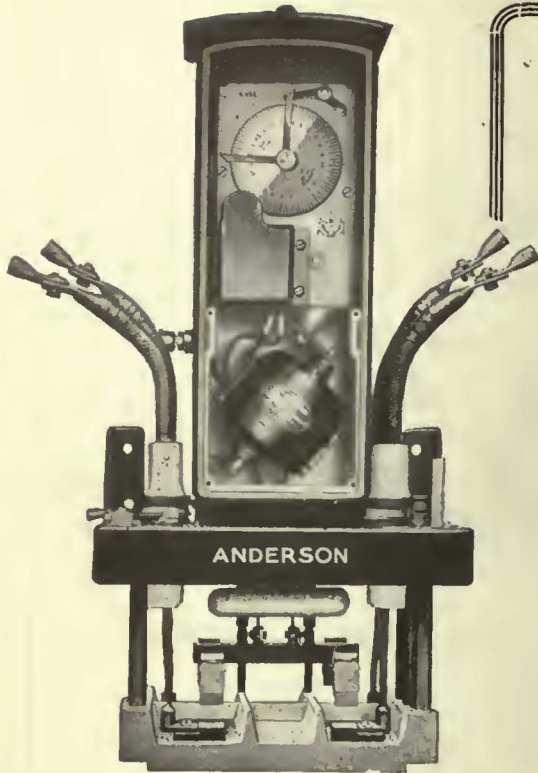
FRONT AXLES ONLY

Shuler Axle Co.

Incorporated

Louisville, Ky.

Member of Motor Truck Industries, Inc. of America



Type SL double pole Oil Break with Oil Tank and door removed. Front plate also removed showing winding motor.

Fully Automatic

Switch: The operation of this switch is entirely automatic; when it is once set to the times for opening and closing a circuit, the switch will continue to operate at these times, without any further setting.

Winding: The winding is also automatic; irrespective of how often the switch operates, whenever the switch needs winding the self-contained electric motor will do it, automatically.

Anderson Automatic Time Switches

Season Changing Device: This device can be inserted in any electrically wound time switch and causes the operation of the switch to follow the lengthening and shortening of the days, automatically. Suppose, for instance, you want a street lighting circuit to close one hour after sunset and open one hour before sunrise; set the switch accordingly and it will thereafter operate, automatically, day after day—literally following the sun.

Send for Bulletin No. 37 which gives information on the Season Changing Device, Electrically Wound and also the Hand Wound Type of Time Switches made by Anderson.

Albert & J. M. Anderson Mfg. Co.

289-305 A St., Boston, Mass.

New York

Chicago

Philadelphia

London



Keep the tracks clear!

ROOT Scrapers

will clear the tracks of snow and ice. Over 80% of the electric railways of the country can verify this statement.

They are easily installed on any type of car. They require less power, deposit the snow further from the track and clean the rail

and groove completely, so that contact from wheel to rail is perfect.

They require no attention. They do not have to be raised for switches, crossings or high blocks in pavement.

Let us ship one on approval, at no expense to you if not satisfactory.

ROOT SPRING SCRAPER CO., Kalamazoo, Michigan

Representatives:

Ross F. Hayes
30 Church St., New York City

Harry M. Euler Co.,
Portland, Oregon.

Charles N. Wood Co.
948 Old South Bldg., Boston, Mass.

Railway, Power & Engr. Corp.
133 Eastern Ave., Toronto, Ont.

Earll Trolley Catchers and Retrievers

—adequate protection and all conditions of service

Earll Retrievers and Trolley Catchers are in motion at the first jump of the pole. They have the pole below the danger line in a jiffy—every time.

Economical in first cost and installation, their maintenance consists of a squirt of oil three or four times a year; their appearance is dignified and simple; and the construction is designed for hard service.

Few parts, positive in operation, with a powerful mechanism, insure perfect results. Wet rope has no terrors for an Earll.

Get an Earll estimate on your cars. Find out more about this important device. Bulletin on request.



This is all there is to the lubrication of an Earll. Just a few spoonfuls of oil every three months!

C. I. EARLL, YORK, PA.

General Foreign Agents
International General Electric Co.,
Schenectady, N. Y., U. S. A.

In Canada:
Railway & Power Engineering Corp., Ltd.,
Toronto, Ont.

FOR SAFETY FROM FIRE INSTALL THE

IMPROVED
Pyrene
TRADE MARK
FIRE
EXTINGUISHER

Safety demands that every car or bus be equipped with a *Pyrene* Fire Extinguisher. The riding public expect and are entitled to the protection from fire which this extinguisher assures.

Aside from the protection from fire afforded by such installation, to both rolling stock, operator and passengers, the schedule of the Central Traction and Lighting Bureau specifies a charge of 5¢ on motor buses, 3¢ on interurban and 1¢ on urban cars, for the absence of fire extinguishers.



The slight outlay involved by having rolling stock equipped with an Improved *Pyrene* (one-quart) Fire Extinguisher should be regarded as an investment—a device that helps make safety from fire certain should be popular.

Safety adds to the revenue of the operating company by inspiring confidence in the riding public toward modern transportation.

Many of the leading Public Service Corporations recognize this and have equipped their cars and buses with *Pyrene* Fire Extinguishers—they know a burning car or bus need not be abandoned if a *Pyrene* Fire Extinguisher is at hand.

For the protection of electrical equipment, power houses, car barns, shops and storerooms *Pyrene* (1½ quart) Fire Extinguishers are dependable in every emergency.

PYRENE MANUFACTURING CO.
NEWARK, N. J.

“Fortify for Fire Fighting”



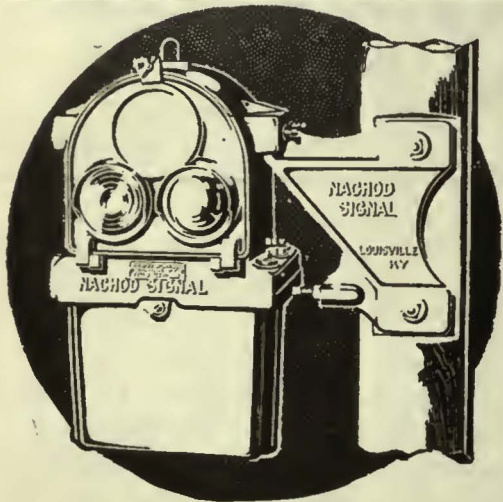
NACHOD spells safety!

At switches, railroad crossings, highway crossings, etc.!

Safety is taught children in school! You teach them to take every precaution in crossing streets! Why not take the same precaution to protect your company's income?

Nachod and United States Signals enable you to avoid serious accidents, thus decreasing accident reserve requirements and increasing net income—they enable you to get the most out of single track by materially speeding up service and saving time at switches.

If you failed to get a copy of our illustrated Catalog at the Convention, write for one now. We will gladly mail it. In addition to Block Signals it describes our Highway Crossing Signals, Headway Recorders, Flasher Relays, etc.



Nachod & United States Signal Co., Inc.
4777 Louisville Ave., Louisville, Ky.
English Representative:
Forest City Electric Co., Ltd., Manchester, Eng.



Gifford-Wood WAGESAVER Street Ice Leveler, operated from boom on derrick car, leveling ice on street outside of tracks. Cumberland Light and Power Co., Portland, Me.

Does more work than 100 men!

"THE Gifford-Wood WAGESAVER Street Ice Leveler dug out more ruts yesterday than would have been broken up by 100 men with picks," said Surveyor Daniel F. Cronin of Manchester, N. H., last winter.

The Cumberland Light and Power Co., of Portland, Maine, advise that their Gifford-Wood WAGESAVER sometimes cuts as fast as 10 miles per hour.

Keep tracks and streets open for automobile traffic this winter! Get the facts on this effective, wage saving ice-leveling equipment.

Levels ice between rails. Cuts out the humps between wheel ruts in street outside of rails.

Easily operated. Inexpensive. In leveling between tracks may be trailed behind car or drawn by tractor or horse. In leveling outside of tracks may be tractor, truck or horse-drawn or operated from boom as illustrated.

Write for Bulletin 1027

It contains complete information, photographs, specifications. Address nearest office below.

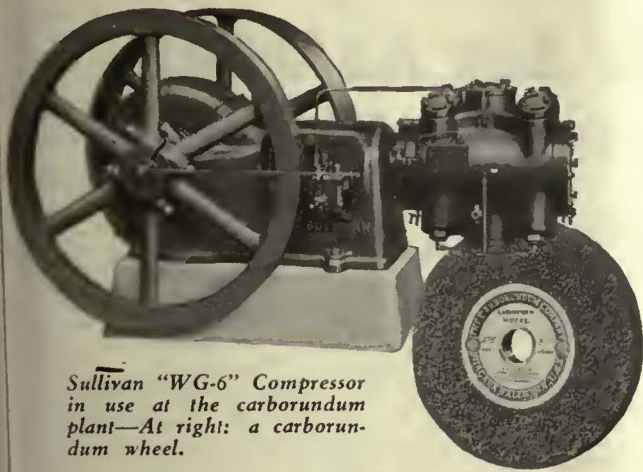
GIFFORD-WOOD CO. 39 Hill St., Hudson, N. Y.
New York:420 Lexington Ave.
Chicago:565 W. Washington St.
San Francisco:1274 Folsom St.

Gifford-Wood

WAGESAVER

STREET ICE LEVELER

DEPEND ON SULLIVAN AIR POWER



Sullivan "WG-6" Compressor in use at the carborundum plant—At right: a carborundum wheel.

Sullivan Compressors Help Make Carborundum

Sullivan "WG-6" Compressors in use by the Carborundum Company of Niagara Falls, are living up to the Sullivan reputation of dependability.

One compressor has been in operation only 2 1/2 years, but the other was purchased second hand after three years' service, and has now operated an additional five years in the Carborundum plant. They supply air for pneumatic tampers, and for various manufacturing processes.

No time has been lost for want of air since these compressors were installed; maintenance cost is insignificant; the machines are operating today as well as when new, reports the superintendent.

The Sullivan "WG-6" Compressor is the machine recommended where air power requirements do not warrant investment in the well known Sullivan Angle Compound Compressors.

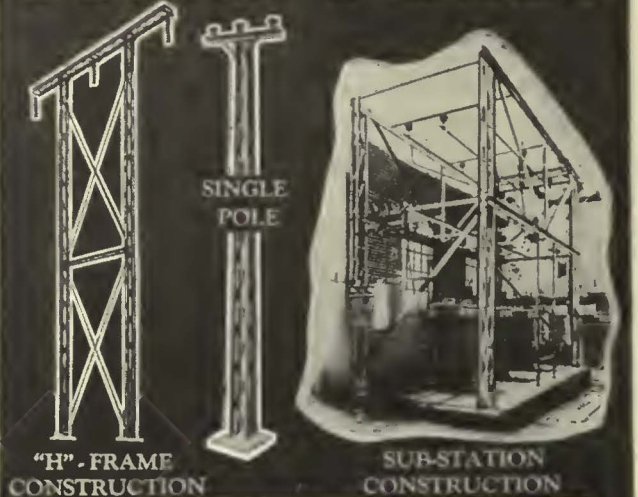
It is a single stage, belt-driven compressor, equipped with "Wafer" valves, "sweep control" unloading, positive automatic lubrication, and total enclosure of working parts. Capacities range from 68 to 500 cu. ft. per min. This compressor has been in extensive use, in many industries, for more than 10 years. Full description is in the Catalog.

WRITE FOR CATALOG 3283-B

Sullivan Machinery Company
150 So. Michigan Ave., Chicago

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TRUSCON
COPPER-ALLOY
STEEL POLES



"H" - FRAME CONSTRUCTION

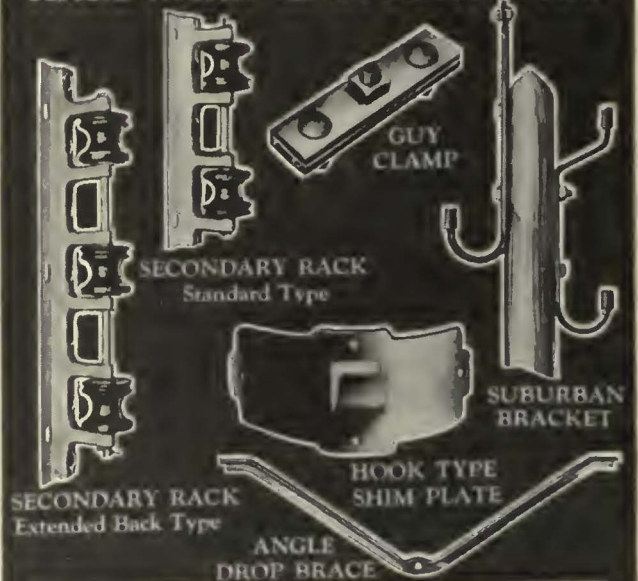
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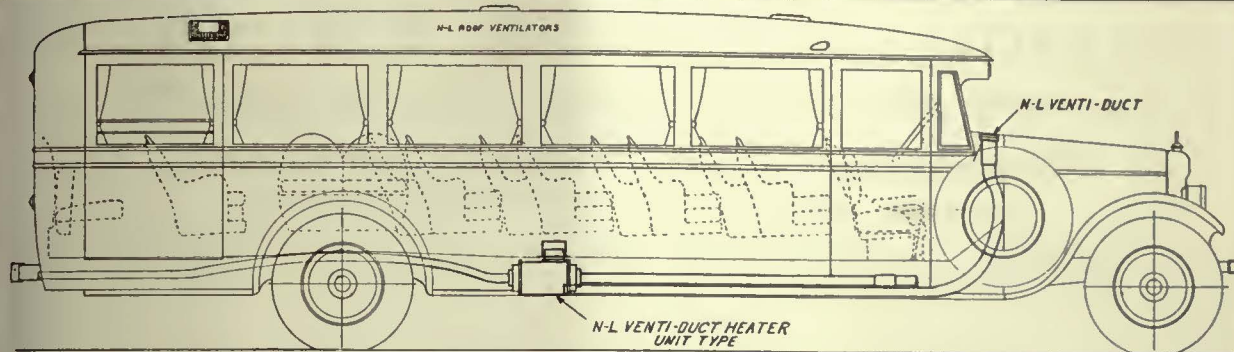
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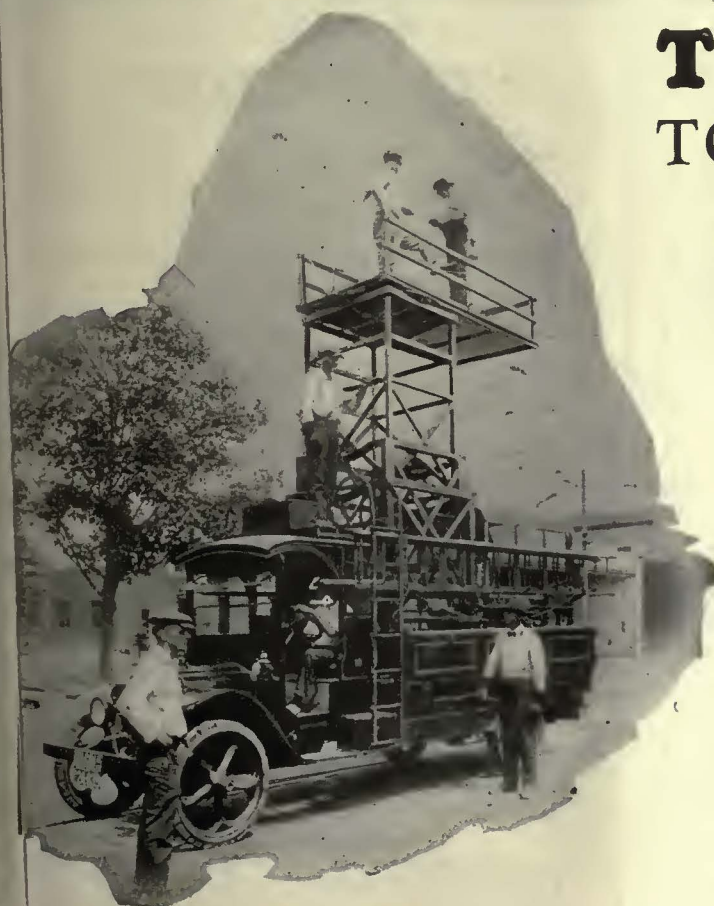
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This is the section which so effectively aided the Government in selling the many millions of dollars worth of surplus material and equipment accumulated during the war without disturbing the market.

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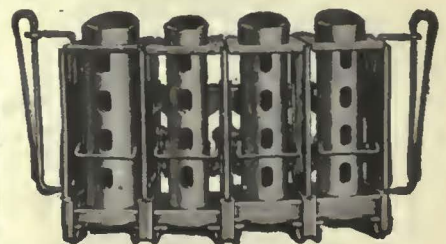
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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

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WANTED—Shop foreman of ability and experience to take charge of modern equipment of twenty cars in city of 50,000 within 100 miles of New York City. State age, experience and salary expected. Address, Room 1509, 43 Cedar Street, New York City.

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WOULD like to correspond with any company needing a high-grade official in any capacity, in city or interurban railways. Can manage any or all departments in the most efficient manner. PW-33, Electric Railway Journal, Guardian Bldg., Cleveland, O.

CORRESPONDENCE solicited with managers that are in need of an experienced equipment supervisor, one who has proven that he can maintain all types of cars and busses in an attractive and reliable condition at minimum of cost, a good organizer, a man who is loyal and one that works in harmony with all departments, references, past and present employers. PW-40, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

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“SEARCHLIGHT” IS Opportunity Advertising

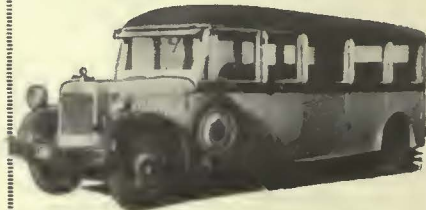
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Brill Built
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Cars Complete—Low Price—Fine Condition
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If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the



Somebody is always looking for something to meet certain business needs. Some men in charge of plant operations may be in the market for good used equipment—others may have just what they want, to sell. Some may require a man of unusual quali-

fications for a particular position—that man may be another reader of this paper! Put the Searchlight Section to work for you under any of the following classifications—to fill your business needs.

- Agencies Wanted
- Agents Wanted
- Auction Notices
- Buildings For Sale
- Business Opportunities
- Civil Service Opportunities
- Contracts To Be Let

- Contracts Wanted
- Educational Courses
- Employment Agencies
- Exchanges
- For Rent Items
- Franchises
- Industrial Sites

- Miscellaneous Wants
- New Industries Wanted
- Partners Wanted
- Patents For Sale
- Patent Attorneys
- Plants For Sale
- Positions Vacant

- Positions Wanted
- Property For Sale
- Receivers' Sales
- Representatives Wanted
- Salesmen Wanted
- ork Wanted
- Etc., Etc., Etc.

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 Brakes
Westinghouse Air Brakes Co.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Air Springs
Cleveland Pneumatic Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Appraisals
American Appraisal Co.
Armatures Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.
Automatic Door Equipment
Manganese Steel Forge Co.
Automatic Return Switch
Stands
Ramapo Ajax Corp.
Automatic Safety Switch
Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works
Taylor Electric Co.
Westinghouse E. & M. Co.
Axles, Front
Shuler Axle Co.
Babbit Metal
National Bearing Metals
Corp.
Babbiting Devices
Columbia Machine Works
& M. I. Co.
Barges, Steel
American Bridge Co.
Badges and Buttons
Elec. Service Supplies Co.
International Register Co.
Batteries, Dry
Nichols-Lintern Co.
Batteries, Storage
Willard Storage Battery Co.
Bearings, Ball
Norma Hoffman Co.
S. K. F. Industries
Bearings and Bearing Metal-
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works &
M. I. Co.
General Electric Co.
National Bearing Metals
Corp.
St. Louis Car Co.
Taylor Electric Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller
Side
Cincinnati Car Co.
Columbia Machine Works
Stuckl Co., A.
Bearings, Roller
Hyatt Roller Bearing Co.
Norma Hoffman Co.
S. K. F. Industries
Bells and Buzzers
Consolidated Car Heating
Co.
Bells and Gasps
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works &
M. I. Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Benders, Rail
Railway Trackwork Co.
Bodies, Bus
Brill Co., The J. G.
Cummings Car & Coach Co.
Fitzjohn Mfg. Co.
Lang Body Co.
St. Louis Car Co.
Body Material, Haskellite and
Flymet
Haskellite Mfg. Corp.
Boiler Tubes
National Tube Co.
Bolters
Babcock & Wilcox Co.
Bolster Hanger Wear Plates
Manganese Steel Forge Co.
Bolts, Nuts & Rivets
Russell, Burdall & Ward
Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improve. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Bonds, Rail
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Electric Ry. Improve. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, etc.)
American Bridge Co.
Bates Expanded Steel
Truss Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
American Brake Shoe &
Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Taylor Electric Co.
Brake Testers
National Ry. Appliance Co.
Brakes, Brake Systems and
Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
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General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Co.
Westinghouse Tr. Br. Co.
Brakes, Magnetic Rail
Cincinnati Car Co.
Bridges, Steel
American Bridge Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Stackpole Carbon Co.
Westinghouse E. & M. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Brushholders
Columbia Machine Works
Buildings, Steel
American Bridge Co.
Bulkheads
Haskellite Mfg. Corp.
Bunkers, Coal
American Bridge Co.
Buses
Cummings Car & Coach Co.
Graham Bros.
International Harvester Co.
Six Wheel Co.
Verare Corp.
White Company
Yellow Truck & Coach Co.
Bus Lighting
National Ry. Appliance Co.
Bushings, Case Hardened
and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
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Cables (See Wires and
Cables)
Cambric Tapes, Yellow and
Black Varnish
Irvington Varnish & Ins.
Co.
Carbon Brushes (See
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Car Lighting Fixtures
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heating
Co.
Westinghouse E. & M. Co.
Car Steps, Safety
Cincinnati Car Co.
Irving Iron Works
Car Wheels, Rolled Steel
Bethlehem Steel Co.
Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.
St. Louis Car Co.
Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
Cars, Gas, Rail
Brill Co., The J. G.
St. Louis Car Co.
Cars, Passenger, Freight,
Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Thomas Car Works, Perley
A.

Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
Brill Co., The J. G.
General Electric Co.
Castings, Brass Composition
or Copper
Anderson Mfg. Co., A. J.
& M.
Cincinnati Car Co.
Columbia Machine Works &
M. I. Co.
National Bearing Metals
Corp.
Castings, Gray Iron and
Steel
American Brake Shoe &
Fdry. Co.
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works &
M. I. Co.
St. Louis Car Co.
Standard Steel Works
Castings, Malleable & Brass
American Brake Shoe &
Fdry. Co.
Bemis Car Truck Co.
Columbia Machine Works &
M. I. Co.
St. Louis Car Co.
Catchers and Retrievers,
Trolley
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Ceiling Car
Haskellite Mfg. Corp.
Ceilings, Plywood, Panels
Haskellite Mfg. Corp.
Cement Products
Portland Cement Co.
Chafing Plate
Manganese Steel Forge Co.
Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.
Change Trays
Cincinnati Car Co.
Circuit-Breakers
Anderson Mfg. Co., A. J.
& M.
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for
Wires and Cables
Columbia Machine Works
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Electric Ry. Improve. Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
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Cleaners and Scrapers Track
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Cincinnati Car Co.
Ohio Brass Co.
Root Spring Scraper Co.
St. Louis Car Co.
Clusters and Sockets
General Electric Co.
Cable Banding and Winding
Machines
Columbia Machine Works &
M. I. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
Colls, Armature and Field
Columbia Machine Works &
M. I. Co.
Economy Elect. Devices Co.
General Electric Co.
Westinghouse E. & M. Co.
Colls, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Changers
Johnson Fare Box Co.
Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.
Johnson Fare Box Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator Slitters
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Wood Co., Chas. N.
Commutator Truing Devices
General Electric Co.
Commutators or Parts

Columbia Machine Works &
M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.
Compressors, Gas
Sullivan Machinery Co.
Compressors, Air, Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.
Condensers
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condenser Papers
Irvington Varnish & Ins.
Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Columbia Machine Works
Consolidated Car Heating
Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Controllers or Parts
Columbia Machine Works &
M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.
Conveying & Hoisting
Machinery
American Bridge Co.
Copper Wire
American Brass Co.
American Steel & Wire Co.
Anacosta Copper Mining
Co.
Copper Wire Instruments,
Measuring, Testing and
Recording
American Brass Co.
Anacosta Copper Mining Co.
Cord, Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
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International Register Co.
Roebbling's Sons Co., John A.
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Samson Cordage Works
Silver Lake Co.
Cord Connectors and
Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Cranes, Car
American Steel Foundries
Brill Co., The J. G.
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St. Louis Car Co.
Ohio Brass Co.
Westinghouse Traction
Brake Co.
Cowl Ventilators
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Cranes, Hoists & Lifts
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Crossings
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Crossings, Frogs & Switches
Ramapo Ajax Corp.
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Curtains & Curtain Fixtures
Brill Co., The J. G.
St. Louis Car Co.
Dealer's Machinery & Second
Hand Equipment
Electric Equipment Co.
Hyman Michael
Derailing Devices (See also
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Derailing Switches
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Destination Signs
Columbia Machine Works &
M. I. Co.

Elec. Service Supplies Co.
Detective Service
Wish-Servise, P. Edward
Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.
Safety Car Devices Co.
Doors & Door Fixtures
Brill Co., The J. G.
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General Electric Co.
Hale-Kilburn Co.
St. Louis Car Co.
Doors, Folding Vestibula
National Pneumatic Co.
Safety Car Devices Co.
Drills, Rock
Sullivan Machinery Co.
Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Ears
Columbia Machine Works
& M. I. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Electric Grinders
Railway Trackwork Co.
Electric Transmission
Towers
American Bridge Co.
Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
John A. Roebbling's Sons Co.
Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.
Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.
Engineers, Consulting, Con-
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Bibbins, J. Rowland
Bylesby Co., H. M.
Day & Zimmermann, Inc.
Falle & Co., E. H.
Ford, Bacon & Davis
Humphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLew
Linn & Marshall Co.
McClellan & Junkerfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp. The J. G.
Engineers, Inspecting &
Chemists
Pittsburgh Testing Labor-
atory Co.
Engines, Gas, Oil or Steam
Ingersoll-Rand Co.
Waukesha Motor Co.
Westinghouse E. & M. Co.
Exterior Side Panels
Haskellite Mfg. Corp.
Face Boxes
Cleveland Fare Box Co.
Economy Elect. Devices Co.
Johnson Fare Box Co.
Perey Mfg. Co.
Face Registers
Electric Service Supplies Co.
Johnson Fare Box Co.
Fences, Woven Wire & Fence
Posts
Acme Wire Co.
American Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Root Spring Scraper Co.
St. Louis Car Co.
Star Brass Works
Wood Co., Chas. N.
Fibre and Fibre Tubing
Westinghouse E. & M. Co.
Fire Extinguishers
Pyrene Mfg. Co.
Floodlights
Electric Service Supplies Co.
Floor, Rub
Haskellite Mfg. Corp.
Flooring, Fireproof
Irving Iron Works
Flooring, Non-Sliping
Irving Iron Works
Flooring, Open, Steel
Irving Iron Works
Flooring, Steel, Subway
Irving Iron Works
Flooring, Ventilating
Irving Iron Works
Floors
Haskellite Mfg. Corp.
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on the

“South Shore’s” Right of Way



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Steel and Steel Products	American Steel & Wire Co.	Gold Car Heating & Light	Irving Iron Works	Treads, Safety Stair	Cincinnati Car Co.	Wheel Guards (See Fenders and Wheel Guards)	Westinghouse E. & M. Co.	Wheel Presers (See Machine Tools)	
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Stokers, Mechanical	Babcock & Wilcox Co.	Ticket Choppers and Destroyers	Elec. Service Supplies Co.	Tree Wire	Okonite Co.	Wheels, Car, Steel & Steel Tire	Elec. Service Supplies Co.	American Steel Foundries	Bemis Car Truck Co.
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Storage Batteries (See Batteries, Storage)	Nichols-Lintern Co.	Ties, Mechanical	Dayton Steel Tie Co.	General Electric Co.	National Bearing Metals Corp.	Wheels, Steel Disc	Ohio Brass Co.	Budd Wheel Co.	Columbia Machine Works & M. I. Co.
Strain Insulators	Anderson Mfg. Co., A. J. & M.	Ties and Tie Rods, Steel	American Bridge Co.	Nuttall Co., R. D.	Ohio Brass Co.	Wheels, Trolley	Westinghouse Tr. Br. Co.	Columbia Machine Works & M. I. Co.	Elec. Ry. Equipment Co.
Superheaters	Babcock & Wilcox Co.	Tires	Carnegie Steel Co.	Ohio Brass Co.	Trolley Buses	Wheels, Trolley	Varnished Papers and Silks	Irvington Varnish & Ins. Co.	Elect. Service Supplies Co.
Sweepers, Snow (See Snow Plows, Sweepers and Benoms)	American Steel & Wire Co.	General Tire Co.	International Steel Tie Co.	General Electric Co.	Brill Co., The J. G.	Welded Rail Joints	Irvington Varnish & Ins. Co.	Consolidated Car Heating Co.	Nichols-Lintern Co.
Switch Stands and Fixtures	Ramapo-Ajax Corp.	Goodrich Tire Co.	Ties, Wood Cross (See Posts, Ties, Posts, etc.)	National Bearing Metals Corp.	Westinghouse E. & M. Co.	Welders, Portable Electric	Consolidated Car Heating Co.	Nichols-Lintern Co.	Natl. Ry. Appliance Co.
Switches, Selector	Nichols-Lintern Co.	Takens	Tires	Ohio Brass Co.	Westinghouse E. & M. Co.	Welding, Steel	Railway Utility Co.	Railway Utility Co.	St. Louis Car Co.
Switches and Switchboards	Consolidated Car Heating Co.	Johnson Fare Box Co.	General Tire Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Nuttall Co., R. D.
Switches, Tee Rail	Ramapo-Ajax Corp.	Tongue Switches	Goodrich Tire Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Star Brass Works
Special Work	Ingersoll-Rand Co.	Tools, Track & Miscellaneous	Towers and Transmission Structure	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Trolley Wheels (See Wheel-Trolley)
Tampers, Tie	Railway Trackwork Co.	Trucks	Archbold-Brady Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Trolley Wire
Tapes and Cloths (See Insulating Cloth, Paper and Tape)	American Steel & Wire Co.	Truck Grinders	Bates Expanded Steel Trusses Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Amer. Electrical Works
Telephone and Parts	Elect. Service Supplies Co.	Metal and Thermit Co.	Trucks	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	American Brass Co.
Testing Instruments (See Instruments, Measuring Testing, etc.)	General Electric Co.	Railway Trackwork Co.	Trucks, Car	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	American Electrical Works
	Westinghouse E. & M. Co.	Ramapo-Ajax Corp.	Bemis Car Truck Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	American Steel & Wire Co.
		Track, Special Work	Brill Co., The J. G.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Anaconda Copper Min. Co.
		Buda Company	Cincinnati Car Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Bridgeport Brass Co.
		Columbia Machine Works & M. I. Co.	Cummings Car & Coach Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	General Electric Co.
		Ramapo Ajax Corp.	St. Louis Car Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Okonite-Callender Cable Co. Inc.
		Trackless Trolley Cars	Taylor Electric Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Roebling's Sons Co., J. A.
		Brill Co., The J. G.	Trucks, Motor	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Westinghouse E. & M. Co.
		St. Louis Car Co.	International Harvester Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.
		Transfer Tables	White Company	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.
		American Bridge Co.	Truck & Body Bolster Center Plates	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.
		Transformers	Manganese Steel Forge Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.
		General Electric Co.	Waskette Mfg. Corp.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.
		Westinghouse E. & M. Co.	Tubing, Steel	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.
			National Tube Co.	Westinghouse E. & M. Co.	Westinghouse E. & M. Co.	Welding, Steel	St. Louis Car Co.	St. Louis Car Co.	Una Welding & Bonding Co.



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No. 301 Type

Rockford wanted Modern Cars and specified **Brill** Seats

A unique feature of the last seven cars built by the American Car Company for Rockford was the use of Brill No. 301 type leather upholstered seats of a distinctive color in each car.

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Interurban Passenger



C. E. R. A.
Standard
Freight
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Motor Freight Car

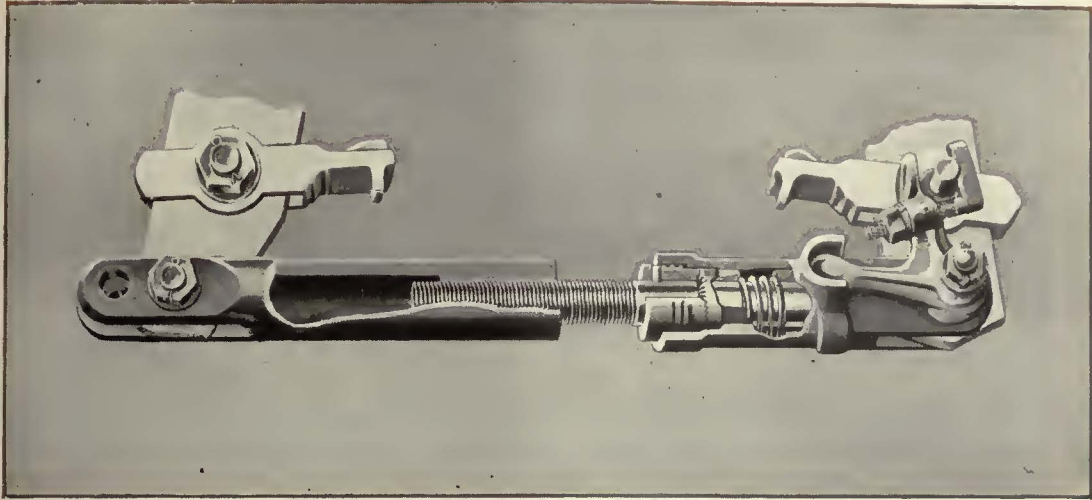
100 per cent New Cars

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The modern tendency is to place in service new cars, scientifically designed, with adequate provision for the public's comfort, convenience and safety. Increased interest in electric railway service is manifested with the introduction of new cars. That's why the Cincinnati, Hamilton & Dayton confidently rehabilitated its service with 100 per cent new equipment.

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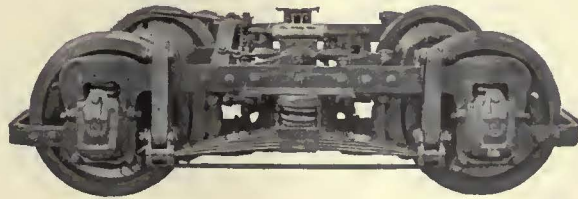


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A mechanical slack adjuster which, while comparatively new, has been thoroughly tested and proven its merit in the automatic adjustment of brakes during the life of the

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Like the Brill 177-E Truck—"Recommended by Proven Merit"



Getting down to Base Cloth



Two cloths which look alike on the surface may not be the same inside—and that's where the protection begins. G-E Varnish-treated Cloths and Tapes are made from a base cloth which is starch and acid free. No fillers are added which might prevent thorough penetration by the treating varnishes. This good base cloth is then given a chance to absorb G-E Insulating Varnishes and naturally holds an exceptionally high percentage of varnish.

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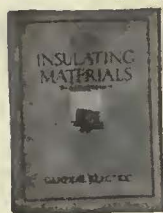
These tapes are cut from our Varnish-treated Cloths and are therefore of the same high quality. Any desired width from $\frac{1}{2}$ inch up in all necessary thicknesses. Colors—black and yellow.

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- Insulating Fibers
- Insulating Papers
- Flexible Varnished Tubing
- Motor Tubing
- Asbestos and Cotton Tapes
- Friction and Rubber Tapes
- Prepared Paper Tapes
- Cords and Twines

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