ELECTRIC RAILWAY JOURNAL

v-Hill Publishing Company, Inc. JUNE 30, 1928 Twenty Cents Per C

An electric car is no better than its gears!

The New W-N Drive

Just like the well-known chain and its weakest link, so are electric cars no stronger than their driving gears.

With this in mind, Nuttall engineers, in conjunction with Westinghouse, have designed the new W-N Drive, especially to withstand the wear and tear of electric traction use, and to make the gears as trouble-proof as possible.

To resist the constant wear of gear on pinion, heat treated hardened gears of helical design have been used. These are kept in alignment by an oil tight case of steel with Timken Roller bearings, and are immersed in a continuous bath of oil. This new improved gear drive permits the use of higher ratio of reduction and makes available the full efficiency of modern high-speed motors.

With this new drive cars can now be operated to maximum advantage and with least trouble, giving silent, swift and satisfactory service to the public, and giving the full benefits of that type of service through the profits that it brings.

All Nuttall Products are sold through the Westinghouse Electric & Mfg. Co., district offices: Refer your inquiries to the nearest Westinghouse Office.

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Westinghouse - Nuttall

Electric Railway Journal

CHARLES GORDON, *Editor*

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June 30, 1928

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Mica Sheets
Mica Tubes
Varnishes
Paints
Japans
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Insulating Compounds
Insulating Glue
Transformer Oil
Switch Oil

WHEN railway motors are dipped and baked in Westinghouse Varnish No. 335, their service-life is greatly prolonged. Varnish No. 335 is not only immune to oil and water, but it also protects the motor insulation against the effects of vibration and excessive heat. Furthermore, Westinghouse varnish does more than save the surface—it insulates. When specifying varnish for railway motors, consider first its ability to protect and to insulate. These factors are your assurances of long service-life.

Using Westinghouse Insulating Materials Is Like Owning a Million Dollar Laboratory

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

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

MEMBER A.E.R.A. 1928

Westinghouse

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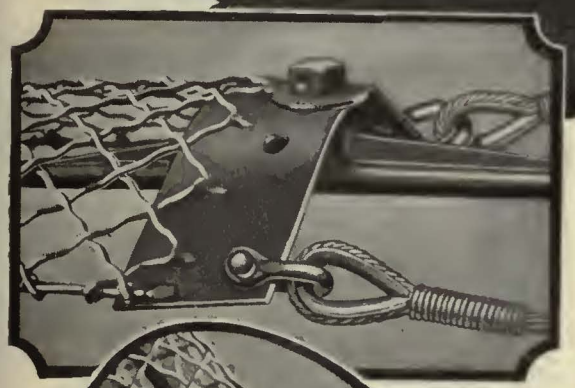
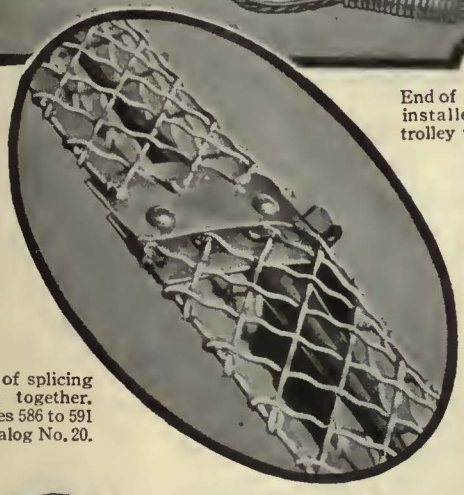
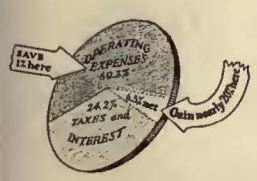


End of guard installed on trolley wire.



Method of splicing sections together. See pages 586 to 591 O-B Catalog No. 20.



Good will, in which thousands of dollars are invested, is only maintained by better service, and by the adoption of modern devices for further bettering service. Increased patronage is very probable, when riders know of these improvements. O-B Trolley Guard, in addition to reducing operating expense and thus adding to the "net", is a safeguard of your investment in good will.

Safe—and an Economic Necessity

THREE important factors have a decided influence on net profits. The first is savings from ***Safety.*** By protecting cars at railroad crossings, eliminating possible serious and costly accidents, O-B Trolley Guard plays a most important part in providing safety.

Service is the second factor. On it depends the good will of your patrons. O-B Trolley Guard prevents delays and saves time at crossings—making faster schedules possible and thus serving your riders better.

You ***Save*** money. One accident prevented by O-B Trolley Guard adds materially to the net. Faster schedules and elimination of delays reduce operating costs.

By its merit and service O-B Trolley Guard becomes an economic necessity. Low initial cost; handy ten-foot sections, factory formed ready to install, with yokes and plates attached; all go to make O-B Trolley Guard a sound "Dollars and Sense" investment.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
890L

Ohio Brass Co.

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

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

Increasing the Utility of Motor Transportation

Speedy highway transportation with the same degree of safety that the riding public has become accustomed to on railway vehicles attracts patronage.

Short, smooth stops, made without discomfort to patrons, permit higher schedule speeds and better running time.

Powerful retarding force, equalized to minimize skidding, easily controlled, and without driver fatigue, insures maximum safety under all road, traffic, and load conditions.

Automatic equalization of braking forces, combined with the absence of "brake riding" due to greater driver confidence, lengthens the life of linings and reduces frequency of adjustment, which results in a saving of material, labor and layover charges.

Westinghouse Air Brakes are increasing the utility of motorized transportation on many properties.

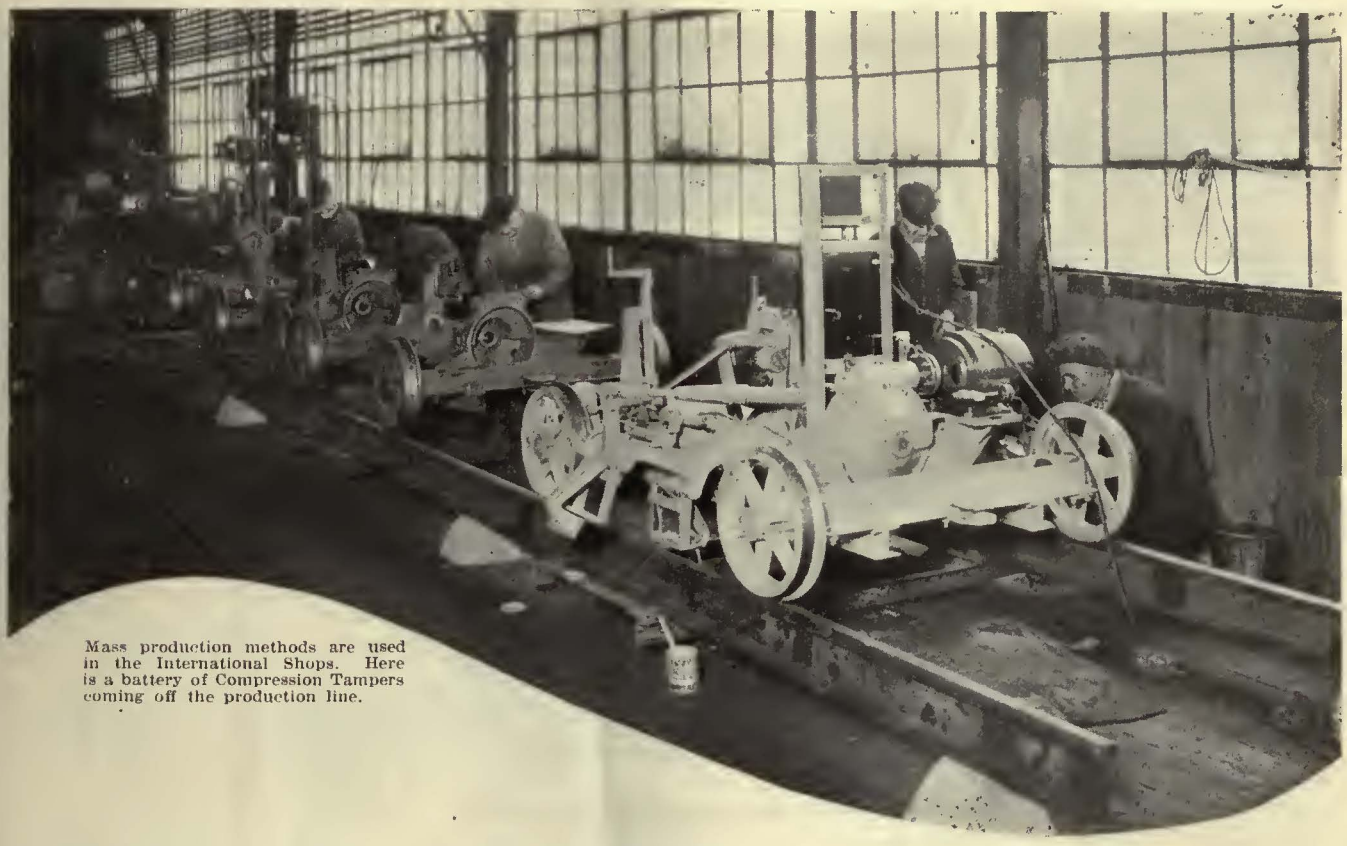
WESTINGHOUSE TRACTION BRAKE COMPANY

Automotive Brake Division - - - - - Wilmerding, Penna.

6225

WESTINGHOUSE

AUTOMOTIVE AIR BRAKES



Mass production methods are used in the International Shops. Here is a battery of Compression Tampers coming off the production line.

This Is A Machine Age!

THAT'S not a startling head line—you knew it all the time. But are *you* taking full advantage of the *benefits* of machinery?

Take paved track construction. With a lot of shovels, picks, maul, crowbars, tongs and *strong backs* you can build paved track

OR

With a compression tamper and a tie layer and the power overhead, you can build paved track.

What's the difference?

Hand labor construction is less durable, takes more time to do and costs a great deal more.

But take the machine method, and Steel Twin Ties—better track at *less* cost every time.

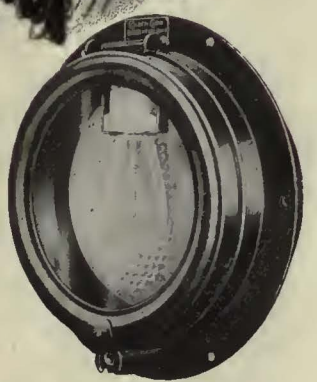
Can you think of any reasons why you shouldn't use mass production methods and Steel Twin Ties?

Better let us quote you on delivered prices for third quarter delivery. (You can lease a tamping machine from us—we'll deliver it and call for it).

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, OHIO

STEEL TWIN TIE TRACK
THE BASE OF MODERNIZATION

Golden Glow



Type DG Golden Glow Headlight for city service. Being fitted with a Golden Glow prismatic reflector it illuminates a wide area adjacent to and for about 50 feet ahead of the car.

Safety!

Safety is the watchword of today's transportation needs. Accidents are dangerous, costly and a constant drain on resources. Safety pays dividends.

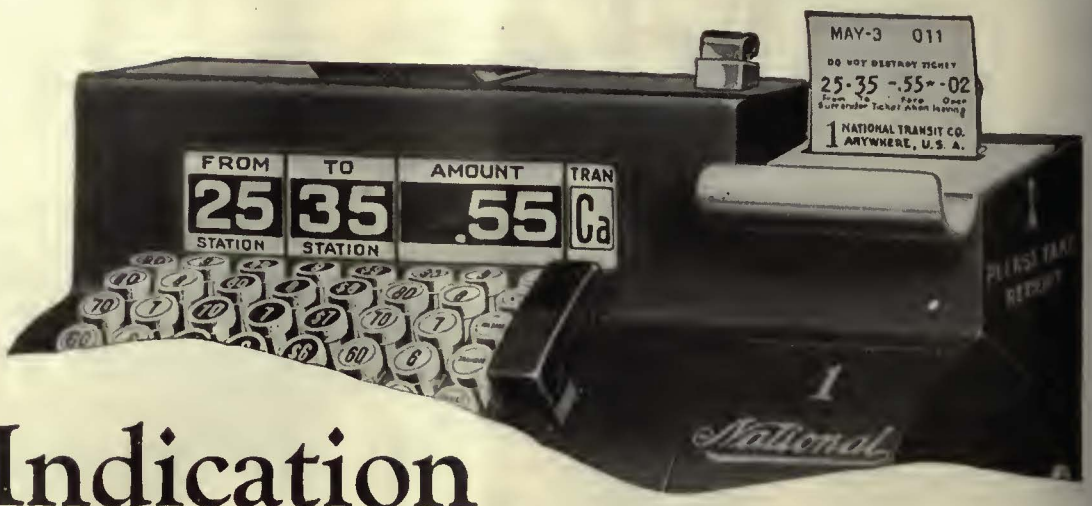
Good headlights provide this safety in night operation—while makeshift headlights or marker-lights are entirely inadequate in competition with the brilliant lighting of swiftly moving automobile traffic.

Let us tell you about Golden Glow Headlights fully described in our latest pamphlets. Send for copies today.

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

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



The Indication

an important feature of National Fare Registers

The public indication is one of the most important of the ten distinctive features of National Fare Registers. It shows the amount of each fare, the zone from and to and the kind of transaction. It is visible to other passengers in the car as well as to the passenger paying fare.

It makes inspection and checking easy and accurate because inspector gets complete information about each fare. Without this public indication there could not be complete protection for fares collected.

The National Fare Register has other distinctive features which have made it the choice of well-known electric railway operators. A ticket of convenient size printed and issued at the time the fare is recorded, shows zone from and to, amount of fare, date, operator's number and other information. A printed trip sheet locked inside the machine gives a consecutive record of each fare. A fast operating keyboard and electric motor insure quick loading.

Electric railway operators have found National Fare Registers a protection for receipts, a means of reducing operating costs and a method of speeding service that has never before been available.

The indication of the National Fare Register is visible to passengers in the car.

The National Fare Register is small and compact, easy to install and fast in operation. It is sturdy in construction and will stand up under hard usage.

There are 252 National Cash Register offices in the United States and Canada, each a service station for National Fare Registers. Our nearest representative will be glad to give complete information and demonstrate this new register.

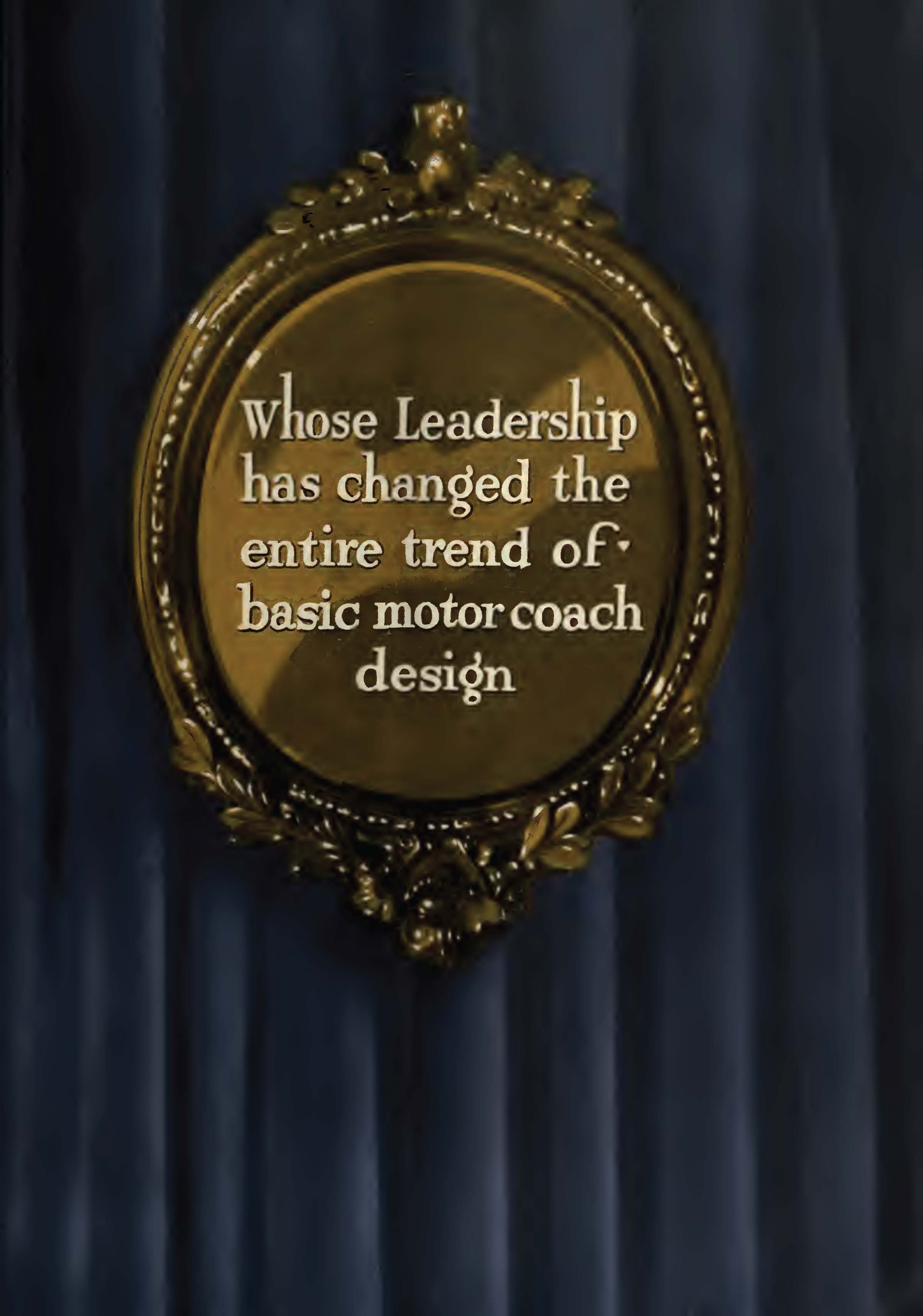
National Fare Registers

Product of The National Cash Register Company

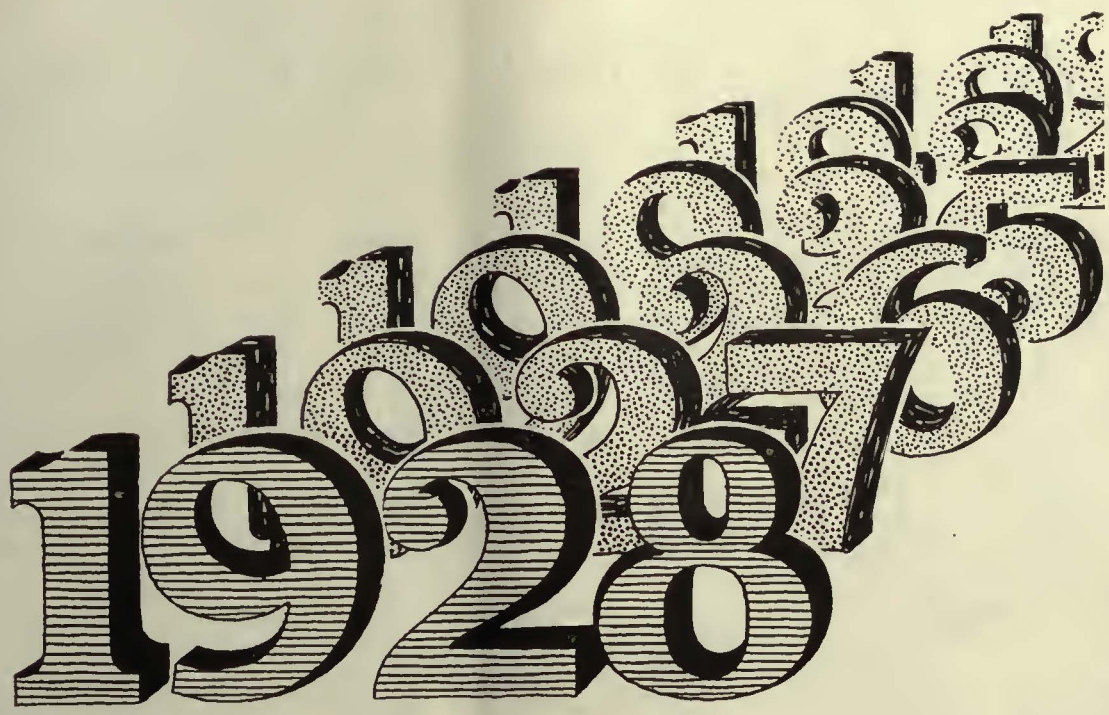
Dayton, Ohio


Commemorating
the First Year of
Twin Coach
HISTORY


FRANK R. FAGEOL


Whose Leadership
has changed the
entire trend of
basic motor coach
design


-Today, the Twin
Coach is generally
conceded to lead
the sales field in
larger type coaches



Year by year the Electric Railway Industry is advancing. This advancement is due to the efforts of those in places of responsibility. It is their determination to keep abreast of the times and their desire to give the traveling public what it wants, that is bringing about this advancement. New and modern equipment, public relations, and a study of street transportation are important factors. Many of the leading operators have seen the advantages of treadle-ization and have adopted the NP Automatic Treadle.

TREADLE-IZE!

NATIONAL PNEUMATIC COMPANY

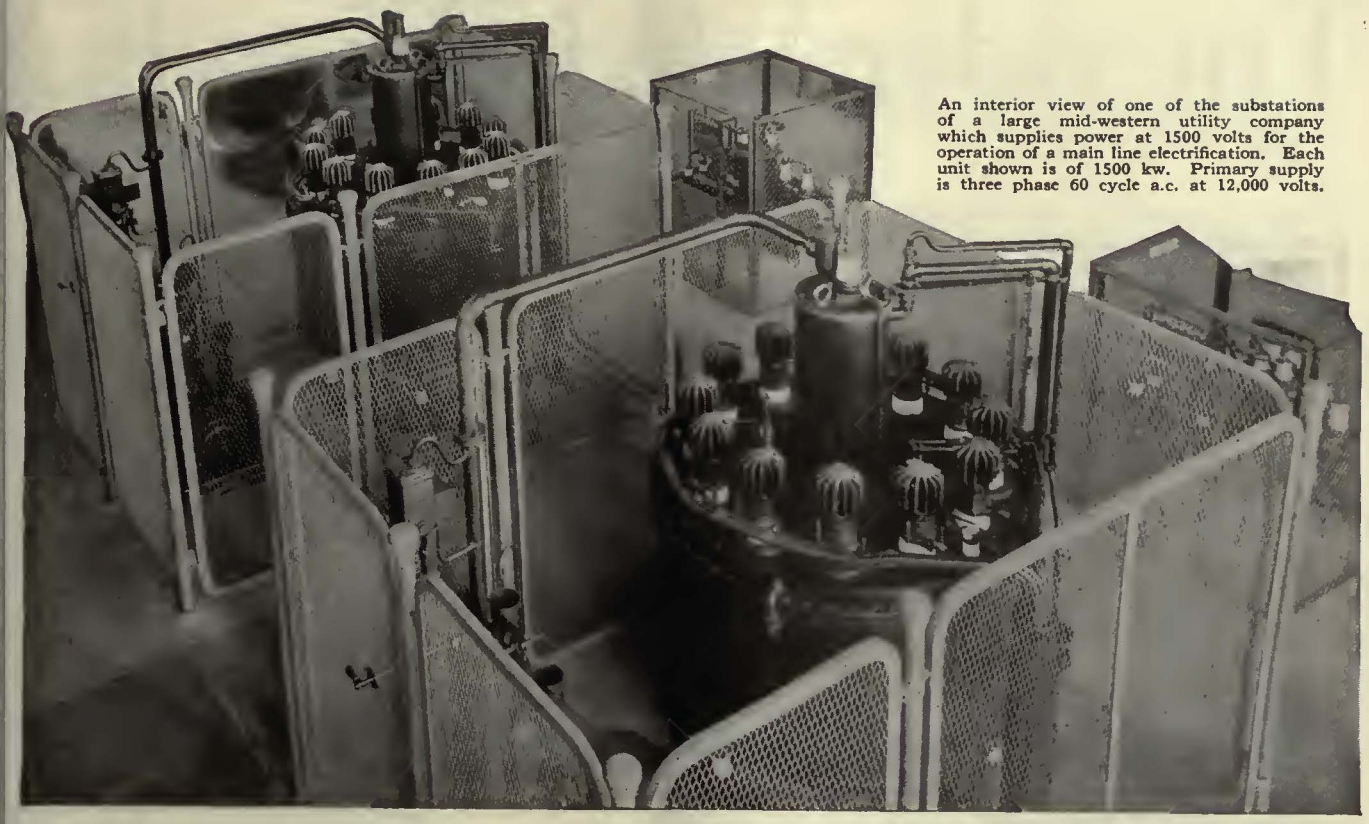
Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

CHICAGO
518 McCormick Building

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

PHILADELPHIA
1010 Colonial Trust Building



An interior view of one of the substations of a large mid-western utility company which supplies power at 1500 volts for the operation of a main line electrification. Each unit shown is of 1500 kw. Primary supply is three phase 60 cycle a.c. at 12,000 volts.

Higher voltages — higher efficiencies

VOLTAGES, customarily used in electric railway practice are high enough to show substantial efficiency gains where A-B-B rectifiers handle the conversion function. Beginning at about 4% saving over best rotary converter performance for all-day runs at 550 volts, they reach much higher gains in similar comparisons on properties operating at 1500 volts such as the one illustrated here. The exact percentage gained depends necessarily on the load characteristics of the system under consideration.

We shall be glad, upon receipt of inquiries, to supply typical load curve comparisons. Further advantages of A-B-B rectifiers are given below:—

Simple operation and minimum attention.
No synchronizing.
Very high momentary overload capacity and insensibility to short circuits.
Negligible maintenance.
Low weight. No special foundations.
Noiseless and vibrationless operation, consequently rectifier substations can be erected in densely populated localities.
New substations need only be of light construction. The plant can often be erected in places that could not be considered for rotating machinery.

AMERICAN BROWN BOVERI ELECTRIC CORPORATION
Camden, New Jersey

Principal Products

Electric Locomotives

Multiple Unit Cars

Diesel-Electric Locomotives

Car Lighting Equipment

Mercury Arc Power Rectifiers

Transformers

Automatic Voltage Regulators

Automatic Synchronizers

High Voltage Oil Circuit Breakers

Steam Turbo-Generator Sets

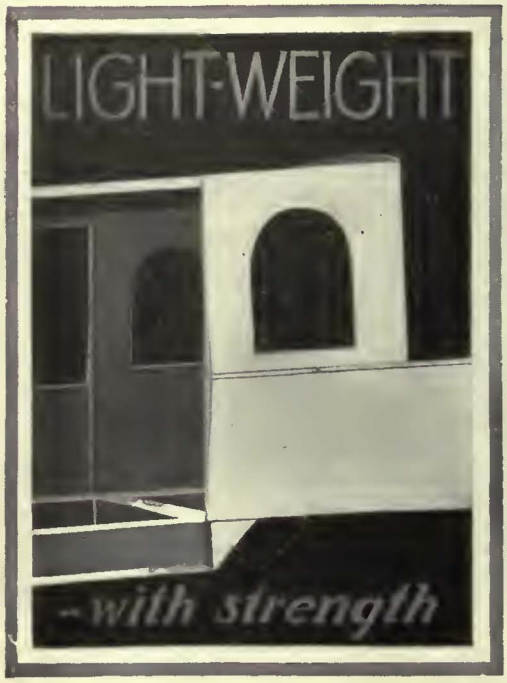
Turbo-Blowers and Compressors

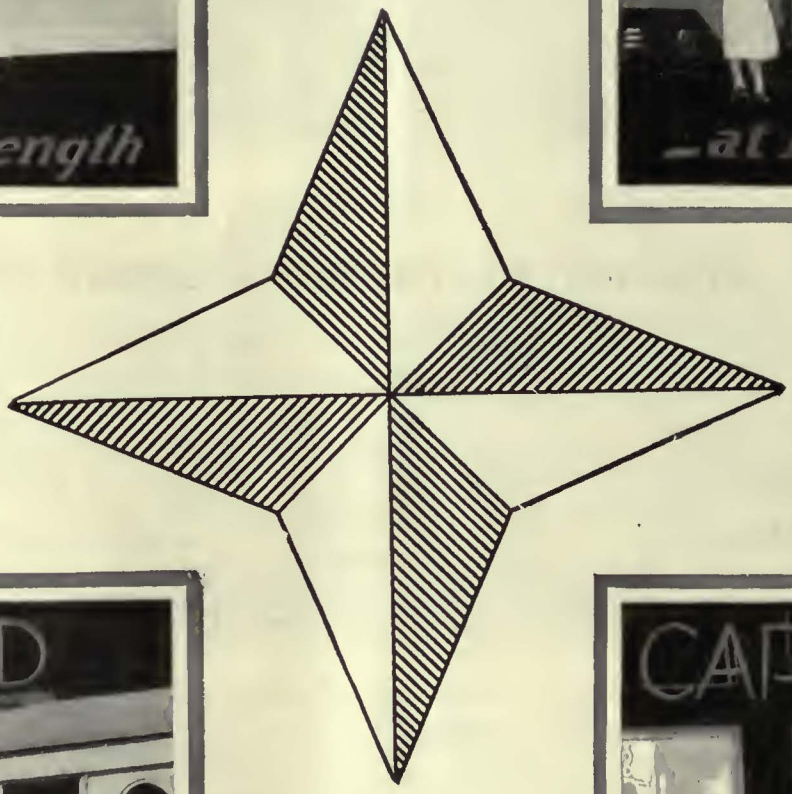
Turbo-Exhausters and Boosters

Scavenging and Supercharging Blowers

AMERICAN BROWN BOVERI

The rider WANTS to buy





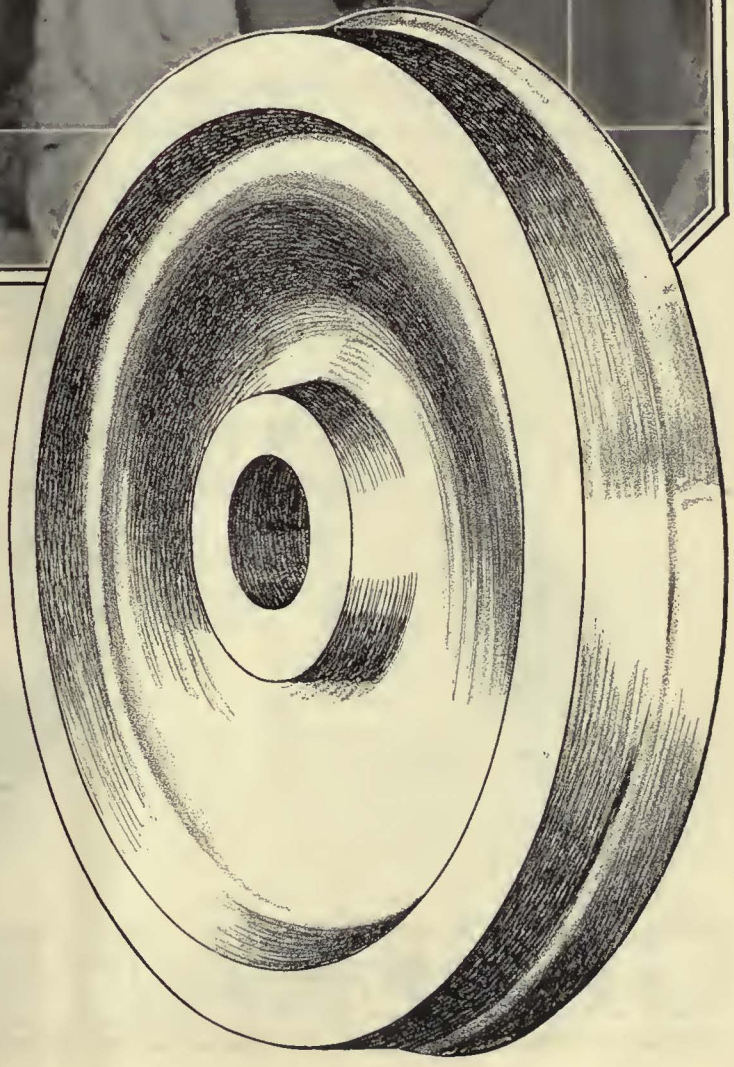
he cardinal points of

CINCINNATI BALANCED LIGHTWEIGHT CARS

The soundness of his logic is unescapable. So, too, is the soundness of the logic of the operating company which heeds the preference.

Looking forward to the time when the purchase of new cars is at hand the Cincinnati Car Company is eager NOW to place the operating records of Cincinnati BALANCED LIGHTWEIGHT cars before you. Compare them with your own. That is the logical way for you to form opinions on which far-reaching decisions may be safely made. May we answer your questions?

CINCINNATI CAR COMPANY
CINCINNATI, OHIO



It's the *Coach* That Carries the Crowd . . . . . But It's the *Wheels* That Carry the Coach

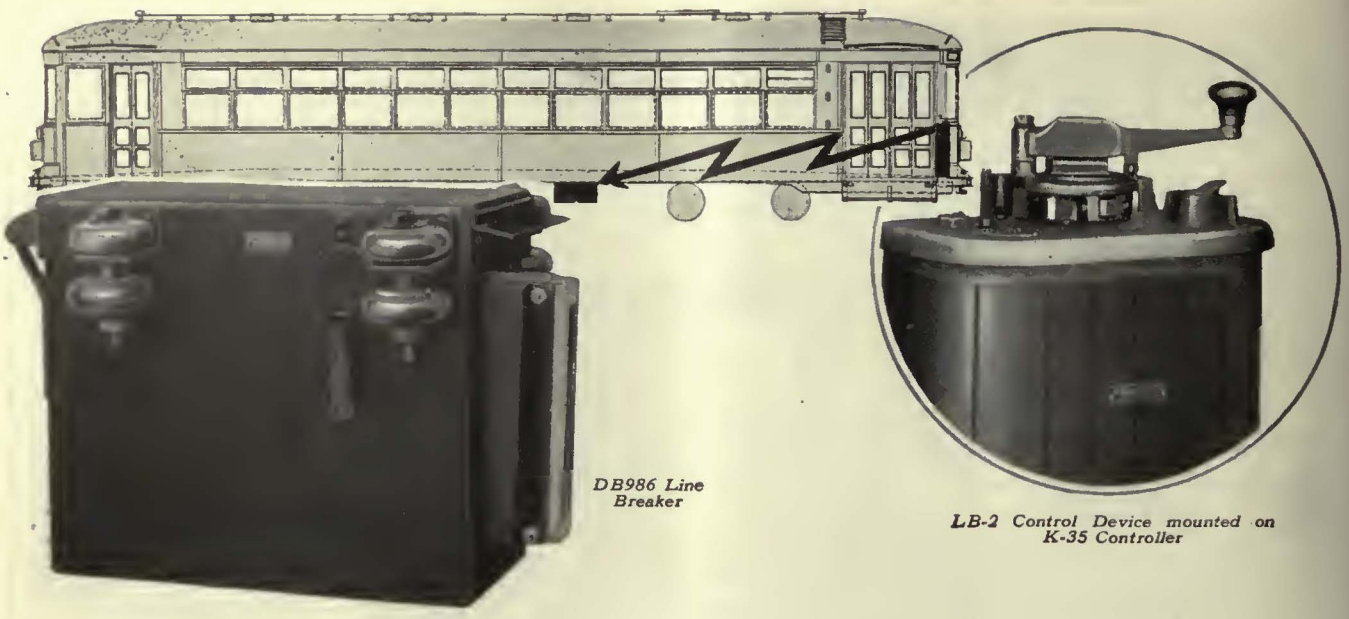
And so, in electric railway service, with its steep peak periods and the ever recurring emergencies that heavy traffic creates, the best wheel made is only good enough.

Gary Wrought Steel Wheels are manufactured in quantity but under a system of individual attention that assures the same physical and chemical precision as if only one wheel were made each day.

Our wheel specialists are at your command.

Illinois Steel Company

General Offices:
208 South La Salle Street
Chicago, Illinois



DB986 Line Breaker

LB-2 Control Device mounted on K-35 Controller

Break the Current under the Car

With the new G-E Line Breaker Control Device, arcing from heavy currents, ordinarily ruptured in the controller or overhead circuit breaker, is transferred to a high-speed line breaker under the car.

The whole secret is in the slight lost motion in the LB Control Device. When the controller is turned toward the "off" position, the cylinder does not move until the line breaker has done its work in rupturing the circuit.

Twenty-five hundred of these LB Control Devices are now in operation on seventy-five properties.

The G-E Line Breaker and LB Control Device are typical examples of G-E developments produced primarily to protect and save equipment.

330-44

GENERAL ELECTRIC

Electric Railway Journal

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

Consolidation of
Street Railway Journal and
Electric Railway Review

LOUIS F. STOLL, *General Manager*
CHARLES GORDON, *Editor*

Volume 71 New York, Saturday, June 30, 1928 *Number 26*

Standing for True Business Statesmanship

EXTENSION of the McGraw-Hill publishing activities to every branch of American business is the most significant effect of the merger of the A. W. Shaw Company, of Chicago, and the McGraw-Hill Publishing Company, Inc., announced elsewhere in this issue.

Heretofore the magazine publishing activities of the McGraw-Hill organization have been confined to specialized service to major engineering industries and the trade channels for distributing their products. The book division of the organization, it is true, has long since broadened its scope; it publishes books not only on engineering, management and industrial subjects, but on general business and scientific agriculture.

Through the merger the McGraw-Hill institution now acquires a medium by which it can speak to the whole range of American business. *The Magazine of Business* has a circulation of more than 150,000 copies and deals with the problems fundamental to all business—such as those of finance, production, distribution and sales, management, transportation and export trade. It treats, as well, those major movements in legislation, such as taxation, tariff and government regulation, which bear upon business.

The importance of this new extension of the McGraw-Hill activities is apparent to all who have followed the standards which, under the leadership of James H. McGraw, have dominated its publications. To give, through effective organization, the best of which they are capable, is his constant admonition to the publishers and editors working under his direction. The new association of interests presages a virile development of an already effective service to the whole business structure of America.

Further, it is significant that in referring to *The Magazine of Business,* Mr. McGraw in his announcement of the merger closed with these words, "It will fight for the interests of business but it will place in an equally important position the responsibility of business to the public. It will, in a word, stand for true business statesmanship."

Past performance in McGraw-Hill papers is a warrant that this pledge will be fulfilled.

Attracting New Blood

"FOR long, long years he has labored to get his engineering degree," writes W. E. Wood, president Virginia Electric & Power Company, in the *Stone & Webster Journal.* Mr. Wood refers to the technical graduates of American universities, thousands of whom at this season step confidently from the class room and laboratory into the ranks of American industry. "Where shall he begin?" asks Mr. Wood. And then he gives the young man some timely and practical advice regarding those human factors in industry as important to success—if not more so—than is technical ability.

What of the part which industries themselves play in shaping the destiny of the young graduate? Choice of a position is the burning question in the young man's mind. Some electric railways have had notable success through placing young graduates in student training courses. As a rule, the plan of moving these men on into the operating departments when they have served their apprenticeship has not been worked out as completely as it should be. Other properties fail entirely to offer any inducement in the way of special training to the graduate.

Many large industrial corporations have recognized the need for organized effort to induct into their ranks the best of this annual crop of engineers who offer that youth and new blood without which any business quickly dries up. In attracting young technical graduates the industry is in competition with others that may seem to offer more to the young man. It has been in serious difficulty for many years, and still has many serious problems ahead. But in this situation lies the great opportunity for the graduate. He can be interested in the possibilities of the local transportation industry if the industry itself takes the initiative.

Enticing the Summer Traveler

JUST as banking houses have come to regard the small-salaried investor as desirable clientele, so of late years transportation experts and managers have been concentrating on tours, itineraries and rate schedules that will appeal to the modest wage-earner who each summer spends some portion of his savings on tours and trips. During this week the annual holiday trek gets under way, with millions of pleasure seekers bound for the beaches and mountains via boats, buses, trains and trolleys.

To induce as many of these prospective travelers to go by the railway's trolley, bus or tour, many companies have been offering special ticket and week-end rates. For instance, the Chicago, South Shore & South Bend has offered a three-day limit $2 excursion ticket to the Dunes on the shore of Lake Michigan with a glimpse of Chicago 30 miles away. Other companies, including the Philadelphia Rapid Transit Company, Kentucky Carriers, and the Public Service Co-ordinated Transport of New Jersey, have advertised special bus trips for excursionists and week-enders. One continued attraction for summer outings will be the Sunday $1 pass. The opportunities for education and recreation through this latter means of travel was told recently by a writer in the Los Angeles *Times* who, short of funds, was entertaining a friend from New York. They traveled on the Pacific Electric Railway on the $1 Sunday pass, and the recital of the places they saw and the territory covered read like a real adventure story. He said that if it weren't for the tourists, one might never discover the possibilities of one's own surroundings.

Railway managements, if they have not already done so, should take stock at once of the particular opportunities on their own lines to sell rides in the good old sum-

mertime. Nature lovers, hikers, campers, bathing beauties —all are part of the caravan moving from the cities and towns on picnics, sightseeing parties and just-out-in-the-open revels. Cheaper rates and good accommodations will attract them. But railways must do more than just run vehicles. They must oblige their patrons with countless extra services. For example, tickets could be on sale at local stores and perhaps a guide might accompany a sightseeing trip. All such extra services will please the rider who has mapped out his time, and will encourage the vacationist who is uncertain where and how to go.

If transportation companies were only to do what was expected of them—carrying passengers hither and yon—they would transport only those business bound. The desired patronage that will round out the service is from the rider who wants to travel for pleasure, for rest or on educational pursuits. By and large, the public has developed a habit of travel. As a transportation and travel agency, the electric railway must consider the small tourist who in at least one season of the year is mentally and physically in tune with the world, is fairly amenable to suggestions and quick to react to bigger and better opportunities for becoming travel-wise.

Galvanized Buckets and the Man

MOST any man will do to fill a job, but to select a galvanized bucket—well, that requires considerable thought and careful inspection. With such comparison one of the flaws in electric railway management is brought to light by Dr. C. P. Segard, of the Third Avenue Railway, speaking at the recent meeting of the New York State Electric Railway Association. His complaint is that man power has been subordinated to mechanical power—that more attention has been given to equipment and operation than to the human element, which is indispensable no matter what type and kind of equipment are in use. He is at a loss to understand why, if the street railways pay out of their incomes approximately 50 per cent in wages, that in itself is not indication enough of the importance of man power in their business.

Mr. Segard's point is well taken. Some time ago before useful discoveries were made in the field of medicine, psychology and sociology, the man at work presented no special problem. He just came, was assigned a task and if he didn't measure up to the standard, assuming there was one, he was automatically dropped to become driftwood—a burden to himself and a liability to the community. Latter-day wisdom discovered many men inefficient in one branch of activity, with possibilities for fair success in another. Gradually time and effort were concentrated on studying the individual employee so as to know his endowments and proclivities. Then he was placed where he could employ his own particular talents to best advantage, become a contented worker, and give to his particular industry something of himself that would make both him and the business grow.

Here and there railway managements have adopted this modern point of view. They have resorted to psychological tests, studied the research available, employed medical assistance and insisted on intensive training in their quest for employees physically and mentally qualified for specific jobs. There is a definite obligation on the part of business to cut down the number of misfits by a study of their employees' aptitudes and abilities. Progressive railway organizations are giving attention, as never before, to the importance of the human element in maintaining and selling a public service.

Many "Ifs" in the St. Louis Finding

JUSTICE in part finally has been done the St. Louis Public Service Company, successor to the United Railways, in the fare and valuation decision rendered by the Missouri Public Service Commission. In the matter of fares, the rates effective on July 1 have been fixed at 8 cents flat, with a 4-cent fare for children, contrasted with the present rate of 8 cents cash or two tokens for 15 cents for adults, and 3 cents for children. The new rate is substantially the request of the predecessor company made a year ago. In the matter of the valuation the figure fixed by the commission is $66,000,000. This contrasts with a sum of $75,000,000 set up by the company and the tentative figure of $52,000,000 fixed some time ago by the commission and apparently the sum on which calculations by the state body have heretofore been made. The valuation question has been a matter of controversy since before the receivership in the year 1919. To that subject alone eight pages are devoted in the final report of the receiver to the court, rendered only a few months ago as the concluding word of his stewardship.

During the almost nine years of the receivership, $1,500,000 a year was charged to depreciation reserves. This sum it was sought to continue as a yearly charge. The city contended that $1,000,000 a year was sufficient. The commission decided that $800,000 a year was enough. This is only 1.2 per cent on the valuation found by the commission. The justification for its ruling in this particular is found by the commission in the facts covering past expenditures, the present large reserves, and the good physical condition of the property at this time. This, of course, is a back-handed compliment, but it remains to be seen whether the sum now set up is sufficient to preserve that excellent condition. Under this plan the difference of $700,000 between the two sums becomes available, other things being equal, as net return, but other things may not remain equal.

It is the old two-edged sword again. The commission's estimate of the probable number of riders may or may not prove to be correct, but it is much to the company's credit that despite the decreasing number of riders carried the railway was able to keep its expenses at a constant during 1925, 1926 and 1927. Among the other interesting comments by the commission is that in its opinion stress should not be put on either original or reproduction costs of the property. The state body said that its desire was to give the company a return as nearly just as possible and still keep its customers.

This is a nice point, and one with which the company may find itself able to conform, but only because of the recent drastic reorganization as a result of which there are now outstanding only $46,457,458 of bonds and preferred stock. But there are a lot of "ifs" in the situation. If the commission's estimate of future earnings proves to be substantially correct; if its estimate of possible future passenger trends is correct; if its depreciation allowance proves to be all that is really needed to keep the property up to its present standard, and if the wage question now up for adjudication can be settled without imposing any additional or substantial burdens upon the company, matters may right themselves. These are only some of the uncertainties. So far as the new company is concerned it has been functioning only since Dec. 1, 1927, but in that time it has given ample evidence that it is keenly aware of its obligations to the public.

Meeting the Need for Employee Training

MORE and more, transportation executives are realizing the need for intensive training of all employees who must perform tasks that require the exercise of individual skill or judgment. While this may be considered to include practically every person working for the property, those who are engaged in the operation of vehicles naturally need the most attention prior to assuming their regular duties on car or bus.

Closely coupled with this training is the selection of the men. It has been demonstrated on many properties that tests can be developed which will enable the examiner to determine with small chance for error whether an applicant has the mental acuteness and physical skill that work of this sort demands. After ascertaining in this manner that the applicant is fairly certain to become fitted for the task, the work of training can be planned accordingly.

This is what has been done by the personnel department of the Milwaukee Electric Railway & Light Company. Methods that are in use for the selection of men, which have been described previously in this paper, have been planned to weed out the unfit before, rather than after, the period of training. This has made it possible to concentrate on those applicants who have been accepted, with the knowledge that few of them will fail to qualify. In developing this idea further, a track and road have been constructed where the men are actually given instruction in their work on car or bus away from the main lines of traffic. An article in this issue tells of the equipment and methods in use. After such instruction the period of probation on the road can be shortened.

The important difference between this and the older methods of employment and instruction is that the entire plan is worked out as a whole, and the steps are arranged to fit into their places in a well-organized scheme. In this respect it constitutes a definite recognition of the returns which have been obtained from the earlier training work of the same company, which necessarily was carried along in abbreviated form but which was planned along the same lines as those now in use.

Creating Modern Standards

COMPETITION and change go hand in hand. An industry pressed to maintain its supremacy must take radical steps to keep pace. An outstanding example of this is the discontinuance of the Model T Ford automobile. The Ford Motor Company realized that the public was demanding more in the way of speed and appearance and, therefore, rearranged its entire plant to bring out a new model.

In most industries it is becoming more and more a survival of the fittest. As E. J. McIlraith stated it before the recent convention of the Canadian Electric Railway Association, "only the active, aggressive and progressive will survive."

While public transportation companies are being pressed relentlessly to make changes they must realize that it is necessary to create new standards along modern lines, rather than allow the development to become haphazard and disorganized. Accordingly there must be a readjustment in the thinking. True, many competent minds have been determining the ultimate development of the industry, but no general conception of its future has been seen by the industry. New ideas are being developed on many properties. It is the joint work of these contributors that eventually will raise the electric railway to the plane where it belongs.

Although much progress has been made in the several fields there still are numerous possibilities in every single one. In his paper Mr. McIlraith listed fourteen items "to serve as a foundation" in developing new ideas. Among these were traffic regulation and improvements of street use, reducing plain wastage in operations, building more comfortable and attractive cars, scheduling service suited to the various districts served, using properly the possible auxiliary equipment, active and effective supervision of the operations to insure performance of the standard sets, and planning for better and bigger city growth.

Each of the subjects named invites research. Not one has been developed to any degree of completion and all are fraught with possibilities. To these fourteen items might be added many others.

Readjustment and modernization in the electric railway industry and the development of new ideas is the answer to the question, "What can be done to create modern standards?"

Face to Face With Facts in Detroit

IN HIS report on the operations of the Detroit Municipal Railway, Ralph Stone appears to have settled the question of the future of the road in its effort to liquidate the cost of the system out of earnings. He says it cannot be done unless fares are advanced. That, of course, is a direction in which the system has been heading for some time. Another thing, Mr. Stone has made plain the reason for the so-called discrepancy of $1,000,000 between the figures of the system as presented by outside auditors and the returns made by the system's own auditor. The $1,000,000 is a tangible sum only in so far as it represents honest differences of opinion between two accounting schools. Mr. Stone has thrown the weight of his opinion in with the more conservative of the two declarations. In other words, he favors the Price, Waterhouse method as indicating conditions accurately. It is a nice point for the accounting technician to debate, the one that Mr. Hauser made to the effect that "it is impossible to pay for two plants at the same time, and that is in effect what is being done when depreciation and sinking funds are both established."

But Mr. Stone sees a legal point involved. He wants the Corporation Counsel to pass upon the matter of the interpretation of Section 14 of the City Charter. He even goes a bit further than was expected. His main finding was that unless the annual debt maturities can be met by rearrangement an increased fare will be needed to comply with the spirit of the city charter, if not the letter of that document. This he supplements with the statement that it is not possible to say that an adjustment of the existing rates of fare could be avoided by a rearrangement of the debt maturities.

Mr. Stone's is a carefully worded document, but for all that it reflects the impression long felt in quarters outside of official Detroit Department circles that an advance in fares is inescapable. The problem in all its details is too complicated for an analysis in a discussion of this kind, but the reports of operation from month to month have for some time pointed in the direction of an increase in fares. The political consequences of such a step would of course not rest lightly on those responsible for taking it, but it is to be hoped that the issue, if it is the real issue which Mr. Stone's report indicates, will be met on an economic rather than a political basis.

San Francisco Needs

Street Traffic Control

Extensive survey directed by Dr. Miller McClintock reveals street traffic problems caused by unusual physical layout of the city. Report condemns jitneys and makes suggestions on electric railway service

FIRST ARTICLE

San Francisco's area of traffic concentration

The large building in the foreground is the terminal for the ferries from the cities on the eastern side of the bay, like Oakland, Berkeley, etc. The broad highway leading from this terminal is Market Street, 120 ft. wide between property lines. In this part of Market Street there are four electric railway tracks, two belonging to the Municipal Railway and two to the Market Street Railway. This photograph is copyrighted by G. E. Russell, San Francisco.

SAN FRANCISCO, because of its topography and resulting unusual street layout, has developed many difficult problems. "In the hope of evolving constructive suggestions and thus bringing about improved street traffic control in San Francisco," Mayor James Rolph, Jr., appointed the San Francisco Traffic Survey Committee. This committee of 22 men from several companies, associations and clubs, organized an advisory council of 64, in which 21 associations were represented. Many business interests gave their financial support to the project and constructive co-operation was given by public officials and the press.

Dr. Miller McClintock, director of the Albert Russel Erskine Bureau for Street Traffic Research in Harvard University, was engaged to organize and conduct a comprehensive engineering survey. Theodore M. Matson was appointed chief engineer and the services of four others secured for the technical staff.

The conclusions in the report were formulated after a year of intensive investigation. Since the object of the study was to secure maximum fluidity of traffic by means of regulatory and minor physical improvements, and hence at a minimum cost, an exhaustive

survey was made of the existing street facilities. Comprehensive and detailed recommendations for a system of street traffic control and proposals for administrative organization and methods to meet the problems of the future were based on the facts of street traffic conditions.

Much Traffic Data Collected

The survey was designed to include a study of the principal factors which affect the use of the street. An intensive check of traffic flow, volume, speed, concentration, and other important elements was first conducted to obtain correct conclusions as to the conditions which have led to congestion and accidents. The analysis of the collected data with respect to the economic wastes and accident hazards involved in street traffic, constituted the second step. With the foundation thus established, there followed a consideration of the ways and means of giving relief through regulation of street use and through minor physical improvements. Lastly, attention was given to the problems of city administration in connection with traffic matters, the formulation of a new and comprehensive traffic ordinance, and the requirements for a suitable and effective enforcement of traffic regulations through the functioning of public officials and police courts.

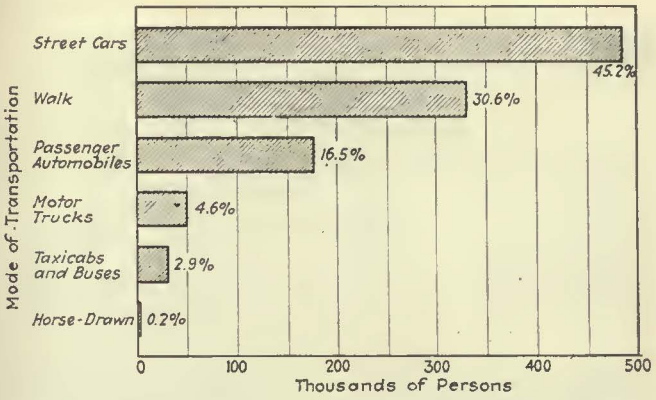
Attention was directed primarily to the area within the corporate limits of San Francisco. For the study two natural divisions were made in this area. First and most important was the central business district, along with the area immediately surrounding it. The second division included the remainder of the city, special attention being given to the prinicpal streets leading from the residential portion of the city to the central business district.

Recommendations Cover All Phases of Street Traffic Control

The report deals exclusively with the problems of traffic control, that is, the safest and most convenient utilization of existing street facilities to a more orderly movement of traffic. The recommendations made by the survey committee fall into several well-defined classes: first, installation and use of various safety and regulatory devices; second, enforcement of law through the police department; third, punishment of violators; fourth, administrative organization for a more systematic handling of future traffic problems; and fifth, a specific and balanced system of traffic regulations.

The report recommends that traffic direction signs be erected immediately to cover all the provisions for which signs are required in the proposed ordinance, that the enforcement of sections requiring signs be dependent upon their actual erection and that fuller use be made of paint markings for the indication of crosswalks, greater visibility of safety zones, and more accurate alignment of traffic.

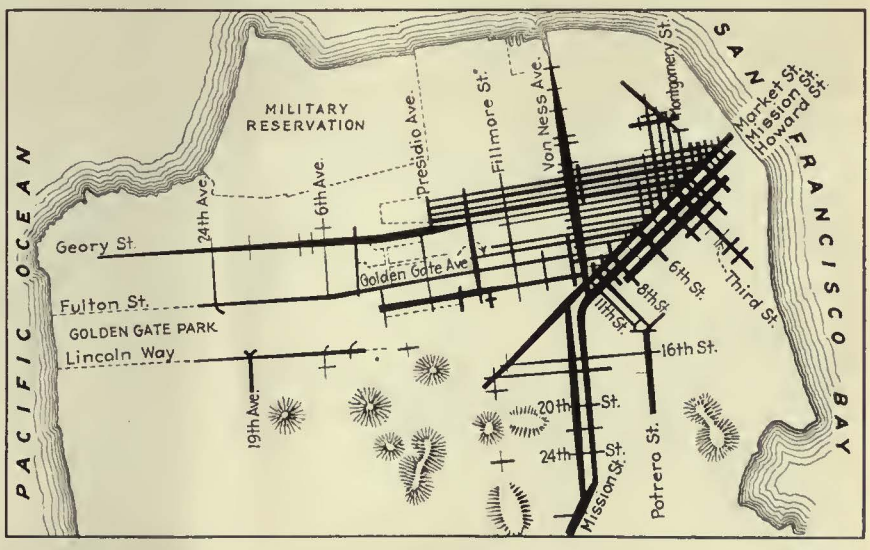
For the system of control designed for Market Street it recommends that three-light electric signals be utilized, also that this type of signal be substituted gradually for existing types for general control of traffic throughout the city; and the present type of signal eventually be utilized exclusively for pedestrian control requirements on Market Street. A complete program of traffic signal installations is proposed in the report and the order in which they should be installed is given.



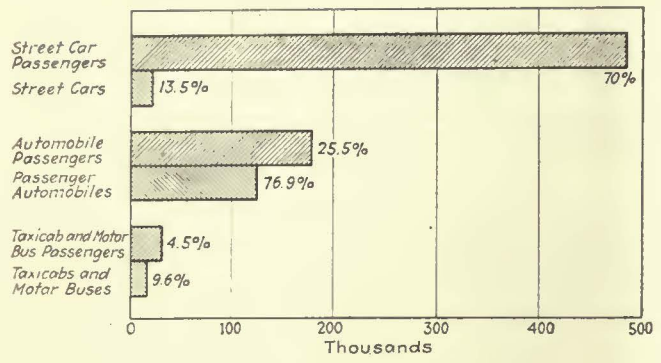
Distribution by various means of transport of 1,073,963 persons entering and leaving the central business district of San Francisco on a typical week day in November, 1926

The report recommends that the personnel in the traffic division of the police department be increased in the near future to 125 officers. Inasmuch as special aptitude and training are required for effective traffic service, it also advises that the personnel for enlargement and replacement be drafted from young men who are applicants for the police department. A traffic school is proposed for the instruction of new men, the maintenance of high standards among the men already employed in the division, and for the general education of all police officers in the city in traffic control methods. Provision should be made, according to the report, for the investigation of all traffic accidents involving serious personal injury and for reports of all traffic accidents upon forms as recommended.

A more systematic enforcement of penalties against traffic violators through the establishment of a traffic fines bureau, is suggested as a substitute for the present method of citation for appearance at traffic police headquarters. Minor violators should be required to appear at the proposed traffic fines bureau, and pays penalties subject to a schedule of fines to be established by the judges of the police courts. Also, records should be



Relative vehicular traffic load on principal traffic arteries of San Francisco, based on an eight-hour count, from 8 a.m. to 12 noon, and from 2 p.m. to 6 p.m., September, October and November, 1926



Distribution by various modes of street transportation of 693,384 passengers and 160,674 transportation units, entering and leaving the central business district between 6 a.m. and 8 p.m. on a typical week day in November, 1926

kept in order that persistent violators may be classified and properly penalized.

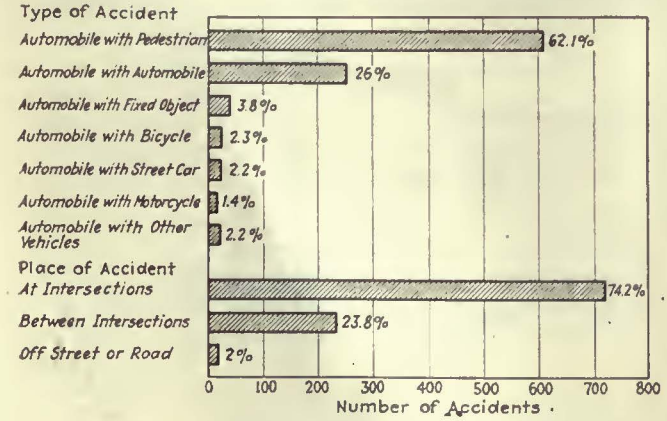
The survey recommends that a division of street traffic engineering be established in the bureau of engineering in the Department of Public Works, this division to consist of a traffic engineer and a technical staff. Its duties would be to study all traffic accidents and other conditions affecting the safe and orderly use of the public streets; to serve as the agency for application of the administrative provisions of the traffic ordinance, and to supervise the location, erection and maintenance of all physical control devices recommended in the report and required by the ordinance. The specific recommendations included in the report will be presented in the following paragraphs.

Cordon Count Shows Heavy Travel in Business District

Many detailed studies regarding volume, flow, and other general characteristics of the street traffic were made. On a typical day there was a total movement in eleven hours of 24,579 vehicles and 156,167 passengers. Ferry passengers make up 107,905 of the latter group.

A study of 183 intersections along the major routes of travel was made to determine the amount of traffic on and across the principal arteries. With the data obtained, a graphic chart was designed showing the relative vehicular traffic flow on the principal streets of the city. The concentration of traffic on certain routes is clearly revealed on the map.

To ascertain the degree of concentration of traffic within the downtown business district the survey undertook, through the co-operation of the two street railways, a cordon count of the central business district for a typical week-day. The study gives the amount of all types of traffic movement, whether inbound or outbound, and shows not only the number of each type of vehicle but also the number of persons and their modes of transportation.



Analysis of motor vehicle accidents involving personal injury in San Francisco for the months of November and December, 1926, and January, 1927

During the fourteen-hour period from 6 a.m. to 8 p.m. it was found that 744,667 passengers in all types of vehicles entered or left the central business district. Besides these were 329,296 pedestrians, making a total movement of 1,073,963 persons. The total number of vehicles was 203,641. Of the total of 1,073,963 persons, 45.2 per cent used street cars, 30.6 per cent walked, 16.5 per cent employed passenger autos, 4.6 per cent were on motor trucks, 2.9 per cent rode in taxicabs or buses and 0.2 per cent were in horse-drawn vehicles. Of the total of 203,641 vehicles, 60.7 per cent were passenger automobiles, 20.2 per cent trucks, 10.6 per cent street cars, 7.6 per cent taxis and buses and 0.9 per cent horse-drawn vehicles.

On the assumption that all who enter the central district leave it during the day, its average daily population is indicated to be 536,981 persons; that is to say, the equivalent of about 85.5 per cent of the population of the city proper passes through the central business district during each week-day, between the hours of 6 a.m. and 8 p.m.

In addition to the study of volume concentration of traffic in the central business district and vicinity, an analysis of the speed of flow was made. Observations were made by traversing each street in a motor car at different times of the day. The study reveals that the average speed of vehicles within the district studied is 10.13 m.p.h. It shows further that 12.3 per cent of the time required to traverse a street is lost by actual stops, and that the average running speed, that is, average speed attained while in motion, amounts to 11.55 m.p.h. The values are for street lengths and would be much lower if only for the central business district.

The physical condition of San Francisco complicates street traffic problems. Because the hills are steep and the areas reached by them not readily accessible, the growth of the city has been forced to concentrate into the lower and more level areas. This concentrates the traffic flow to fewer arteries of travel and reduces the available street area. The steep street grades are a serious accident menace. More than 35 per cent of the total street mileage of San Francisco is at grades exceeding 5 per cent. The lack of street area and the street design are other factors which have contributed to much traffic congestion within the city.

Street Cars Affected by Street Layout

The unique street layout of San Francisco, with a lack of arteries paralleling Market Street on the north side and the peculiar pattern by which all streets of the "western addition" branch from Market Street make acute and obtuse angles, has produced a great amount of street car congestion on Market Street. The concentration of street cars on Market Street is principally due to the inherent defects of the city plan. Yet, the duplication of service for the entire length of the street by the Municipal Railway and the Market Street Railway, and the excessive frequency of service resulting from the competition of these two systems have caused a large yearly loss to both railways. They have also materially restricted the growth of local merchandising in

other business activities, because of the congested area and street hazards. Commenting on jitney service the report says:

"In addition to the excessive rail transportation facilities on Market Street, there is a duplication of service in jitney operation. Jitney service is absolutely unwarranted. They not only add to congestion by loading and unloading in the one traffic lane left for motor vehicles, but their practice is hazardous to their own patrons as well as to the patrons of the rail lines. Moreover, the jitneys operate only during the rush hours, taking the 'cream' of the business from the street railways which furnish the public with consistent, reliable service."

Street car movement was studied in conjunction with other vehicular traffic, so that a properly balanced system of regulation and control might be set up. While it was found that as a rule regulations which are really beneficial to motor vehicle traffic are equally helpful in expediting rail movement, certain intersections demanded special study and special regulation to improve the traffic stream as a whole. In arriving at the control measures outlined for several important intersections, certain car stops were eliminated because of their effect in preventing reasonable speed. A number of mid-block crossings were also eliminated because they delay many while accommodating only a few. As a rule, it was concluded that a reduction of one stop per mile results in an increase in speed of about 6 per cent.

The far-side stop on the north side of Market Street should be eliminated at all points, the report states. The obstruction caused to traffic flow by these stops is very serious. Other changes recommended in car-operating practice included abolition of the "dead-ending" of street cars from intersecting streets on Market Street and the standing of cars there to maintain a definite schedule. The schedule could be adjusted better at some other point on the line, if necessary. The report also says that left-hand turns of trolley cars into Market Street from such streets as Geary and Sutter Streets are the source of considerable delay in trolley speed on Market Street. Each movement of this character intercepts the flow of three lines of street cars and one line of vehicular traffic. Moreover, it prevents the smooth flow of traffic at the intersecting street running in a northerly direction. The situation, however, cannot be avoided under the present operating methods of rail movement.

This practice of reversing cars on a turntable on one of the side streets debouching into Market Street blocks traffic

Far side car stops on the north side of Market Street cause congestion, in the opinion of the authors of the report

The ultimate solution of this difficulty can only result from a comprehensive plan of rerouting.

Many Accidents Occur at Intersections

An analysis of motor vehicle accidents in San Francisco involving personal injuries was compiled by the survey, with individual reports made by police officers for November and December, 1926, and January, 1927. The analysis shows that of 973 accidents, 62.1 per cent were caused by automobiles with pedestrians; 26 per cent automobiles with automobiles; 2.2 per cent automobiles with street cars; 3.8 per cent automobiles with fixed objects; and 5.9 per cent automobiles with vehicles other than those listed. A large majority of the accidents, 74.2 per cent of the total, occurred at intersections. Reckless driving or speeding was responsible for 56.8 per cent of the accidents on the part of the motorists. Jay-walking, crossing with no signal, running or walking into vehicles and automobiles running down passengers boarding or alighting from street cars were the chief causes of pedestrian accidents.

The analysis of accidents served as the basis for numerous recommendations. The report suggests that every effort be made to encourage the establishment of sound community habits in street use, that the simple traffic ordinance prepared by the survey be made the textbook for every motor vehicle driver in the city and that its provisions be made known to all who use the streets. To this end the survey recommends that at all times printed copies of the traffic ordinance be provided for free circulation through the police department, public schools, automobile organizations, business clubs, civic associations and all other organizations interested in traffic.

The survey further states that there should be an energetic and continuous educational campaign based upon the special traffic hazards as revealed by the future and constant analysis of accident records, and that the public officials should energetically pursue a program of protection for both motorists and pedestrians, through the construction and maintenance of the physical devices for traffic protection, direction and warning. These devices should include, among others, traffic signals, warning signs, paint marks, visibly marked safety zones and cross-walks, in accordance with the system as recommended.

The second article, to appear next week, discusses the pedestrian, parking and traffic control problems, and presents a proposed traffic ordinance.

Sunday Pass Plan Increases Riding

INSTALLATION of the Sunday pass by the Gary Railways, Gary, Ind., has been received by the public with great enthusiasm and has caused a large increase in riding and revenue, even though the plan has only been in effect since April 15. The increase in riding necessitated an increase in service on the Valparaiso division shortly after the pass was installed. The former two-hour service was replaced by hourly service, and later, on April 29, even this was inadequate and an extra car had to be added.

On the Saturday preceding the Sunday the pass went into effect, a cold rain fell all afternoon and evening, and Sunday was cold and windy, considerably dampening the company's hopes of a successful opening day. Despite the adverse conditions, 1,388 passes were sold and a total of 34,528 riders were carried for the day, an increase of almost 3,000 passengers over the average for the three previous Sundays.

On April 22, the second Sunday, the weather again was unfavorable, but 1,638 passes were sold, an increase of 250 over the first Sunday and an increase in passengers carried of nearly 3,300 over the average Sunday.

On the third Sunday, the weather was more favorable, and 1,989 were sold. This figure represented an increase of 351 over the previous Sunday and 601 over the first Sunday the passes were sold. There were 36,525 passengers carried on this day, an increase of nearly 5,000 over the average Sunday.

With the coming of more pleasant weather, the company is looking forward to a large increase in both riding and revenue as a result of the Sunday pass.

SAN FRANCISCO TRAFFIC SURVEY COMMITTEE

TRAFFIC SPEED STUDIES

STREET Mason
CONDITIONS FAIR-WARM.
OBSERVERS O'Donnell & Meehan

~LEGEND~
A - Automobile C.T. - Cross Traffic
A.S. - Arterial Stop S.C. - Street Car
C.C. - Cable Car T. - Truck
CON. - Congestion T.S. - Traffic Signal
*(T.S.) - Officer

Cross Streets	Date	Cab No.	Time of Day	Time Reading	Time in Sec's.	Distance in Feet	Av. Speed M.P.H.	~Delays in Seconds~ A.	A.S.	C.C.	CON.	C.T.	S.C.	T.	T.S.	Total Delay	Per cent Delay	Running Speed M.P.H.	Remarks	Double Parking	Backed to Curb
Clay to Pine																			Steep Hill		
Pine to Bush	10/4/26	94	4-5	00	37	34375	6.30					04				04	10.00	7.00	Hill		
	10/8/26	302	1-2	5 55	33		7.08											7.08			
	10/11/26	302	2-3	00	33		7.06											7.00			
	10/13/26	374	12-1	2 42	23		10.15		02							02	8.70	11.12			
	10/15/26	374	3-4	3 52	20		6.34		03							03	10.70	9.33			
Bush to Sutter	10/4/26	94	4-5	37	35	34375	6.66											6.66	Hill	1	
	10/8/26	302	1-2	5 22	31		7.52					06				06	19.35	9.33			
	10/11/26	302	2-3	33	31		7.52											7.52			
	10/13/26	374	12-1	2 19	25		9.33											9.33			
	10/15/26	374	3-4	3 24	20		6.34							02		02	7.14	6.96			
Sutter to Post	10/4/26	94	4-5	1 12	43	34375	5.42					04				04	9.30	5.98	Hill	*2	*2
	10/8/26	302	1-2	4 51	163		1.43				20			66		06	52.71	3.03			
	10/11/26	302	2-3	1 04	127		1.84				90				*03	93	7.320	7.76			
	10/13/26	374	12-1	1:56	20		11.70											11.70			

A portion of typical traffic speed study, as conducted by traffic survey committee

An oval practice track with stops, signals, switches and grades is used. Bus drivers practice on the macadam road shown in the center

Milwaukee Builds Practice Track and Road for Instruction

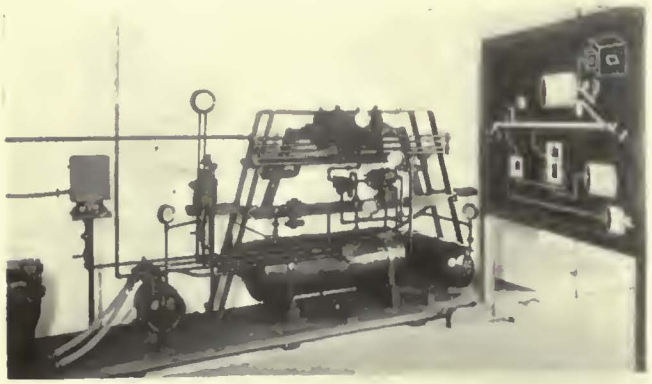
Half-mile car track, macadam bus road, and specially equipped building expand training facilities of T.M.E.R.& L. Company

FOR outdoor training of transportation employees a half-mile oval practice track and a tarvia macadam bus road have recently been constructed by the Milwaukee Electric Railway & Light Company. These, in conjunction with a transportation training building equipped with class rooms and an abundance of street railway, interurban and bus apparatus, enlarge materially the scope of the courses which can be offered the railway and bus men. The same building also has facilities to improve the organized trade training given to car repairmen.

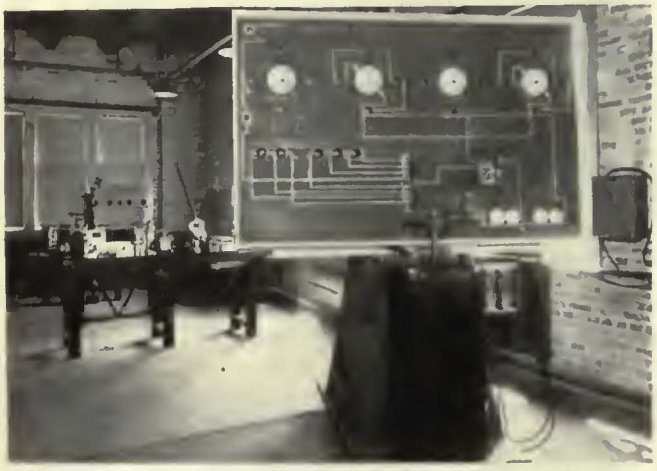
During 1927 instruction was given to 114 conductors, 147 motormen and 370 one-man operators in the building and on the training track and bus road.

The housing of training facilities in a building designed especially for them makes it possible now to offer optional courses to the railway men in electrical equipment, air-brake equipment, car repairing, and special courses in English, arithmetic and other subjects. These all supplement the regular training given to prepare them for the job of conductor, motorman, one-man operator, bus operator or repairman. Supervisors, instructors and division superintendents, in addition to the rank and file of railway and bus personnel, are taking advantage of these opportunities for self-improvement.

The transportation training is given in a two-story brick building erected for the purpose adjacent to the Fond Du Lac station, the company's largest carhouse and storage yard. One class room on the second floor is especially equipped for the use of lantern slides, opaque projections and motion pictures. Special car equipment may be mounted for testing and demonstration work. A second class room is used largely for conductor training, and for the conductor part of one-man training. This class room has large bulletin boards where the schedules, transfers, accident and car condition reports, and other forms in use are posted. Instruction in the mechanical manipulation necessary for the conductor's job is afforded by an arrangement of sockets countersunk in the floor which permit setting up the forms of standard railing that inclose the conductor's position in the various types of Milwaukee street cars. The third class room is used for training motormen and one-man operators in the motorman's part of their duties. This room is equipped with a row of controllers for giving starting and notching practice. Another room is used for instruction of the rolling stock maintenance men. The fifth class room is devoted to training bus operators, both from the transportation department and from the Wisconsin Motor Bus Lines. For optional



Set-up of interurban air brake equipment. The demonstration board at the right duplicates graphically the interlocking action of valves in air lines



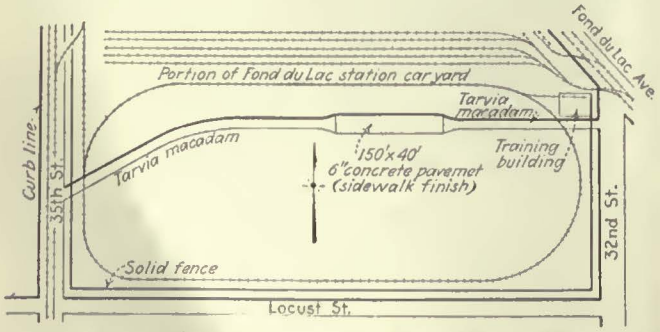
Several of these boards are used to show action of equipment and procedure in trouble hunting. In the background are cutaway demonstration bus motors, clutch and transmission mechanisms

work, any class room is used which is not in use at the time for some other purpose.

Besides the five class rooms, the top floor includes a storeroom, an interview or examination room, a private office and a general office. The general office is not only a space for instructor's work, but has complete records of the men trained, material for the several courses, etc.

The ground floor of the building is given up entirely to apparatus, to be used for laboratory instruction. On it there is installed a variety of railway equipment arranged to show the operating principles of the cars on the road.

Bus equipment includes a White poppet-valve motor, with cut away sections for illustrating motor principles,



The oval practice track, exclusive of spurs to the neighboring Fond Du Lac car yard and into the training building, is 1,997 ft. long. The bus road runs from end to end, vehicles completing their circuit through streets along the training field

This 60-ft. track pit is so constructed that either a street car or a bus can be run over it

next to which is mounted a Knight sleeve-valve motor, coupled with clutch and transmission, all having sections cut away to permit study of the mechanism.

Along one wall the air-brake equipment found on the rapid transit cars is mounted so that all of the troubles which happen out on the road may be demonstrated. Details of this arrangement of air-brake equipment are shown in an accompanying illustration. Near this equipment is a demonstration blackboard which shows by means of a schematic diagram the operating principles of interurban air brakes. Another piece of equipment is a double demonstration panel having a K-35 controller on one side and a K-6 controller on the other. These boards demonstrate graphically the principles of operation of the electrical equipment of most of the types of cars used in Milwaukee. Another board shows the hook-up of electrical equipment on the rapid transit cars, and another one the operation of the air brakes on all one-man cars.

A work bench, near a window, is used in the training of maintenance or repair men in details of soldering, chiseling and other bench work. In the center of the room is a shortened electric car, on which all of the equipment of a modern safety car is to be mounted, exposed to full view, for study by both the repairmen and trainmen. A well-lighted track pit extends the full length of the north side of the building and is connected by a concreted spur outside to the training track. This pit is built so that both street cars and buses may be driven over it. The indoor section of track is used in the training of maintenance men and car repairmen in the main uses of the various parts of the car truck. A complete truck with gears exposed assists in this instruction.

Training Track Carefully Detailed

The outdoor training track is more than ½ mile in circumference, and completely incloses a plot of ground two blocks long and nearly a block wide. Five street cars can be run around this track with sufficient headway to allow for the instruction of the platform men in all phases of their work. Regular stops bearing street designations are distributed around the track, and the student is taught to stop at standard places and call streets in a standard way. The track is so located that these regular stops are made on level ground and on

grades. On each trip around the track, the student operator must open and close an electric switch, pass through a set of Nachod signals and run under a trolley circuit breaker. The spur between the training track and the training building is concreted. On this 75-ft. stretch of track, a car is derailed as part of the training practice. Every new man must learn how to use the car rerailer.

Illumination for night practice is supplied by twelve 200-watt lamps equipped with white enamel reflectors and mounted at equal intervals on the trolley poles which parallel the track.

The track has two grades, a short one of approximately 4 per cent and a longer grade of 6 per cent. As part of the operator's training he has to make emergency stops on the steeper grade after the track has been greased to simulate conditions during inclement weather.

A training road for bus instruction is partially completed. The road bisects the training track inclosure, extending the full length of the field with access to streets at opposite ends of the training ground. The road is being designed to give bus operators special training in backing and turning around, double clutching, avoiding skidding, and in maneuvers which cannot be carried out on a public street without interference to traffic. A section of this road consists of a 40-ft. pavement 150 ft. long, with a 5 per cent grade, the section being heavily cemented.

This two story brick building, housing the offices, classrooms, and special training equipment, was opened last October

The instruction is tied in with the operating department through the supervisor of training, who reports both to the superintendent of transportation and to the educational director. There is no direct connection with the medical department, although all men must have a doctor's certificate before they can start training. Special men are given examinations at the request of the training division. During 1927 the approximate average cost of training per man trained was $100. This included instructors' salaries and students' pay while in training.

The importance of learning to do things in a standard way is the first subject handled in the training course. One standard way of operating a car to get good results is taught, and the motormen are told that this is the only method to use, even though they will probably find older men on the system using different methods. The next classroom subject is the controller. Practice on notching to stop on every notch, to use proper feeding speed, and to respond quickly to signals is given. Controller troubles are discussed and their repair demonstrated. The air brake is next discussed with classroom practice on operating the air valve. The rest of the first day is spent on the outdoor track, practicing the proper notching of the controller and the use of air brakes on a regular street car. The functioning of Nachod signals is demonstrated on the track and also by means of parallel switching circuits located within the laboratory at a point where, through a window overlooking the track, the action of the signals can be observed.

Effort is made to get the man thoroughly familiar with the department organization, the duties of supervisors, instructors, clerks and division superintendents. A great deal of time is spent in discussing the rules of the road. Safety is strongly emphasized. The necessity of constant attention to changing conditions of street traffic is thoroughly impressed on the railway man's mind. Various dangerous situations are discussed in the hope that the new man will recognize when danger impends without needing the actual experience of an accident.

Under the supervision of an instructor each new motorman spends three days on the practice track, putting into effect the principles which have been demonstrated in the class room. About three hours of these first three days are spent in teaching the man the location of all parts of the car with which he must become familiar.

One of the first things the conductor is taught is the use of standard practice in handling his job. This is not only true in the mechanical methods of doing his work but in the method of announcing streets and in the use of standard expressions. The mechanics of making change, selling tickets, and handling transfers are explained. Signals are taught, with emphasis on safety as well as in connection with helping the motorman to speed up the schedule. One-man operators are given a combination of motorman and conductor training courses. Platform instructors are trainmen who have regular runs but are specially trained. When they have a student for road instruction they are given a day-off run so that practice may be had on all runs.

Car Shop and Garage Is of Latest Design

Building erected by Hamilton Street Railway provides excellent working conditions for employees and allows maximum efficiency in performance of maintenance duties

By C. J. Porter
Construction Engineer Hamilton Street Railway
Hamilton, Ont., Canada

The size of the new building can be seen in this view, which also shows the old inspection barn and a section of the storage yard. Note the many windows in the walls of the new building

FOR some time the old car shop and inspection barn, on account of unfavorable location, lack of room and dearth of modern equipment, failed to afford adequate facilities for the maintenance and repair work of the rolling stock of the Hamilton Street Railway, Hamilton, Ont., Canada, and the interurban railway owned by the Dominion Power & Transmission Company, the parent company. The inauguration of bus service made the situation more acute because the company owned no building of suitable design or location to serve as a bus garage. The foregoing considerations in conjunction with the agreement with the city of Hamilton, made at the time a new franchise more favorable to the company was secured, resulted in the decision to undertake the construction of a modern car shop and bus garage.

Excavation work began for the building on Aug. 20, 1927. On March 1, 1928, a few days more than six months later, the new building was occupied and operating in large part. In addition to the building, the construction program included five new storage tracks and a sixth track to enter the car shop.

The building is a one-story, fireproof structure, covers an area of 85,600 sq.ft., or 1.96 acres, and has a total floor area of 109,921 sq.ft. It includes four main sections, the offices and headquarters for employees, a general storeroom, a bus garage and a car shop. In designing the building and selecting the equipment, care was taken to provide for the comfort and efficiency of employees. Adequate heating facilities, good lighting and ventilation, sanitary conditions of the best and machines to do the heavy work were factors not overlooked. The plan also included adequate means of efficiently handling materials and equipment, and of routing work through the various departments.

Building Located Advantageously

Careful consideration was given the location of the new building. The requirements were that it should be as central as possible with respect to the various street car and bus routes to eliminate dead mileage of rolling stock to and from route starting points, that if possible it should be located on property already owned by the company, that it should be so connected with the existing storage yard and street railway system that it would afford maximum facility for movement of cars, and that it should require the minimum modification of existing storage yard trackage. The requirements were all met by locating the building as shown on the accompanying drawing. Certain properties were acquired and consolidated with the plot already owned by the company. Buses have access to two streets, Wentworth and Nightingale, while track connections are made on two other streets, Wilson and King. The tracks on Wilson Street, in turn, provide connection over track on Sanford Avenue to the belt lines at Barton and King Streets, and

View of the pit room and the craneway. At the left of the crane are the armature repair and machine shops, and to the rear of these shops is the general storeroom

with the Hamilton Radial Electric Railway at the corner of Sanford Avenue and Wilson Street. The storage yard connections with the belt line on King Street remain as before.

The building is 385 ft. 6 in. long, and 250 ft. wide at the widest part, narrowing to 157 ft. at the smallest width. Its total floor area of 109,921 sq.ft. is divided as indicated in Table I. The four main sections are the offices, completely equipped for the car shop superintendent, the general construction superintendent and their staffs, and quarters including locker rooms and toilets for the shop and construction employees; a general storeroom where all shop and construction materials for the Dominion Power & Transmission Company in Hamilton are stored; a bus garage where all city and interurban buses and service trucks will be repaired, serviced, cleaned and stored, and the car shops where city and interurban cars will be repaired or rebuilt. The car shop section includes a machine shop, armature repair shop, forge shop, pit room, paint shop, carpenter shop and a transfer table which serves the four latter subdivisions.

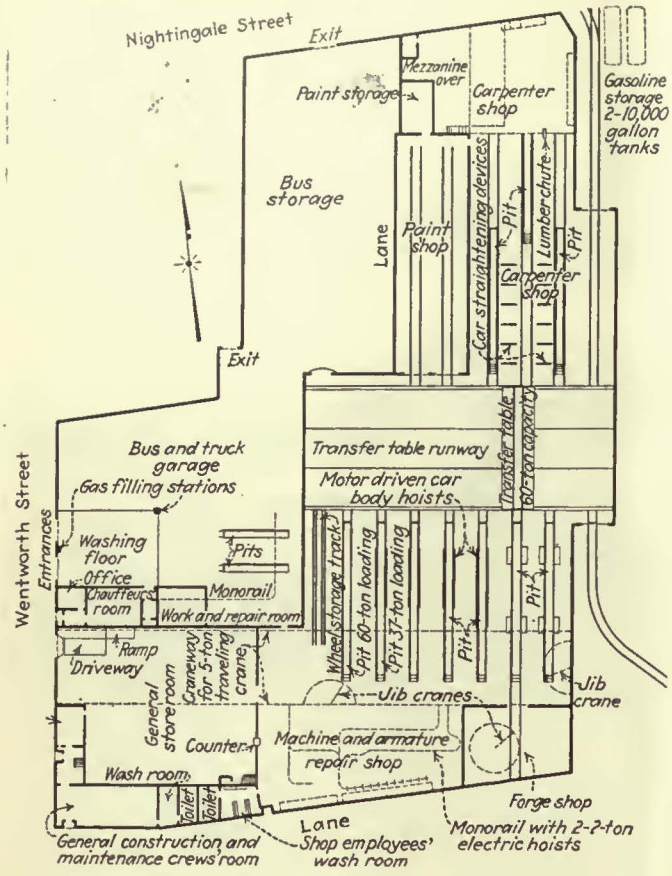
All foundations are of concrete, reinforced with steel where necessary. All exterior walls are faced with pressed brick laid in dark mortar. The building trim along Wentworth Street is of cut stone, while that of the remainder is of artificial stone. The inside face of the exterior wall and all interior walls are of high-grade building brick, painted. An outstanding feature of the exterior walls is that 40.5 per cent of their entire area is for windows. The windows are of factory ribbed glass, set in ventilated steel sash. All inside walls with the exception of those in the offices are painted white with a dado of pearl gray 4 ft. from the floor. The partition walls of the offices are of gypsum slab construction, plastered and painted in a buff shade and trimmed in chestnut. The building's interior has a very bright and pleasant appearance.

The floors in the bus garage, inspection and repair pits, paint shop, basement and employees' quarters are of concrete treated with a hardener. The floors of the general storeroom, machine shop, armature repair shop, pit room and carpenter shop are of creosoted wood blocks, laid grain on end on a concrete slab to which the blocks are bonded by paving tar. The wood block floors resist wear, are easily cleaned and do not become slippery and hazardous for the workmen. The forge shop floor and the transfer table runway are of cinder fill on earth. The rails for the transfer table, however, are laid in a substantial concrete bed.

The building's main supports are steel columns of H section, while the roof is carried on trusses of structural steel. Close to 550 tons of structural steel were required for the entire building. The roof is of reinforced gypsum slab, laid on steel purlins and covered with three layers of roofing laid in hot tar. The great number of skylights in the roof is another feature of the building. With a total area of 10,720 sq.ft., they permit a wealth of light to enter. They are of ribbed wired glass fitted into and held by formed members of solid copper sheet. All flashing and entrance heads to downspouts are also of solid copper.

Unit heaters with motor-driven fans are placed in suitable locations throughout the building. Steam for the heaters is furnished through a main from a central heating plant, consisting of two 200-hp., Kewanee-type boilers and located in the inspection barn. A coal pit was constructed under a track just outside of the boiler room. Coal in carload lots is brought in bottom dumping cars and emptied into the pit, from where it is transported by wheelbarrow into the boiler room.

Power and lighting are supplied through transformers located in a vault under the employees' washroom. All wiring is in metal conduit with the exception of feeder mains strung open through the trusses. Switch panels for the many lighting circuits are provided at convenient points. Lighting units consist of 110-volt lamps mounted



Plan of Mezzanine Floor

The many units of the building are arranged to provide the utmost in efficiency in handling cars, buses and materials

in standard dome reflectors. The intensities of illumination provided for the various departments are listed in Table II.

Offices Are Spacious

The offices are located on a mezzanine floor above the employees' quarters. The shop superintendent has an office at one end of the suite with a window overlooking the shop, while the construction superintendent has an office at the opposite end. The large intervening office, which has an area of 900 sq.ft., is for the staffs of the two departments. On the main floor is an office for the stock clerk in charge of the storeroom.

The offices and storeroom were made larger than necessary for the car shops alone, so that the staffs of the Dominion Power & Transmission Company caring for rolling stock, track work and line construction could be concentrated at one point.

Quarters for shop employees and general construction crews are commodious and comfortable, with well-appointed locker and wash rooms, toilets and an assembly room. These are located underneath the offices in the section of the building facing Wentworth Street. They can be entered from the shop or from the outside.

The storeroom, with an area of 8,410 sq.ft., is used for materials for both the car shop and the line construction work. A 5-ton, motor-operated, overhead crane serves 4,000 sq.ft. of its floor area. The crane is used to unload incoming materials and equipment entering by trucks through the Wentworth Street entrance, or by carload over the transfer table and a track in the pit room. The crane also covers 6,000 sq.ft. in the machine shop, serving lathes, wheel presses, heavy drills and other machinery. That portion of the storeroom not served by the crane is occupied by steel shelving of latest design, in which a myriad of materials are stored.

Transfer Table Is Important Unit

The transfer table, capable of carrying a load of 60 tons, is one of the most important units in the entire shop. It operates between the ends of the machine shop tracks at one end of the building and those of the paint and carpenter shops at the other end. It also serves the bus garage through a door at the end of the runway.

The machine and armature repair shops including the pit room occupy an area of 28,070 sq.ft. The machine shop proper is equipped with every type of machine needed for efficient work. The machines doing heavy work are located in the craneway, so that heavy pieces may be lifted to and from them with the crane. Machines doing work of a lighter nature are placed in the remaining section of the shop. Materials for this section are handled by an overhead monorail system with two electric hoists of 2-ton capacity. Jib cranes with hoists are provided also at convenient locations. Lists of the more important items of equipment for the machine shop and armature shop are given in Tables III and IV.

In the pit room there are seven tracks with pits and an eighth for storage of wheels. All repair pits are open, allowing easy access from one to another, and providing room to lay aside tools or parts removed from trucks. The rail heads are 4 ft. 10 in. above the pit floor, giving good head room for working on car trucks. Lighting units are placed in the sides of all pits and project light upward.

Two repair pits are equipped with wheel pits with removable sections of rail. Three pits have motor-driven car hoists, each capable of raising the entire body of the heaviest car from its trucks.

The heating and drainage facilities of the pit are of particular interest. Three unit heaters are located below the main floor slab. The warm air, driven along the pit by the heater fan, in rising from the pit, comes in contact with the undergear of cars and is extremely effective in the removal of ice and snow in winter. Good drainage of pit floors has been effected by crowning them a little and placing drainage openings between them. This insures good drainage of the floor for the workmen and ease of cleaning.

TABLE I—FLOOR AREAS OF THE BUILDING'S SEVERAL SECTIONS

Section	Sq.Ft.
Carpenter shop, including repair pits, main floor, basement and mezzanine	17,520
Paint shop and storeroom	4,410
Transfer runway	11,550
Machine shop, including repair pits	28,070
Storeroom	8,410
Garage, including repair pits	36,026
Offices	3,935
Total floor area	109,921

TABLE II—INTENSITIES OF ILLUMINATION FOR THE VARIOUS DEPARTMENTS

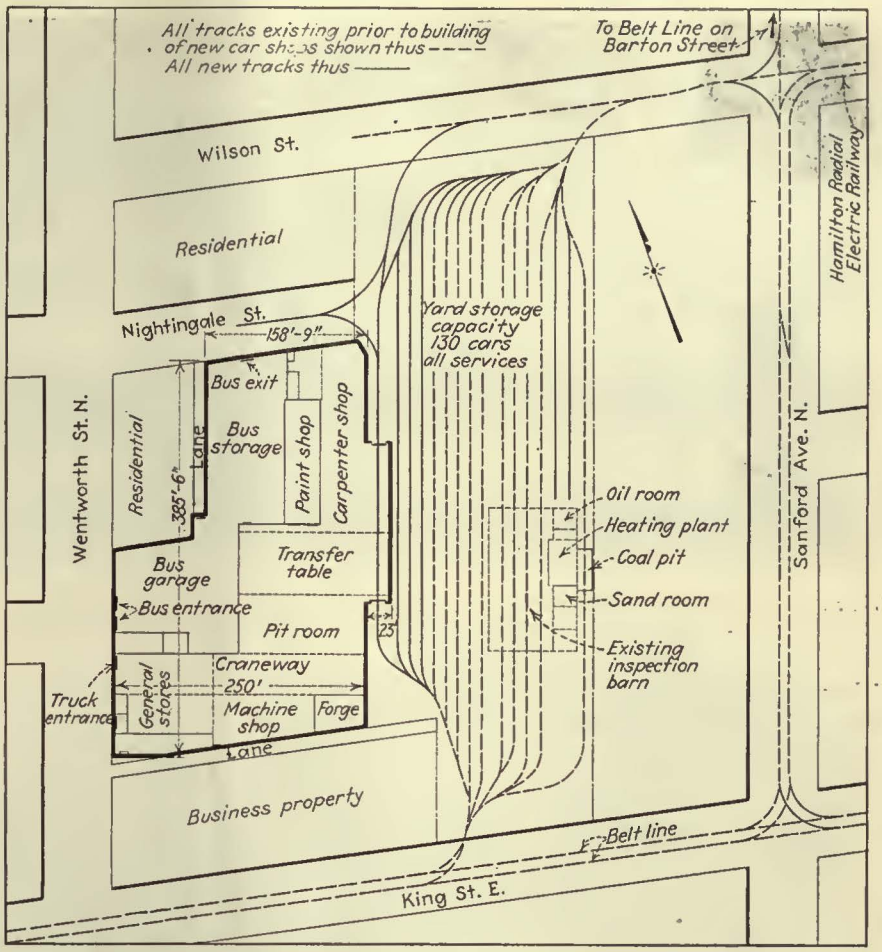
Department	Foot Candles
Storeroom	5
Machine shop	12
Forge shop	10
Carpenter shop	12
Paint shop	12
Bus garage	6
Garage workroom	14
Offices	12

The forge shop, in one of the corners of the building, is convenient to both the machine shop and the pit room. Car trucks may be rolled into the shop for repairs on an extension of one of the pit tracks. A jib crane operating through 360 deg. and equipped with a 2-ton electric hoist handles heavy parts in the shop. An exhaust fan creates a draft over the forge fires and carries away all fumes and smoke. In Table V the equipment of the forge shop is listed.

Body rebuilding and repair work for cars and buses is done in a large, well-equipped carpenter shop. Three tracks, each with a pit, accommodate six cars of any length now in use on the system. Each pit extends the full length of the longest car, allowing minor work to be done to the underbodies. A car-straightener made of structural steel buttresses which hinge into slots in the floor is a useful device of this equipment. Cars that are bowed or twisted are readily brought back into line with these buttresses, beams and jacks. The principal pieces of equipment in the carpenter shop are listed in Table VI.

The millroom section of the carpenter shop is adjacent to the section in which the tracks are located. Below the shop floor is a basement with a floor area of 2,050 sq.ft., providing ample and convenient storage. A lumber chute and stairway communicate with this basement. Upholstering work is performed on a mezzanine floor which extends over a section of the carpenter shop and paint storage room, as shown at the bottom of the plan on page 1070.

Between the carpenter shop and the bus garage is the paint shop, with a floor area of 4,410 sq.ft. It has two tracks which will accommodate four of the longest cars. The shop has excellent lighting and ventilation. It is provided with an exhaust system to change the air frequently and remove paint and varnish particles suspended in the air when spray equipment is used. Tubular posts with arms which may be moved vertically on the posts support platforms for the workmen.



General plan of the present terminal showing the convenient location of the new building with respect to the storage yard and the adjacent streets. The new tracks are shown by solid lines

Garage Designed for Efficiency in Caring for Buses

In addition to ample office and work room, the bus garage with its floor area of 36,026 sq.ft. has space for storing 45 buses and trucks. Two doors on the Wentworth Street side are for entrance, while a door at the extreme end of the garage, and another to a lane adjacent to the west side of the building, provide exits to Nightingale Street. The garage was designed for rapid and efficient care of the buses. Wash racks and a specially drained wash floor are just inside the entrance door, so that buses can be cleaned just as they are brought in from their various routes. Warm water to temper the cold water and to assist in the removal of ice and snow in winter is supplied from a 2,000-gal. storage tank. After being washed the buses are serviced with gasoline, oil and grease, as required, and the tires are tested and inflated at convenient air hose connections. If any repairs or adjustments of a major nature are required a bus is

TABLE III—MACHINE SHOP EQUIPMENT, IN PART

One heavy-duty wheel lathe with 18-ft. bed.	One shaper.
One heavy-duty general purpose lathe.	One bolt machine.
One intermediate lathe.	One power-driven hacksaw.
One small lathe.	One cylinder grinder for air compressor and automobile engine cylinders.
One large drill.	Three motor-driven car hoists.
One intermediate drill.	One horizontal wheel press.
Two small drills.	One cleaning and rinsing tank.

TABLE IV—ARMATURE REPAIR SHOP EQUIPMENT, IN PART

One commutator slotting device.	One coil taping machine.
One commutator turning lathe.	Two coil winding machines.
One 30-ton vertical forcing press.	One armature baking oven.
One armature banding machine.	

TABLE V—FORGE SHOP EQUIPMENT

One jib crane with 2-ton electric hoist.	Four forges with down draft.
One 600-lb. air-operated power hammer.	One combination punch and shear.
	One babbitt melting gas furnace.

TABLE VI—CARPENTER SHOP EQUIPMENT, IN PART

One circular saw.	One Radial-arm sander.
One planer.	One disk sander.
One jointer.	One wood-turning lathe.
One lightning cut-off saw.	One mortiser.
One table saw.	One tenoning machine.
One band saw.	

View of the bus garage looking toward the storage end. At the left of the doorway may be seen the ventilation hood and above the hood, the steel roof truss construction. Buses are serviced and repaired in the rear section of the garage

driven over one of the two repair pits. After servicing, the buses are placed in a storage section of the garage.

Gasoline is stored in two 10,000-gal. underground tanks remote from the building, and is forced through underground pipe to the filling stations, two of which are located at the Wentworth Street entrance. Water pressure obtained by a small water tank located in the peak of the carpenter shop forces the gasoline through the pipe. Nozzle valves of the filling station are opened by pressing a trigger and permit a flow of 20 gal. per minute.

The unit heaters of the bus garage are so arranged that they may recirculate the air of the room or draw fresh air from outdoors. When drawing fresh air from outdoors a slight air pressure is created in the garage which effectively expels the fumes.

Inspection Barn Used for Car Washing and Minor Repairs

The car inspection barn, built some years ago, is to be used for greasing, oiling, renewal of brakeshoes and the detection of faults. The minor repairs will be made here, while others, such as the replacement of a damaged motor, imperfect wheels, etc., will be made in the new shop. Car washing is done also in the old building, where ample track space is available and where proper washing racks are being installed for the purpose. Each car in service is washed once a week.

Track additions include two storage tracks extending half the length of the yard, three extending practically its full length and one passing through the new building to serve the transfer table. A separate track was laid from the one extending through the building to join the Wilson Street track, and a wye was constructed in Nightingale Street. Two single-track curves were made at the corner of Wilson Street and Sanford Avenue, and a double-track curve at the corner of King Street and Sanford Avenue.

The general layout of the building and the arrangement of equipment were planned by the engineering department of the Dominion Power & Transmission Company of Hamilton, while the design and working out of building construction details were done by the firm of B. H. & F. Prack, architects and engineers. Most of the construction work was done by local contractors and the company's own construction forces.

Another view of the pit room, looking toward the carpenter shop and the two closed doors of the paint shop. The transfer table can be seen at the left of its runway

South American Cities Have Fine Railway Service

Lines are heavily patronized and prove profitable. Considerable pleasure riding is done in some of the cities near the equator

By Arthur Floyd
Victoria, B. C., Canada

ELECTRIC railways in the various cities of the South American republics are uniformly good. Starting with the largest city of South America, Buenos Aires, the wonderful capital of Argentina, we find electric traction well established, with frequent services to all parts of the city and suburbs. Zone fares obtain in all the Latin-American cities, as in many cities in Europe. The lowest fare is the equivalent of 2 cents.

An Anglo-American company operates the service. Most of the cars are of the English type, as the American car would be too long for the narrow streets.

Turning to the west coast, we find Valparaiso, foremost seaport in Chile, a city with a topography strikingly similar to San Francisco, with steep hills in all parts of the town. Many of the cars here are of the double-deck type, as used in Great Britain. The seats inside are for first-class passengers and the outside for those paying for second-class seats. Many amusing scenes are witnessed with American and English visitors, who invariably seek the outside seats, both for the fresher air and the possibility of seeing the town to better advantage. The natives stare at the Anglo-Saxons, well dressed and seemingly prosperous, sitting outside with the hoi-polloi, not knowing that their fellow passengers paid the higher fare and preferred to sit on top to view the sights.

A picturesque feature on the Valparaiso electric railways is the woman conductor, who wears a rather jaunty

Open cars are the rule in Rio de Janeiro, owing to the tropical climate

British and German companies share the franchises to run cars in Buenos Aires. The cars are of European design and of rather small size.

In addition to the surface lines, a British company has built an excellent subway system. The cars on this line are modern and of an approved type. A feature is the embellishment of the stations, the names being strikingly prominent in mosaic lettering. The trains emerge from the subway about 3 miles from the city and continue on the surface to the more distant terminals. The Argentine Central Railway also is electrically equipped for suburban service for a distance of 30 miles. The third rail system is used. This line is well patronized.

Montevideo, the charming capital of the Republic of Uruguay, can also lay claim to a fine electric railway system. This city, one of the most Spanish of all the Latin-American towns, has a large amount of track. In spite of extremely narrow streets, the cars render service to every part of the city. They seem almost to touch the houses in passing around corners. The lines which run to Pocitos and Ramirez, two fasionable seaside resorts a few miles from Montevideo, do an enormous business.

hat not unlike a waterproof derby. These Amazons perform their work expertly and climb up and down the winding staircases of the cars with facility. How they manage when encountering belligerent males is hard to say, although it must be admitted that when the Chilean goes on the warpath he is one boisterous *hombre*. Perhaps the native Chilean gallantry asserts itself in such case and no harm is done.

São Paulo, Brazil, one of the amazingly modern and prosperous cities of South America's largest republic, possesses an excellent traction system, in common with the other places mentioned. This city, with a population of well over 400,000, is the great coffee center of the rich province of Minas Geraes. The tracks radiate from one of the central plazas to all parts of the city.

There are many beautiful trips to be had in São Paulo, not the least interesting being the ride out to the famous snake farm at Busançon. This snake farm is maintained by the Brazilian Government for the purpose of studying at close range the various poisonous snakes with which interior Brazil abounds. The cars are modern and neatly finished in cream and black and are of the European type. Traffic is exceedingly profitable, if one

Rio and Sao Paulo, two large and beautiful cities in Brazil, possess excellent tramway systems. A plaza in Rio intersected by car lines is shown at the right. The Sao Paulo view shows the Automobile Club in the background

can judge by the full loads carried at all times of the day.

All of the cars in this city, even the small ones, carry both motorman and conductor. Indeed, the writer never once came across a one-man car in the whole of the South American continent. Evidently there is not the stress of competition down there that there is in North America. One reason probably is in the fact that few mechanics there can afford to own an automobile. The joy rides of the masses are taken on the street cars.

Last, but not least, we come to the beautiful city of Rio de Janeiro, by many considered the world's most scenically grand city. Here is the finest street car service in the southern hemisphere. There is a regular electric railway terminus on the Avenida Central, in the heart of the city, from which point the system radiates to all parts of the city and distant suburbs.

In no city in the world are there so many scenic trips to be enjoyed as in Rio de Janeiro. The cars skirt the wonderful harbor, world famous for its beauty, and reach out to the lovely seaside resorts that abound near the city. A particularly charming ride takes the visitor along the Beira Mar, a crescent-shaped drive along the coast. This road is likened to the famous Corniche Road in the south of France, in the Riviera district. Another wonderful journey by electric car is to the little suburb of Santa Theresa, over canyons and crossing a fine old bridge built in the time of Dom Pedro, last emperor of Brazil.

The management of the car company in Rio makes special provision for tourists, and this class of travel proves highly profitable. One trip of note is to the Corcavado, a high prominence overlooking the sea, with an elevation of nearly 3,000 ft. The trip is through luxurious tropical foliage, with wonderful vistas on all sides. At the top of the Corcavado there is a public restaurant and beer garden, where visitors can refresh themselves before returning to the city.

The cars in Rio are well maintained and have center entrances. Owing to the tropical latitude of Rio there is no necessity for windows in the cars, and here lies one of the chief magnets for drawing customers. It is the regular thing on the part of the Rio populace to take trips around the town and along the sea front to escape the humid atmosphere, which at times is quite oppressive. A ride in an open car on one of the magnificent avenues of Rio on a hot night is a real joy, and in affording this relief to the citizens the street car company is a benefactor to the city. A Canadian corporation controls the destinies of the Rio de Janeiro Electric Railway, which is a profitable concern.

Altogether South America can be proud of its electric traction systems, and it can be noted there is not the competition that similar systems have to contend with in North America. In fact, extensions are being made quite generally, but especially in Brazil.

The Readers' Forum

More on Car Heating Costs

CHICAGO SURFACE LINES
CHICAGO, ILL., June 21, 1928.

To the Editor:

The discrepancies between the conclusions reached in my recent letter to you on Mr. Baumgarten's article regarding "Heating Costs" and his reply to him seem to arise from a difference in interpretation and viewpoint. To attempt to reconcile the various points of difference would result merely in an extended controversy.

The point which I wished to emphasize, and which Mr. Baumgarten also brings out in his reply, is that each installation must be considered on its own merits, and the savings realized will be determined by conditions peculiar to the application. We realize that very different conditions obtain on a large property from those encountered on a smaller one, such as the required capacity and distribution of substations, and the corresponding distribution of peaks which tends to reduce the power plant demand or required capacity, resulting in a much better load factor.

We feel sure, however, of our figures and deductions presented as applying to our property and conditions. Our calculations have taken into account demand charges such as we obtain, and include only such other items as seem properly chargeable to the particular type of heating considered, but do not include those which should be common to all forms of heating. In like manner, the savings take into consideration the availability of heat when needed, and loss when generated though not required.

W. C. WHEELER,
Engineer of Equipment.

Maintenance Methods and Devices

Fireproof Lacquer Spray Room

By J. W. Weir

Assistant to General Superintendent of Maintenance Kansas City Public Service Company, Kansas City, Mo.

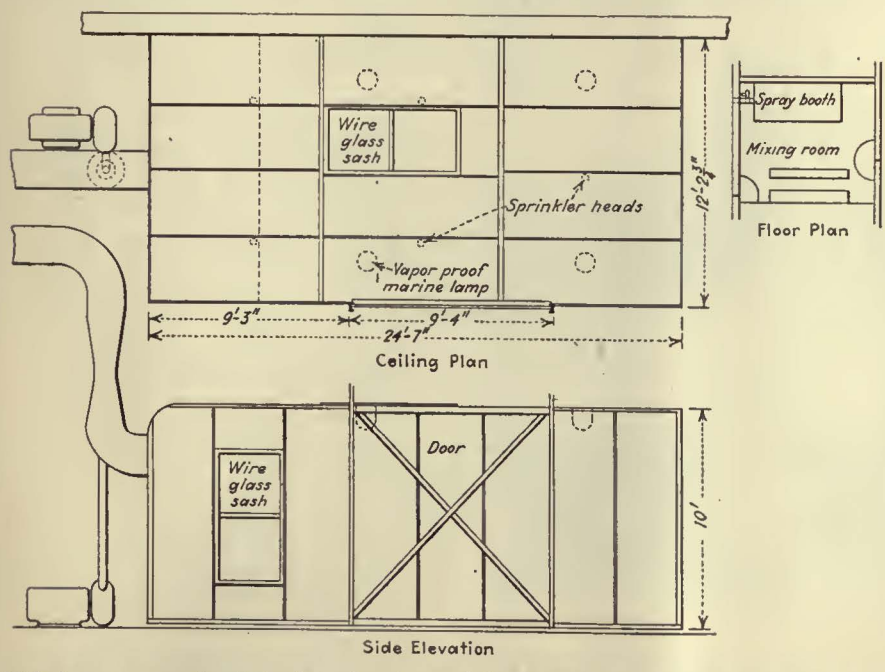
USE OF sprayed lacquer as a maintenance item in the 10th and Lister shops of the Kansas City Public Service Company has increased rapidly in recent years. A part of the overhaul program for cars of this company calls for lacquering of numerous car parts such as window guards, seat cushions, seat frames, stanchions, window frames, etc.

In order to handle this class of work without incurring a fire or explosion hazard and in conformity with the requirements of the State Inspection Bureau, the spray painting equipment has been isolated from the remainder of the paint shop.

The accompanying diagram gives a general idea of the arrangement of the lacquer spray booth. It is located in the paint mixing room and is constructed entirely of sheet steel reinforced with angles. The sash is metal with two-wire glass. The booth is ventilated by an indirect type of blower fan and air ducts which will completely change the air in the booth every two minutes. The room will be illuminated with marine type vapor-proof lamps.

Access to the booth is through a large fire door constructed under the specifications of a class A fire door, which was made large enough to permit the hauling of material into the booth on electric-driven industrial trucks.

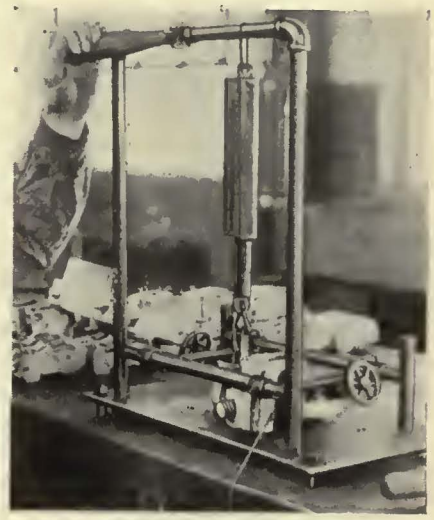
Fire protection will consist of three open sprinkler heads of the wet type, two mounted within the booth and one in the exhaust air duct. There will be five sprinkler heads on the same system in the mixing room.



This lacquer spray booth in the paint shops of the Kansas City Public Service Company is of fireproof construction and contains latest equipment for handling this type of work

Brush-Holder Tension Measuring Device

FOLLOWING an overhaul in the electrical department of the Coney Island shops of the Brooklyn-Manhattan Transit Lines, it is the practice to adjust and measure the brush-holder spring tension in order to insure uniformity and accuracy. For this work a device has been developed. The brush-holder is clamped in position, a spring clip attached to the brush pressure lever and the pressure read on a spring balance as the tension is raised by a lever arm. A link connects the clip attached to the brush pressure arm to the spring balance, and the top of the balance is fastened to the inside end of the lever, as shown in the illustration.



Testing brush-holder spring tension by a special device in the shops of the Brooklyn-Manhattan Transit Lines

The apparatus is mounted as a unit on a plate 20x12x¼ in. This is fastened firmly to the work bench, the plate being raised slightly from the bench by bushings. The framework for clamping the brush-holder in position and supporting the spring balance is constructed of ¾-in. pipe in the form of a rectangle. The front and rear longitudinal pipes carry straps to which are riveted rectangular pieces that support the clamping mechanism. The straps on the front and rear pipes slide for adjustment, but when in position to fit a particular type of brush-holder they are held firmly by cotter pins.

Each of the two longitudinal cross-members carries a nut for the hand screws used in clamping the brush-holders. These nuts are also arranged to slide back and forth to provide proper adjustment. The screws are provided with a small hand wheel at the top and a swivel end at the bottom which rests on the brush-holder frame. The adjustable clamping device thus provided will clamp different types of brush-holders securely in position in a moment's time.

The two upright pipes at the front carry a crossarm on which is mounted a lever on a sliding sleeve to support the spring balance. The front end of the lever has a wooden handle

while the back end has a link to hold the spring balance.

The lower end of the spring balance is fitted with a ring and a spring clip so as to attach quickly to the brush-holder lever arm. After attaching it to the brush-holder arm the operator pulls down on the front end of the lever which raises the spring balance and the brush-holder lever arm. The tension can then be read on the spring balance.

How Worn Carbons or Brush-holder Boxes Affect the Neutral Position

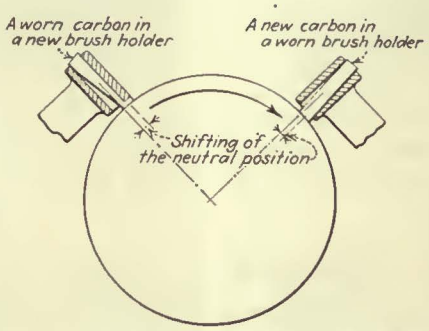
By John S. Dean
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

PRACTICALLY all railway operators appreciate the importance of setting brush-holders on the neutral position, which on nearly all standard railway motors is in line with the centers of the poles. This location is determined by the throw of the leads on the armature coils, which as a rule is equally spaced around the center line of the coil. There are some few machines made where for special design reasons the leads are unequally spaced. On these the brush-holders do not line up opposite the center lines of the poles.

In the mechanical design of railway motors, the method of clamping the brush-holders to the frame is such that when properly adjusted they are drawn up securely into the correct neutral position. This is especially true with the more modern motors using the construction commonly known as the insulated pin type.

With the brush-holders properly adjusted on the neutral position, carbons that are badly worn on the side will shift the neutral position ahead on the motor, as shown in the accompanying illustration. With the modern ventilated motor the carbon brushes are subjected to excessive side wear due to the dust and dirt which are drawn through the motor. Before the brushes are allowed to wear $\frac{1}{16}$ in. as a permissible maximum they should be replaced, as the shifting of the neutral to a forward position tends to produce sparking and poor commutation.

Besides shifting of the neutral due to the side wear on carbons, badly-worn brush-holder carbon boxes also affect the neutral position. This is also shown in the illustration, from which it will be seen that this also tends to shift the neutral position ahead, which will cause the motor to spark and commutate poorly. It is important to maintain the carbon box inside dimensions quite close to the original gage limits. The maximum permissible limit of wear on the brush-holder box should not exceed $\frac{1}{32}$ in.



The above shows a worn carbon in a new brush-holder on the left, and a new carbon in a worn brush-holder on the right. Both affect the neutral position

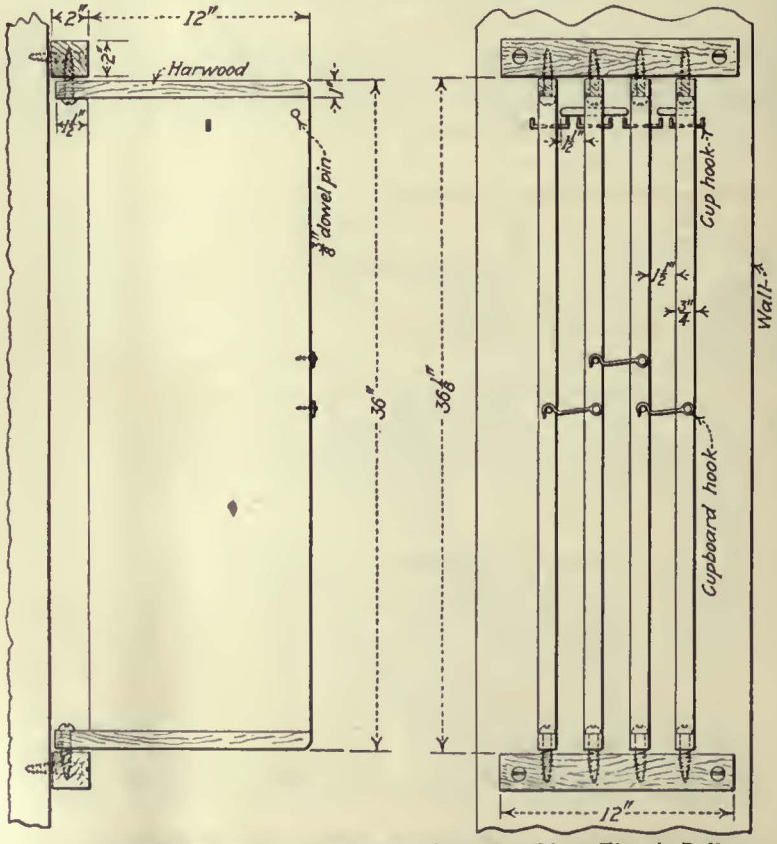
Either one of the conditions mentioned has a detrimental effect on the commutation, while a combination of both, which is quite frequent in service, tends to shift the neutral ahead to such an extent that the commutator sparks badly, frequently flashing from brush to brush and occasionally jumping to ground, causing the motor to blow. In addition, this poor commutation causes rapid wear, both of the commutator surface and the carbon brushes. From an economic point of view these defects justify correction. This can be accomplished readily by systematic inspection and better maintenance of these parts.

Book Type Gasket Rack*

By Charles Herms
General Foreman San Diego Electric Railway, San Diego, Cal.

GASKETS for bus engines are usually large and so require considerable storage space if each type is kept separate. If they are kept in piles damage is sure to occur, especially to some of the paper and cork types. For convenient storage which will take little room a gasket rack has been constructed in the shop of the San Diego Electric Railway. This takes care of all the gaskets in general use on the system. The rack occupies a wall space of 12x40 in., and if the gaskets which it accommodates were to be spread out on a flat wall,

**Submitted in* Electric Railway Journal *Prize Contest.*



Type of gasket rack used in the garage of the San Diego Electric Railway

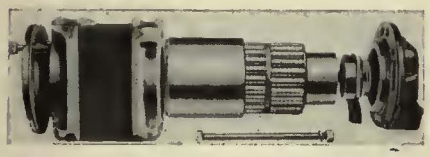
the space required would be 36x96 in. The rack is made in book form with four panel wings. Any desired number of hooks may be fastened to each side of a panel, and of course any number of wings may be used, depending on the number of gaskets stored.

A label is placed over each hook to show the particular type of gasket to be carried on it. Hardwood dowel pins glued in place prevent wings from touching each other and causing the gaskets from the opposite wing to be caught on the hooks of another wing. End hooks are provided to hold the wings together and eliminate flapping at random.

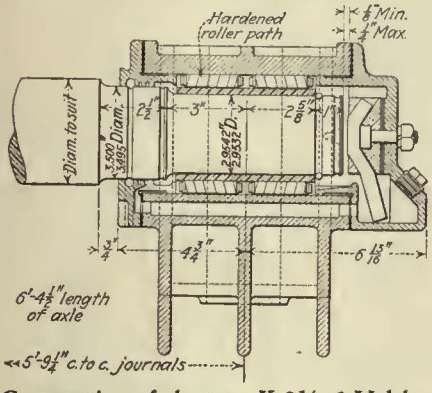
New Equipment Available

Roller Journal Bearing

DESIGNED to meet the demand for a journal bearing that requires no weekly or monthly inspection, the improved Melcher roller journal bearing has been produced by the Railway Motors Corporation, De Pere, Wis. This journal bearing interchanges with all A.R.A. standard equipment and is Hyatt equipped. It utilizes standard axles, is quickly and easily installed, and every part is accessible for inspection without removal from the truck.



A Melcher roller journal bearing assembly which is Hyatt equipped



Cross-section of the type K 3¼x6 Melcher roller journal for electric railway use

This journal includes both radial and thrust bearings, neither of which reduces the efficiency of the other, and lateral adjustment is easily made. The center member is reversible and is made of R.M.C. alloy noted for its wear-resisting qualities. The pedestal guides and equalizer seats are heat-treated and hardened and the finished surfaces are ground accurately to the size required.

The lubricating system constantly washes and cleanses the roller path of any foreign matter, thus increasing the life of the bearing. It circulates and filters from 15 to 30 drops of oil per minute under all temperatures. The normal operating temperature is only 10 deg. above atmosphere, and inspection or lubrication is only necessary every 100,000 miles. These bearings have been in operation for a considerable time on steam railways and a number of applications are now in operation on electric equipment.

Device For Testing Meters and Instruments

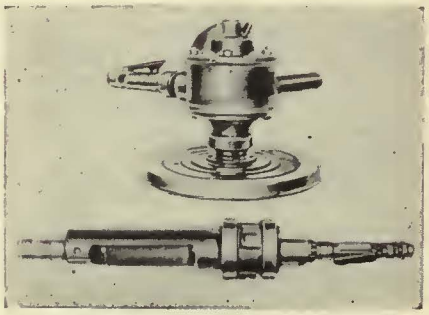
TEST blocks and plugs for making connections when testing meters, instruments and relays, have been developed by the General Electric Company, Schenectady, N. Y. The new line will be designated by the type number PK.

The blocks are essentially four-pole and six-pole jacks, provided with covers having internal plug contacts which make connection when the plug is in place. The four-pole and six-pole blocks have various combinations of auxiliary contacts which automatically short-circuit the current transformer when the cover is removed. Thus a block and cover are equivalent to a double-throw test switch.

Both test plugs are provided with studs and links and may be connected permanently to the testing equipment for any of the various test methods in use. Routine testing may be accomplished simply by removing the cover and substituting the properly connected test plug. Normal connections are restored by replacing the cover.

Improved Portable Grinder

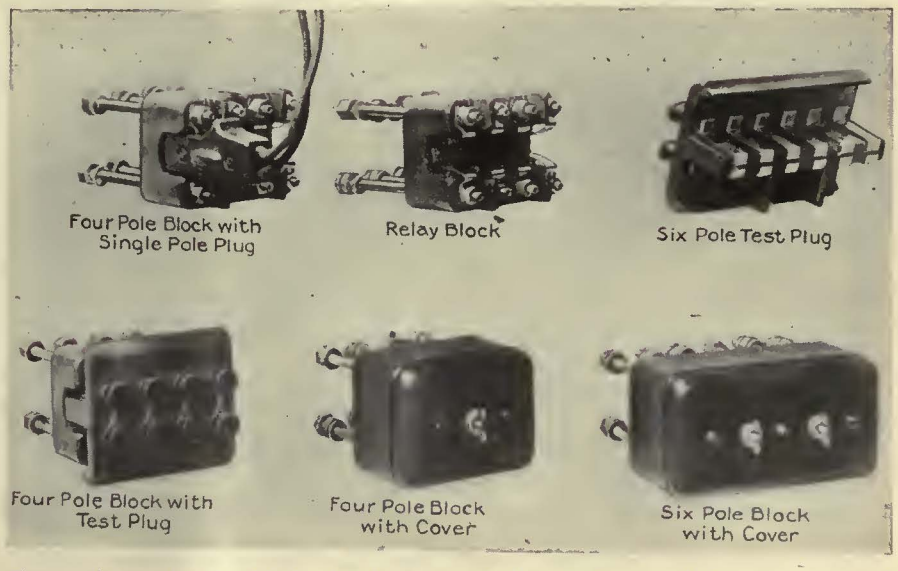
FOR grinding, sanding and polishing the Buckeye Portable Tool Company, Dayton, Ohio, has just announced the Hercules air tool. The rotary principle is used, compressed air acting against movable blades.



Air-operated tool—at top, sander; below, grinder

This is claimed to eliminate much of the vibration hitherto associated with air tools.

The only wearing parts of the new tool are the small blades in the rotor. For lubrication, grease is injected into the tool at one point and reappears at an outlet at the other end.



Four and six-pole relay blocks showing spring jacks and plugs, and the arrangement of links and studs for making various connections

Association Activities

Steam Railroad—Automotive Conference at A.R.A. Meeting

MEMBERS of the Motor Transport Division of the American Railway Association and representatives of the National Automobile Chamber of Commerce, the American Automobile Association, the Society of Automotive Engineers, and the Railway Supply Manufacturers' Association, participated in a general conference on June 23 at Atlantic City, on the occasion of the first annual meeting of the newly-organized Motor Transport Division of the A.R.A.

Sessions of the Motor Transport Division during the preceding two days were open only to railroad representatives, but the final session was thrown open for general discussion of problems of mutual interest to railroad and automotive transportation men. The question of interstate regulation of highway carriers, both passenger and freight, together with that of automotive rail car design occupied most of the attention during the meeting. In a preliminary statement A. P. Russell, chairman, explained that the Motor Transport Division was anxious to co-operate with others interested in the solution of problems incident to the development of highway transportation, and suggested that the question of the regulation of interstate vehicles was of paramount importance. He called upon A. J. Brosseau, vice-president of the National Automobile Chamber of Commerce, to voice the views of that body regarding interstate regulation.

Mr. Brosseau said that the difficulty in arriving at a satisfactory regulatory law is that of finding a common ground of thought. He suggested that one of the difficulties in the past has been that the policy of the several interested groups have been formulated by lawyers instead of practical operating men. He said that the automobile industry has on several occasions given evidence of its interest and desire to co-operate in finding a proper basis for regulation, and called attention to the statement which he had made at the hearings held by the Interstate Commerce Commission, expressing the views of the N.A.C.C. This statement, in brief, held that only a certificate of convenience and necessity, together with adequate assurance of liability responsibility, is needed to insure healthy development of interstate highway transportation. Regulatory legislation covering trucks was opposed on the ground that these vehicles in most instances are not operated as common carriers. Mr. Brosseau was hopeful that a fair and reasonable solution of the bus regulation problem can be found, and said that although the automobile industry has at times opposed specific regulatory bills, it is not opposed to the principle of regulation of common carrier highway vehicles.

C. S. Sale, president American Car & Foundry Motors Corporation, suggested the need for uniformity of regulation regarding the dimensions of buses. He recommended that a uniform maximum width of 96 in. be advocated throughout the country. Speaking on the question of rail car design, he maintained that the weight of rail cars can be reduced and said that a 30 to 40-passenger rail car capable of operation at speeds of from 45 to 60 m.p.h. can be produced. Representatives of various railroads operating rail cars participated in the discussion and outlined some of the operating problems of branch line service which determine the type of automotive rail equipment demanded by the railroads. Although the advantages of a more frequent service which can be given with small light rail vehicles were emphasized, the trend of thought among railroad representatives was toward larger units capable of handling the wide variations in traffic encountered on branch lines.

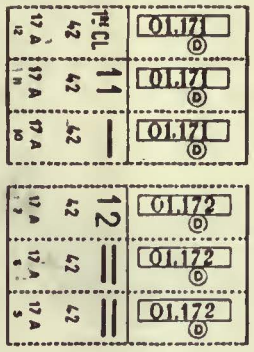
Paris Adopts New System of Fare Collection*

Offers 16 2/3 per cent reduction in rates to passengers who purchase coupon tickets in advance. Eighty-five per cent of passengers use the new system

By André Mariage

Chairman of the Board of the S.T.C.R.P. (Paris Surface Lines and Bus System)

FARES in Paris are based on the zone system, with a higher charge for the first zone than for each succeeding zone. There is also a difference in charge between first-class and second-class passengers, and these fares are still further modified by reduced round-trip workingmen's tickets, reduced rates for cripple war veterans, and double rates charged during certain hours of the night.



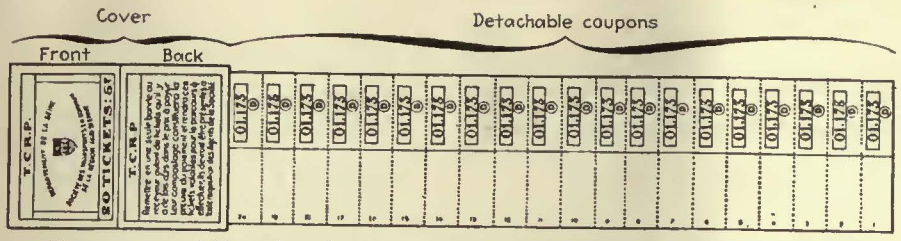
Reproduction of cancelled coupon. That at the left is for a first-class fare covering one section, that at the right for a second-class fare covering two sections

The practice has been to give each passenger paying fare a ticket or fare receipt, indicating the ride to which he is entitled and the fare paid. This has meant that the conductor has had to carry a large number of each kind of ticket. This he has usually done on a board which he has carried with him. On certain long lines where a board to carry all of these tickets would be unwieldy, the conductor has been supplied with two such boards, one to use, say, during ordinary hours and the other during the hours in which workmen's tickets are sold. As he has to issue the right ticket to each passenger, mark it with a pencil to indicate the zone and often make change he has a great deal to do. In an effort to reduce the work of making change, the company tried the plan of issuing fare tokens at their cash value, but as few passengers purchased them, no great saving in time resulted.

New system of fare collection

The principle by which these fare receipts are supposed to protect against fraud is that as they carry a serial number assigned to the conductor of that car, they are good only on the car on which they are issued. A record of these serial numbers is kept in the office of the company, and periodical checks are made of the tickets issued to passengers on individual cars to see that there is no trading in tickets,

**Abstract of communication presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intèret Local et de Transports Publics Automobiles, held in Rome, Italy, May 6-12, 1928.*



Coupons are sold in strips of twenty at a reduction of one-sixth over the cash fare

overriding or use of expired tickets.

In the new system adopted, the work of the conductor has been greatly reduced, as it has been changed almost entirely to that of cancelling rather than that of issuing tickets. The system is based on the following principles:

1. Where there are various rates of fare for different lengths of rides and different classes of accommodation, these rates should be multiples of a common factor.

2. The coupons issued to cover all rides should be of the same kind, and the unit value of each should correspond with the value of the common denominator mentioned in condition 1.

3. When these tickets or coupons are cancelled on the car, the cancellation should be of such form as to indicate the length of ride for which they have been accepted, and the cancelling apparatus should be arranged so as to totalize the receipts as well as the number of travelers in each class.

4. It is desirable to make obligatory, so far as possible, the use of these coupons for passage. Otherwise, it will be necessary for the conductors to carry not only the new cancelling machine but also all the equipment formerly used, such as assorted packages of tickets, change bags, ticket recording blanks, etc.

5. If it is not possible to make all passengers buy coupons, a special inducement should be given to those who do so, the purpose being to reduce the number paying cash for fares to the smallest number.

6. For this final group of passengers some system should be devised by which the new equipment can be used, so as to reduce the appliances carried by the conductor.

All of these conditions have been fulfilled by the system which we have on trial now on five of our city lines. Later it will be extended to the suburban lines.

The conditions were met in the following manner:

Thirty centimes were adopted for the common denominator of fares when paid in cash, and the fares were set as follows:

NEW SCHEDULE IN FRANCS OF CAR AND BUS FARES IN PARIS IF PAID IN CASH

Number of sections	1st Class	2nd Class
1	0.90	0.60
2	1.20	0.90
More than 2	1.50	1.20

If paid in tickets, the fares are as follows:

NEW SCHEDULE IN FRANCS OF CAR AND BUS FARES IN PARIS IF PAID IN TICKETS

Number of sections	1st Class	2nd Class
1	0.75	0.50
2	1.00	0.75
More than 2	1.25	1.00

It will be seen that these fares are all a multiple of the denominator 25 centimes and that they represent a reduction of $\frac{1}{6}$th from the fares paid in cash. The reduction given over the cash fare is so considerable that practically all regular users of transportation will purchase the slips. The coupons are sold in strips of 20 in the way illustrated. The price of the twenty-ticket strip is 5 francs (20 cents in American currency).

The special rates for crippled veterans and workmen were arranged as follows: The veterans are allowed to travel first-class and their rate of fare is 30 centimes for one section, 40 centimes for two sections and 50 centimes for more than two sections. Their coupon unit has been fixed at 10 centimes, making the cost for a twenty-coupon strip, 2 francs. For workmen, weekly tickets carrying a coupon for each day, one for the outgoing trip and one for the return trip are sold in advance. These coupons are cancelled by being punched by the conductor on the car.

Cancelling and Registering Machine

The cancelling and registering machine is carried by a strap around the neck of the conductor. It measures $7\frac{1}{4}$x$5\frac{1}{4}$x$2\frac{3}{4}$ in. and cancels the coupons by surcharging them. This surcharge gives: (1) the number of the machine, (2) the day of the month, (3) the trip number, (4) the class of accommodation, and (5) the numbers of the sections through which the passenger has paid to ride. Of these, only the two last mentioned have to be set by the conductor during the trip.

Typical cancelled coupons are illustrated. In the lower line, 17 is the day of the month and "A" is the route number. In the line above, 42 is the number of the cancelling machine. In the next line above, the first words indicate first class. If these words do not appear, the ticket is for second-class accommodation. The number 11 indicates the boarding station, and the one horizontal line on the third coupon indicates that one section only has been paid for. In the group of second-class cancelled coupons, the two horizontal lines show that two sections have been paid for.

The registering part of the apparatus totalizes the number of tickets cancelled and the number of passengers traveling first and second class.

Provision, of course, has to be made for passengers who insist on paying cash. The conductor sells them the number of special coupons which they require from a roll of 200 coupons which he carries, but charges them 30 centimes for each coupon instead of 25 centimes.

The coupons, after being cancelled, are retained by the passengers in the customary way until the end of their trip.

Practical Experience with the System

The company was anxious, of course, when the plan was started, to learn how many passengers would purchase tickets in strips. During the first days 30 per cent continued to pay cash, but in a short time this proportion shrank to 15 per cent, made up primarily of persons like tourists, who are either unacquainted with the system or who do not use the cars or buses often enough to warrant the purchase of a strip of coupons. The company believes from its experience on the five lines on which the system has been tried that this percentage of 15 will grow considerably less.

It has been found that by this system of fare collection the average time

required by the conductor to collect a fare has been reduced at least 50 per cent. The saving is more than this, of course, when the time taken to make change is included. That took, on the average, 25 seconds per passenger, whereas the present system takes only seven seconds per passenger. This greater rapidity permits the conductor to watch more carefully for attempted fraud. The plan is very popular with the employees.

Another advantage of the present plan is the reduction of inspectors needed, as the work of the inspection of tickets is greatly simplified. The elaborate system of accounting in the office for tickets issued to conductors and the return by them of unused tickets is eliminated. Finally, the accounting for receipts and number of passengers carried is much reduced, as these figures are given on the totalizers on the cancelling machine.

Periodical Physical Examination of Trainmen*

By W. L. Weber

Chief Surgeon Pacific Electric Railway, Los Angeles, Cal.

FEW large corporations as a preliminary requisite to employment subject their applicants to a thorough physical examination. Fewer still conduct periodical health rechecks of their employees. Many concerns have no medical department at all. Some that have are more or less indifferent in their attitude toward the employee.

The Pacific Electric Railway Company employs some 6,000 individuals, who, excepting the Mexican laborers, are obliged to submit to a thorough medical examination before final acceptance into the employ of the company. This examination is made by a full-time doctor whose office adjoins that of the employment bureau, thus facilitating the handling of the men. This doctor's time is largely occupied in the examination of applicants and in the re-examination of men already employed.

The medical department has a full-time staff consisting of a chief surgeon and two assistants, three office nurses, and other clerical help. The office organization is quite complete, having a well equipped X-ray laboratory in charge of a competent radiologist and technician. There is a physio-therapy department and a full-time masseur. The laboratory work is done by a competent laboratory staff, the material being called for once daily and reported upon promptly. In addition, there are in every line specialists whose services are free to the employee. Perhaps one of the most valuable acquisitions to our medical department has been the installation of a dental clinic under the direct supervision of a competent dental surgeon. While not an integral part of the railroad organization, it is so closely associated with the men that it has become a definite and important factor in our organization. The charges for dental work are very moderate, being about half of that usually made for similar work done elsewhere. The dentists are not on a salary but make a charge directly to the individual having the work done. The service is extended to dependent family members as well as to the employee.

The aforementioned medical and dental benefits are derived through the maintenance of a hospital fund through pay roll deductions. The amount deducted varies from 50 cents to $1.50 a month, depending on the salary received.

With such an organization the re-examination and subsequent care of any number of cases can be effectually done. During 1925-26-27, 2,956 trainmen were re-examined. Up to 1925 the re-examination of trainmen took place every three years and consisted in testing visual acuity, auditory and color perception, and noting the general appearance of the applicant. Only in isolated instances was an applicant given a detailed examination. This may account, and probably does, for the large number of men found suffering from serious organic disease, as revealed by our re-examinations of 1925. Now the trainmen take this examination every two years and are not permitted to return to duty unless they present to their immediate superior a clean bill of health from the examining doctor.

The man to be examined removes all of his clothing, even to his shoes and socks. The examination takes in the general fitness of the applicant, the cardio-vascular system, the teeth and the nervous system. Blood pressure records are taken, including in all cases both the systolic and diastolic readings, and a urinalysis of a specimen voided in the doctor's presence. Vision, hearing, and color perception are carefully noted. Where a more detailed examination is required, such as X-ray of heart, lungs, gastro-intestinal tract, including the teeth, Wasserman tests of the blood or cerebro-spinal fluid, blood chemistry, etc., the patient is referred to the laboratory doing such work. All findings, whether normal or otherwise, are carefully recorded on the applicant's blank. These blanks at the close of the day are placed before the chief surgeon for inspection, and should any very serious defect be found the man is requested to return for further rechecking. However, should the examining doctor find any defect that in his judgment is of sufficient gravity to be a menace, the applicant is withheld from duty until further examination and disposal of the case can be made.

When the system of re-examination was first inaugurated, it created quite considerable consternation and ill feeling among some of the employees, but when they became convinced that they were the actual beneficiaries, and that it did not mean their loss of position, the feeling changed so that soon there were no more complaints. Instead of resentment the men welcomed the careful examination which they received.

The question as to the ultimate disposition of a given case in which a serious disqualifying defect might be found, naturally arises. In no case has an employee ever been discharged from service because of physical disability. Those men who were found suffering from organic disease of sufficient gravity to render them a hazard to the traveling public, their fellow employees or to themselves, were removed from the position and employment less exacting provided. Motormen with high blood pressure and serious heart disease are removed from the front end and given work as conductors, or at station, or trolley holding positions. Some were found to be too seriously ill to continue at any employment, and were given the benefits derived from their insurance in the Metropolitan Life Insurance Company. In other cases where the length of service warranted it, a monthly gratuity or pension is allowed in addition to their insurance, thus providing, at least, a living. We discovered a few platform men suffering from locomotor ataxia. These were transferred to station or similar positions and seemed to do quite well. At the present time one or two such are holding trolley jobs. They are carefully supervised both from a medical and efficiency standpoint. They report to the medical department at least once a month, and are carefully checked over for possible development of symptoms that would render them an unsafe risk, even in such a position as holding trolleys.

In 1925, 1,586 men were re-examined, and of this number 157 were instructed to return for rechecking. The following defects were found, which, in the great majority of cases showed improvement or recovery under observation and treatment: Glycosura, 21; hypertension and associated cardiac disease, 85; hernia, 24; visual impairment, 9; faulty color perception, 4; nephritis, 4; locomotor ataxia, 12; bad teeth, 73.

In 1926 there were 133 re-examinations and nine rechecks: Hypertension, 3; glycosuria, 1; disease of the nervous system (non-syphilitic), 3; visual impairment, 2.

The reason for the small number re-examined in 1926 was that the majority of the trainmen were checked in 1925.

**Abstract of a paper presented at the annual meeting of the California Electric Railway Association, San Francisco, Cal., May 7-8, 1928.*

In 1927 1,237 men were re-examined, and of this number only 84 were instructed to return for rechecking. The defects noted were as follows: Hypertension and associated cardiac disease, 42; cardiac disease without hypertension, 6; glycosuria, 17; locomotor ataxia and nervous syphilis, 6; cardiovascular syphilis, 3; nervous system disease, 8; visual impairment, 9; auditory defects, 2; impairment of color perception, 3; thyroid gland, 1; nephritis, 1.

There can be no question but that tremendous benefits have accrued to the men. Almost all have co-operated in a most satisfactory manner in the effort to detect disease and improve their health. The fact that in 1927 our X-ray laboratory took 1,000 more dental X-rays than in 1926 shows conclusively that the employee appreciates the value of detailed and careful physical examination.

Since most of the defects noted were for arterial hypertension and associated cardiac disease, the possible cause, or causes, becomes interesting and important. The majority of our cases occurred among the motormen, and I am inclined to believe that the nervous strain incidental to running high-speed trains where traffic is frequently crossing the tracks, must be a factor. I also believe that since their occupation is largely sedentary, combined usually with overeating and consequent overweight, that these latter factors also play a considerable part in causing hypertension. I do know that the majority of these men showed marked improvement under proper dietary regime and elimination through skin, bowels, and kidneys. Any case showing a blood pressure in excess of what should be normal for his years is rechecked and made to report at stated intervals. A systolic pressure of 180 mm. disqualifies for the work of motormen—a diastolic pressure of 100 mm. or over also disqualifies, no matter what the systolic pressure may be.

American Association News

Engineering Executive

DISCUSSION of work done during the year by various committees, approval of the program for the sessions of the Engineering Association at the coming convention and many other routine matters formed a busy session of the executive committee of the American Electric Railway Engineering Association, at association headquarters, New York, June 13. Those present were: President R. H. Dalgleish, chairman; F. H. Miller, W. W. Wysor, C. H. Jones, L. D. Bale, P. V. C. See, F. McVittie, E. M. T. Ryder, J. W. Welsh, John Y. Bayliss, H. F. Brown, H. H. George and A. T. Clark.

A report of work being done in the rolling stock division was presented by A. T. Clark, chairman of the general rolling stock committee. In addition to the regular assignment, several special ones which have come up during the course of the work were reported on by Mr. Clark. These included the designing of a new standard axle and a study of lamp sockets for 20-in series lamps.

Work in the purchases and stores division was reported on by John Y. Bayliss. A request for the organizing of a joint committee with the National Electric Light Association to consider certain subjects of mutual interest was approved, as was also another request for arrangements to co-operate with committees of the National Association of Purchasing Agents, the National Electric Light Association, and the American Railway Association, in a joint study to establish standard packages for storeroom material. John Fleming was appointed as a representative of the purchases and stores division, to co-operate with the United States Department of Commerce.

A report of the committee on revision of the constitution and by-laws was discussed and approved with certain revisions. H. H. George presented a very complete report for the program committee covering the coming convention. It was voted to publish all advance papers for early distribution.

Correspondence covering many suggestions for subjects to be considered during the coming year were discussed, and these were referred to the subjects committee. The following personnel changes on A.E.S.C. committees and those co-operating with other societies, were approved: Messrs. H. W. Codding and W. E. Bryan were appointed as representatives of the Association on the sectional committee on mercury arc rectifiers. H. E. Bachman was appointed to the place made vacant by the resignation of M. B. Rosevear, on technical committees 5 and 10 of the sectional committee on insulated wires and cables.

Charles R. Harte was appointed to represent the association at a conference called by the American Society of Mechanical Engineers in connection with the co-ordination of standardization activities in the mechanical industries. L. D. Bale was appointed to represent the association at a meeting of the fuels division of the American Society of Mechanical Engineers to be held in Cleveland, Sept. 17 to 20. W. W. Brown was appointed to represent the association on the advisory board of the Power Transmission Association.

It was voted to endorse the report of the revision conference on classification of iron and steel scrap put out by the Division of Simplified Practice of the United States Department of Commerce. Recommendation No. 71 on turnbuckles was also endorsed.

Power

JUNE 11-12 the final meeting before the Cleveland convention of the standing committee on power was held at association headquarters, New York City. Those present were W. E. Bryan, chairman; C. S. Anderson, J. W. Allen, W. H. Bassett, L. W. Birch, H. W. Codding, H. A. Kidder, John Leisenring, H. S. Murphy, J. F. Neild, F. W. Peters, W. J. Quinn, J. L. Ross, Dwight L. Smith.

Special committee No. 1 on Manual review presented a final report, which has been sent out to the various members of the standing committee for ballot. A revised report on mercury arc rectifiers was presented by special committee No. 2. This will be sent out for approval later.

Due to recent changes in the chairmanship of special committee No. 3 on power costs and power contracts, data have not yet been compiled. A questionnaire has been prepared to be sent to member companies. The questionnaire was discussed in detail and a number of changes suggested. The questionnaire was then referred back to the committee for revision. A formal report on catenary construction was presented by special committee No. 5. Suggestions for some changes were made by the general committee. Special committee No. 6 on trolley wear and breaks reported that it is compiling results of a questionnaire sent to member companies. This information will be in shape for approval soon. Regarding other assignments to the committee, no definite conclusions have been reached.

Special committee No. 7 on inductive co-ordination and radio interference has presented its final report, which has been sent to members of the standing committee. The report was reviewed for further suggestions. Special committee No. 8 on trolley wire reels submitted a formal report. After discussion it was decided that several minor changes were advisable in the drawings of the reels. These will be made and the report sent out for approval.

The report of special committee No. 9 on underground conduit specifications was discussed in considerable detail. It is proposed to substitute revised drawings in place of the present Manual drawings after these have been rechecked. Designs of manholes will be treated as a recommended design.

Special committee No. 11 on overhead versus underground distribution cable presented a progress report, but stated that information following the questionnaire as to cost, operation, etc., of underground and overhead cables was still being received. No conclusions were reached by the committee.

Special committee No. 12 on ferrous versus non-ferrous overhead material, and No. 13 on trolley voltage in congested districts did not present reports.

A program for the various sessions of the power division at the Cleveland convention was agreed upon. These were presented to the program committee and also to the executive committee for consideration.

News *of the* Industry

Cardinal Fliers Organized

Transportation men embark on new venture looking toward cross-country service via the air

TO PROVIDE air transportation from Louisville, Ky., to any point between the United States and Canada within the next few years is the dream of James P. Barnes, president of the Louisville Railway, and Lee L. Miles, president of the Louisville Taxicab & Transfer Company, who recently organized the Cardinal Fliers, Inc. This company caters to general cross-country taxi and sightseeing work and has under negotiations the matter of contract with the United States Government for transportation of mail on its newly developed air routes. At the present time the regular operation consists of handling newspapers for the *Courier Journal* and Louisville *Times* between Louisville and Lexington. Flights have been made by planes of the Cardinal Fliers, Inc., to Atlanta, Philadelphia, New Orleans, Little Rock, Hot Springs, St. Louis, Chicago, Grand Rapids, Detroit, Buffalo and Kansas City, Mo.

The company was originally incorporated, early in March, with a capital of $50,000, but since then the industry has made such strides that at a meeting of stockholders the last of May, the capitalization was increased to $250,000.

The equipment of the company at the present time consists of five open Waco planes and one Fairchild cabin plane. An order has been placed for two additional cabin planes, and one Whirlwind Waco open cock-pit plane, the latter being equipped for night flying. In addition the company is local agent for the Monocoupe, equipped with a five-cylinder radio motor, manufactured by the Velie Auto Manufacturers, and also for a two-passenger cabin plane. The five-passenger cabin planes operate on the basis of 50 cents per air-mile and the three-passenger open plane on the basis of 25 cents per air-mile.

At a municipal election in November, 1927, a bond issue of $2,000,000 was approved by the voters of Louisville, $750,000 of which was for the purpose of park work, including the establishment of a municipal air port in what has been known for several years as Bowman Aviation Field. The company has just been allotted a location in Bowman Field approximately 80x200 ft. for the construction of hangars, and adjacent will be terminal buildings and offices.

The backers of the Cardinal Fliers, Inc., are men of experience in transportation matters. They are anticipating the establishment of cross-country service in conjunction with other commercial aviation companies. At the present time the company is planning the establishment of part air and part rail trips across the country, using airplanes, for instance, from Louisville, Ky., to Omaha, Neb., traveling on sleeper by night for a portion of the journey, and making the final hop to the Pacific Coast by air. As an alternate the combination of commercial air companies has in mind flights by day, possibly from New York City to Louisville, spending the night in Louisville, hopping thence from Louisville to Denver, Col., spending the night in Denver, and hopping the third day to the Pacific Coast.

Lee L. Miles, president of the Louisville Taxicab & Transfer Company, is president of Cardinal Fliers; Saunders P. Jones, capitalist, is vice-president; Houston Quinn, former Mayor of Louisville and vice-president of the Louisville Trust Company, is treasurer, and Miss Mary E. Clines of the Louisville Taxicab & Transfer Company, is secretary.

The board of directors consists of James P. Barnes; Graham Brown; A. H. Bowman; C. C. Webb; W. W. Crawford and J. C. Willson.

Flat Eight-Cent Fare in St. Louis

State commission passes upon plea made originally by receiver of United Railways, since succeeded by St. Louis Public Service. Valuation $60,000,000

THE St. Louis Public Service Company has been authorized by the Missouri Public Service Commission to charge a flat 8-cent fare for adult passengers and a 3-cent fare for children between five and twelve years of age in all of the fare zones of St. Louis and St. Louis County, effective July 1. Eight cents cash or two tokens for 15 cents for adults and 3 cents for children were the former rates. The commission also found the value of the property of the company used and useful for transportation service to be $63,500,000 and the property not used for public service $2,500,000, a total of $66,000,000. This compares with the former valuation of $52,000,000, or an increase of $14,000,000. The commission also allowed the company to charge $800,000 annually for depreciation.

How Contentions Differed

The company, in its application for the higher fare, had sought an 8-cent flat fare, a valuation of $75,000,000, a rate return of 8 per cent and a depreciation allowance of $1,500,000, while the city of St. Louis in resisting the application contended for a fare of 7½ cents, $53,000,000 valuation, a 7 per cent return, and only $1,000,000 depreciation. The commission anticipates that the new fare rates will return the company 7.14 per cent net on the $63,500,000 valuation. This is based on the passenger business of the system in 1927. A continuation of the universal system of transfers was recommended.

On the basis of past experience the commission estimated that in 1928 252,392,464 adult passengers will be carried at 8 cents for $20,191,397 and 6,418,512 children at 3 cents for $192,555, making total gross revenue from passengers $20,383,952.

A recapitulation of the commission's findings shows:

Net revenue available for return in 1927, $2,360,990; estimated increase in revenue, $1,792,740; decrease in depreciation reserve, $700.000; grand total, $4,853,730. From this amount must be deducted the $318,323 increase in income taxes, leaving an estimated $4.525,407 available for dividends.

Explaining its decision to cut the depreciation reserve the commission said:

In view of past expenditures, the present large reserve, and the present physical

Neither Company nor City Satisfied

THE St. Louis Public Service Company on June 28 applied to the Missouri Public Service Commission for a rehearing, contending for a $75,000,000 valuation and claiming that $800,000 annual depreciation allowance is insufficient. The company conditionally accepted the 8-cent fare, but asked a rehearing on the valuation and depreciation items. It said the return should be 8 per cent instead of the 7.14 per cent allowed, and that the commission failed to make due allowances for intangibles and erred in allowing only $3,000,000 instead of $8,700,000 for going value.

City Counselor Muench has stated the city will also ask for rehearing, but did not announce the basis for such appeal. It also probably will attack the $63,500,000 valuation fixed by the commission as too high.

condition of the property, as compared with conditions in the past, the commission is of the opinion that $800,000 is a reasonable and just amount for this company to place yearly in its depreciation reserve fund.

The company has accumulated $8,500,000 in the depreciation reserve.

The commission allowed $3,000,000 for "going value" and $2,042,164 as working capital.

The capitalization of company is $50,843,020, leaving an excess of valuation over capital of $15,156,980.

In arriving at the $66,000,000 valuation the commission took a middle of the road course, as the $63,500,000 valuation on the operating property practically "splits the difference" between the $75,000,000 asked by the company and the $53,000,000 contended for by the city. The set-up is:

Original cost physical property other than land	$49,355,565
Reproduction cost physical property (estimated)	73,392,609
Reproduction cost less depreciation	55,044,457
Land (present fair market value)	4,700,000
Cost of franchises, amounts actually spent	208,522
Materials and supplies	1,442,164
Cash working capital	600,000
Going value	3,000,000
Rate-making valuation	66,000,000

In this connection the commission's ruling in part reads:

The commission is of the opinion that stress should not be put on either the original or reproduction cost of this property. The commission is attempting to fix a value that will keep the car-rider from seeking some other means of transportation and at the same time give the company a return as nearly just as is possible and still keep its customers. The commission believes that an 8-cent adult fare will not produce excessive return.

The estimated net return of $4,535,407, which the 8-cent fare is calculated to produce, is sufficient to pay $1,884,975 interest on all the outstanding bonds and the $494,294 needed for the 7 per cent dividend on preferred stock. This will leave $2,156,183 available for return to the holders of 343,645 shares of common stock, or $6.28 a share. This stock was issued at $12.50 a share, but had an actual valuation of about $18.50.

Under the commission's ruling the book valuation of the common stock has been greatly increased. The total of all the outstanding bonds and preferred stock is $46,547,458. This sum deducted from the $66,000,000 valuation leaves $19,452,542 valuation for the common stock, or $57 a share.

However, the calculations of estimated net return for the company have not taken into consideration any probable increase in wages for the platform men and shop workers affiliated with the Amalgamated Association. The Public Service Commission has been selected to arbitrate the differences between the company and its workers on the wage question. The commission probably will not give its final decision in the wage question for many weeks. Neither side has presented its evidence to the commission.

The St. Louis Public Service Company on June 23 asked the Missouri Public Service Commission to establish an 8-cent fare in each zone on the Missouri Electric Railway operating between Wellston and St. Charles, Mo., and its branch lines, effective July 1. In the past the fare on that line has followed the rates fixed for the St. Louis city lines, which on July 1 advance to a flat rate of 8 cents for adults and 3 cents for children.

S. W. Greenland, vice-president and general manager of the company, believes that the 8-cent fare will produce far less additional revenue than anticipated by the commission. He pointed out that when the state commission fixed the rate at 8 cents or two tokens for 15 cents it estimated that the company's revenues would be increased $1,250,000 a year, but while the period covered in this estimate expires on July 5 present indications are that the increase will not exceed $500,000. The reason has been the progressive decline in street car travel.

The company is also facing higher operating costs due to the demands of the Amalgamated Association for increased wages for carmen and shop workers of from 5 to 10 cents an hour. Company officials estimate that if these demands are met in full the payrolls will increase $1,800,000 a year.

Subway System Suggested in Cleveland

Local railway not committed at present to $30,000,000 project. Plan is to make new line pay for itself out of earnings

THE "penny subway" proposal, first broached two years ago, has come to the front again in Cleveland, Ohio. Raymond Cragin, author of the plan, announced recently that financing is assured and he has submitted to the City Council an ordinance authorizing the Cleveland Subway Company to build subways to cost $30,000,000, to be operated by the Cleveland Railway when complete.

The name "penny subway" is derived from the method of financing. The plan is to allot 1 cent out of each car fare paid the Cleveland Railway for the next 35 years to a fund to pay 6 per cent interest on the $30,000,000 bond issue and at the same time amortize the principal.

A limit of $30,000,000 of construction is fixed because it is estimated that 1 cent on each car fare will produce enough to retire this amount in 35 years with a safe margin on the basis of the average number of fares collected each year by the Cleveland Railway for the last ten years.

Subway routes provided in the Cragin ordinance are:

Two-track subway in Superior Avenue Northwest, connecting with the lower deck of the Detroit-Superior high level bridge and looping under the Public Square.

Four-track subway in Superior Avenue Northwest, starting at East Twelfth Street and with two loops under the Public Square.

Two-track, subway connecting with the East Superior subway at Payne Avenue Northeast, entering Chester Avenue Northeast at East Thirteenth Street and proceeding east under Chester and the proposed Chester extension, connecting with Euclid Avenue surface tracks at University Circle.

If sufficient balance is left in the $30,000,000 fund when these units are built, the following lines will be built under the ordinance:

Two-track subway in Ontario Street from Woodland Avenue Southeast to to the Public Square.

Two-track subway in West 25th Street from the lower deck of the Detroit-Superior high level bridge to a point south of Lorain Avenue, with a branch in Lorain Avenue to a point beyond West 28th Street.

The ordinance provides in addition that the Council may substitute new routes for any of those specified, provided the cost of the new route keeps the total cost within the limit of $30,000,000

The entire $30,000,000 will be furnished by the Equitable Trust Company, New York, Mr. Cragin said. The profits of the Cleveland Subway Company are to be derived from two sources—advertising concessions in the subway stations and the difference between the rate at which it can borrow money and the 6 per cent charge which is to be met by the car riders out of fares.

Under existing provisions of Ohio law, a municipality is not permitted to own stock in a public service corporation furnishing transportation. But if the city ever acquires the right to take title to the subways, it may do so any time after their completion. In the meantime, the title is to be vested in a trustee. But when they are paid for the lines will be the property of the city.

The ordinance also contains provisions that the city may contribute

Bright Red Trains

ALL passenger and freight cars of the Arkansas Valley Interurban Company, operating between Newton, Wichita and Hutchinson, have been painted a bright red and equipped with musical whistles. Officials declare that motorists can see a red car at a greater distance, and the new color therefore should aid in reducing accidents.—*Topeka Capital.*

money from taxation or other sources to the funds used for subway construction, so that the proposed subway system may be extended as the need arises.

OPPOSITION TO THE PLAN DEVELOPS

Opposition to the plan developed even before the ordinance was introduced in the Council. One bone of contention is that the method of financing would place the entire burden of construction on the car riders and that no part of the cost would be paid by automobile drivers and owners of property specially benefited. Opponents of the Cragin plan also have said that if the city intends to assess subway construction costs solely against car riders, the city could direct the Cleveland Railway to build subways and the Cleveland Railway could finance the job through bonds at less than 6 per cent, or issue stock at 6 per cent, which would not require the accumulation of a retirement fund.

The Cragin ordinance cannot go into effect, even if passed by the City Council, unless it is approved by the Cleveland Railway. Officials of that company were unaware of the details of Mr. Cragin's plans until they were announced in the newspapers. Joseph H. Alexander, president of the company, has declined to comment on the plan, beyond saying that the company had not been consulted and had not entered into any commitments.

McGraw-Hill and Shaw Company Merge

Consolidation affects twenty engineering and industrial papers and "Magazine of Business," "System" and "Industrial Distributor and Salesman"

A CONSOLIDATION affecting two large publishing interests was brought about on June 29 by the merger of the McGraw-Hill Publishing Company, Inc., of New York and the A. W. Shaw Company of Chicago.

Two reasons for the merger are stressed by the officers of the merging companies. The magazines of the two organizations are complementary in character. The Shaw papers cover business broadly, giving the business man an understanding of what is going on in all branches of trade, industry and finance. Their service is extensive in character. The McGraw-Hill service, on the other hand, is intensive. Its magazines afford a highly specialized service to given major industries and to related industrial groups. Thus the consolidated companies serve the business man in both his general and special business interests. The second reason is the very evident economy and increased effectiveness of consolidated operation, enabling a superior service to be rendered to the whole sweep of American business. A statement by Mr. Shaw said:

It is gratifying to me after long years spent in developing the Shaw publications to have them put together with the strong group developed under Mr. McGraw's leadership. The combination will strengthen both groups. *The Magazine of Business* and *System* cover broadly the problems of all business, and exchange knowledge between its different divisions. The McGraw-Hill papers specialize on the problems of a dozen or more major branches of industry and trade. The advantages of joint control of these related but differing publications is apparent.

The merger comes at a particularly gratifying time, when the Shaw organization, following a plan long contemplated, is re-establishing *System*, the pioneer general business paper and for more than 25 years the guide, philosopher and friend of tens of thousands of men conducting the smaller businesses of this country and the administrative work of the larger ones.

In his comment Mr. McGraw said:

Mr. Shaw's organization and ours have been working closely together for more than a year. It was apparent that the McGraw-Hill group of industrial and trade papers would have a new way of carrying the message of common business problems if it was allied with papers like *The Magazine of Business* and *System*. At the same time these publications would be immeasurably strengthened by being tied in with and assisted by the great editorial staff of more than 130 industrial and business specialists who edit the McGraw-Hill papers.

Every paper of the merging companies will be strengthened by the consolidation, and thus render greater service to its readers and advertisers, but the most conspicuous result will be the new and strong position of *The Magazine of Business*. Through Mr. Shaw's vision and courage it is a magazine of strength, standing and influence. It now becomes the capstone of the virile group of papers and the other publishing activities of the McGraw-Hill company, thus extending the scope of the latter organization to the whole range of American business. At the same time, drawing on the intimate contact with trade and industry of the large corps of McGraw-Hill specialist editors, it will speak with unexampled authority on the problems of business. It will be able to render an outstanding service to the business men of America by its authoritative information, its expert interpretation, and its fearless advocacy of sound business policies. It will fight for the interests of business but it will place in an equally important position the responsibility of business to the public. It will, in a word, stand for true business statesmanship.

A. W. Shaw will continue as chairman of the board and James H. McGraw will become president of the A. W. Shaw Company. Mr. Shaw will also become a director of the McGraw-Hill Publishing Company, Inc., and will continue as president of the McGraw-Shaw Company. Mr. Wheeler Sammons will become a director and member of the executive committee of the McGraw-Hill Publishing Company and senior vice-president and general manager of the A. W. Shaw division of the business, which will be known as the "A. W. Shaw Company, a division of the McGraw-Hill Publishing Company, Inc." The McGraw-Shaw Company will also be operated as a division of the McGraw-Hill Publishing Company.

The Shaw organization publishes *The Magazine of Business, System,* and *Industrial Distributor and Salesman,* while the McGraw-Hill organization is the publisher, either directly or through subsidiary and affiliated companies, of more than twenty leading business papers, and of engineering and business books. Among its papers are ELECTRIC RAILWAY JOURNAL, *Bus Transportation, Electrical World, Engineering News-Record, Power, American Machinist Engineering & Mining Journal, Chemical & Metallurgical Engineering* and *Radio Retailing.*

The two companies have had a close relationship since last fall when they jointly formed the McGraw-Shaw Company, which publishes *Factory and Industrial Management* and *Industrial Engineering.*

Another Strike Vote in Connecticut

A strike of employees of the Connecticut Company, New Haven, Conn., was scheduled to begin at midnight June 24, but was postponed. It was given out by those interested in affairs of the employees that a new vote would be taken at once on the matter of going on strike, as it was explained that many voted in favor of a strike without knowing it. The next vote will involve the simple question to each voter: "Are You Willing to Go on a Strike?"

J. T. Reardon, Worcester, Mass., international official of the Amalgamated Association, explained the decision to hold the strike in abeyance was due to a misunderstanding of the ballot on the part of the men. Another ballot was desired now so there would be no further misunderstandings.

The Connecticut Company offered a renewal of the wage agreement, which terminated on June 1. The wage demands call for an increase from 62 to 75 cents for both men on the two-man cars and proportionately more for one-man operators.

Committee Will Solve Boston Problems

Under an order adopted by the Massachusetts Legislature, after such action had been requested by Governor Fuller in a special message, a special committee of four senators and eleven representatives has been appointed to draft new legislation for the solution of the Boston Elevated Railway problem in Boston. The public hearings were started on June 21, but the public failed to respond and the committee then went into executive session. The committee will now study material at its disposal, such as reports and plans, and formulate a bill to submit to the Legislature which is waiting to receive it.

Progress in Toledo

Toledo's new transit plan, which provides for a monopoly of bus and railway service under the Community Traction Company, operation for at least five years, establishment of at least fifteen bus lines and extension lines, and a general rehabilitation program in addition to financing and power rate helps for the company, will probably go into effect on July 5 without interference.

Officials of the company have closed options for the purchase of the Ottawa Motor Coach, Inc., which operates fifteen buses, and for the Elm Street line, which has been operating eight buses. The new plan prohibits an independent line from operating within a quarter mile of any company-operated service and it is now believed that since the two most important independents have been purchased there will be no referendum on the ordinance and no challenge made by any of the smaller operators.

The Community Traction Company, had previously agreed to a plan of purchasing all independent bus lines at their physical value as determined by an independent commission appointed by Mayor William T. Jackson. Serving on the commission are James Aitken, radio dealer, Ben Groenewold, who is in the storage business, and Walter Stoepler, who is in the coal and cartage business. They have valued several of the properties but owners of the bus lines have been closing with the railway before announcement of the valuations.

The new power rate specified under the agreement has been approved by the Ohio Public Utilities commission. It provides for a refund to the railway of $2,500 monthly by the Toledo Edison Company, for five years, and a new rate on a flat basis of 1.25 cents per kilowatt hour measured on a.c. basis without any demand or service charge.

North Shore Summer Trips

Special excursion trains are being operated by the Chicago, North Shore & Milwaukee Railroad each Sunday during the summer months between Chicago and Kenosha, Racine and Milwaukee, Wis., according to the new "bargain rate round-trip" policy announced by North Shore Line officials. The excursion specials leave Chicago and Milwaukee early in the morning and make the return trips late in the evening. This gives all those taking advantage of the special rates almost a complete day in whatever city they choose to visit. All-steel equipment is used on the excursion trains. Descriptive literature dealing with the various cities on the schedule is distributed to passengers en route.

In addition preparations have been made by the North Shore Line to furnish special service direct to the gates of Ravinia Park during the summer opera season. For the convenience of Chicago and suburban residents a special train will be operated each evening during the opera season, arriving at Ravinia Park just before the program starts and leaving immediately after the performance. Chicago and suburban music lovers will also be afforded special facilities for reaching Ravinia Park on regular trains, according to an announcement by J. W. Simons, superintendent of transportation.

Special opera tickets, including round trip fare and admission to Ravinia Park, may be secured at North Shore Line stations. Tickets for seats in the open-air theater must be obtained through the opera ticket office.

Reduced Mileage Books in South Bend

A reduction of 15 per cent in the price of commutation mileage books between any two stations on the system has been announced by the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind. Books containing coupons worth $5 in straight cash fares may now be purchased at $3. The old rate was $3.75.

New York Surface Lines Asks Increase

The Dry Dock, East Broadway & Battery Railroad, New York, has applied to the Transit Commission for a 7-cent fare, effective as of July 24. The 7-cent fare schedules were referred by the commission at its meeting to Clarence M. Lewis, the commission's general counsel, for an opinion. The current fare is 5 cents.

The outstanding stock of the Dry Dock, East Broadway & Battery Railroad is owned by the Third Avenue Railroad. The Dry Dock operates from 6 to 8 route-miles of road in the East Side district of New York City.

The Drydock, organized in 1863, operates under a franchise granted by the Legislature under the railroad laws of 1860. Inasmuch as company functions under a franchise, the status of the present application differs from that of the Interborough, which is operating under a contract with the city. If the commission decides it has jurisdiction in the matter, it may suspend the increased rates and hold hearings on the justification for a higher fare.

Excursion Rates in Indiana

Permission to establish for a trial period a reduced "excursion" fare of 50 cents between Gary and Valparaiso, Ind., was granted recently by the Indiana Public Utilities Commission to the Gary Railways. The new rate, which will become effective July 1, is, in fact, a one-way fare and represents a reduction of 10 cents below the former single-trip rate. A corresponding reduction will be established at the same time between Gary and intermediate points on the Valparaiso interurban line and a cut from 24 cents to 15 cents in the regular one-way fare between Gary and Indiana Harbor. The new tariffs will in no way affect or supercede the 25-cent Sunday pass established by the company on all lines last spring.

Upholds Fare Increase in Philadelphia

The United States District Court has ruled the Public Service Commission has a right to grant the Philadelphia Rapid Transit Company, Philadelphia, Pa., increases in fare notwithstanding the 1907 agreement which stipulated a 5-cent fare. In reaching this ruling, the court dismissed an equity suit of George Sambor and John J. Mullin, taxpayers, for an injunction to restore the 5-cent fare and a refund to the city of $79,800,000 in fares.

Complainants previously had said they would appeal the case to the United States Supreme Court.

Hearing Set on Omaha Franchise

City Commissioners of Omaha, Neb., have set July 2 for a public hearing on the Omaha & Council Bluffs Street Railway franchise. The Council itself has agreed to the franchise in its present form. It calls for an election on Nov. 6 on the question of granting a 30-year franchise. The only change suggested by the Council from the draft as agreed upon between the corporation counsel and the Company is that the Council retain the control of stopping places for cars. This has reference to the skip-stop system, which the patrons, in a straw vote, recently decided to retain.

"When I accept this franchise," said President Shannahan, "I marry it; I accept it for better or for worse. The corporation counsel has included a provision that obligates the company to co-operate with the city in carrying it out. I enter into the agreement with no other purpose in view."

$9 Monthly Pass on Pacific Electric Suburban Line

The Railroad Commission on June 20 by informal action authorized Pacific Electric Railway, Los Angeles, Cal., to establish on less than statutory notice, effective July 1, a $9 monthly pass good for bearer and for any number of rides between Los Angeles and Santa Monica, Ocean Park and Venice.

The present 60-ride commutation fare is $11.65. The pass therefore will result in a reduction of $2.65 a month, in addition to giving the pass owner the privilege of additional transportation. The pass will be honored via either the Venice short line, Sawtelle line, or Hollywood-Venice line, and also be good on local street cars within the first zone of Los Angeles and within the 5-cent zone of Santa Monica, Ocean Park and Venice.

This reduced transportation is similar to the monthly pass now in effect between Los Angeles and Pasadena, and is established for an experimental period, July 1 to Oct. 31, 1928.

A New Start in Chicago

Important change of procedure relied upon to bring success in committee's effort to reach satisfactory agreement

THE City Council of Chicago and representatives of the local transportation companies will join forces in a new attack on the baffling railway problem. Instead of seeking to obtain enabling legislation first and afterward drafting an ordinance, as contemplated in previous negotiations, the new plan will be to determine the basic principles and features of a satisfactory ordinance. These points will then be drafted into an ordinance and submitted to the voters next November. If then approved by them the ordinance will be presented to the Legislature at the session in January, 1929.

This decision was reached on June 21 at the conclusion of a conference between members of the Council's committee on local transportation and officials, attorneys and bankers for the Chicago Surface Lines and the Chicago Rapid Transit Company.

A sub-committee of Aldermen is to be appointed to represent the city in the new negotiations. The same committee will probably be asked to draft, in cooperation with company representatives, the enabling legislation to be presented jointly by the city and companies to the General Assembly. On previous occasions, enabling bills have been presented independently, first, in June, 1927, by the companies, and last May by the city, both sets of bills having been allowed to die in the Legislature.

With the resumption of franchise discussions in the City Council, prospects for the construction of a downtown subway system in the near future have once more begun to brighten. The latest move in this direction was a request by Michael J. Faherty, president of the board of local improvements, for an appropriation by the City Council of $647,000 to finance the preliminary work of planning the underground system. This money would be spent for engineering and legal aid and for the building of a $25,000 model subway to be used in the trial of special assessment cases in court. Maintaining that a subway is, in reality, a lower level street, Mr. Faherty believes that it can be built and paid for like any other local improvement by special assessments and without additional legislation.

Consideration of Mr. Faherty's request for an immediate appropriation was continued until the next meeting of the Council on the plea that it would be unwise to build a subway without first obtaining a tenant.

A movement to have private citizens undertake the solution of the transit problem—entirely apart from the new program adopted by the City Council and transportation companies — was started on June 15, when invitations were sent out to some 40 civic, commercial and educational organizations of Chicago by the City Club asking them to co-operate on the plan. Each group was asked to send two representatives to a conference sponsored by the City Club, who will be willing to devote a large share of their time for the rest of the year to study the various angles of the problem and to devise "a comprehensive, sound and business-like traction program."

The citizen's committee plan is in answer to the suggestion made by certain Aldermen that they would be glad to receive aid and advice in the settlement from public-spirited citizens. The committee will merely propound principles which it feels should be followed.

Illinois Franchise Will Go Over

The St. Louis, Mo., Board of Public Service on June 22 approved the proposed 50-year franchise for the Illinois Terminal System which provides for a subway and elevated system connecting the McKinley Bridge with a new freight and passenger terminal at Twelfth Boulevard and Lucas Avenue. Improvements planned by the McKinley System would cost $5,000,000. The company would have the right to handle carload freight in St. Louis under the new franchise. It is restricted to package freight at present. On June 28 the Board of Aldermen voted to recommit the bill. This delays action on the measure until the fall as the Aldermen start on vacations June 30.

Queens Road Wants Six-Cent Fare Continued

General Lincoln C. Andrews, receiver for the New York & Queens County Railway, Long Island City, has applied to the New York Transit Commission for permission to continue to charge a 6-cent fare on the lines of the company. The present permission to charge the extra cent expires on July 1. The company has been charging the extra fare for nearly three years. General Andrews says the extra cent means a difference between operating at a loss and making expenses.

News from Houston

HOUSTON, TEX., June 24, 1928—Houston *Chronicle* today states "after careful survey among metropolitan newswriters here, Hope's new political guide to Washington is awarded first place among political pieces of the month. The prize, a palmetto fan, a pair of slightly used bedroom slippers and a Houston Electric Company street car token will be delivered to Mr. Hope, the author of "Alice in the Delighted States," by A. S. Draper, of the *Herald-Tribune*, and O. O. McIntyre following the convention." — New York *Herald-Tribune*.

Railway Station in New York Off the Air

S. W. Huff, president of the Third Avenue Railway, New York, has informed Radio Commissioner Caldwell that Station WEBJ, belonging to that railway, is "prepared voluntarily to discontinue operation."

This station is relinquishing its broadcasting license to aid the Radio Commission to clear the air, and was not one of the 162 stations ordered off the air in the New York zone.

Mr. Huff wrote that the station was established for broadcasting safety campaigns, the relations between the public and the transportation company, relations between the employee and employer, and kindred subjects, along with sufficient entertainment to carry the more serious subjects, that it never entered the advertising field and that it was not operated more than six hours a week. Mr. Huff said:

I may add that we have taken an active part in the scientific work of radio development. Our electrical engineer is chairman of the committee of the American Electric Railway Association for the study of radio interference and we have been making a number of investigations to determine the causes and possible remedies of interferences derived from street railway currents, and we shall continue this research work, although we are no longer in the broadcasting field.

Commissioner Caldwell has expressed to Mr. Huff the appreciation of the Radio Board for his "public spirited action." Mr. Caldwell's letter concludes:

Your willingness to adopt the course indicated certainly deserves the commendation of the local millions of listeners who will benefit. It is to be hoped that this fine and unselfish example of your company will be voluntarily followed by other broadcasters in the metropolitan area, to the end of helping the commission solve its difficult problem of clearing the ether channels for good radio this fall and winter.

San Francisco Casts Longing Eyes at Private Road

The public utilities committee and the finance committee of the Board of Supervisors of San Francisco, Cal., on June 20 considered the expiring franchises of the Market Street Railway and instructed City Attorney O'Toole to file suit at once to establish the date of expiration, the city contending it is September, 1929, and the railway contending it is 1932. Mr. O'Toole has also been asked to report what legislation is needed for the city to take over the Market Street Railway system.

According to Mr. O'Toole three things are necessary: placing valuation on the properties of the Market Street Railway, studying the elimination of Market Street Railway lines, and having a conference with California Cable Car Company officials on properties to take over. The city attorney was authorized to go ahead with his work in this connection, for which a $30,000 budget has been appropriated.

Foreign News

Japan Opens Subway

First city in Orient to resort to underground system for traffic solution

WITH the opening of the first link of an underground subway system to the public in December, 1927, Tokyo, Japan, is the first city of the Orient to adopt the subway as a means of solving traffic problems. The enthusiasm of the populace over the inauguration of what was to them a most novel scheme of travel was so great that close to 100,000 passengers crowded the trains and stations on the opening day, and many rode repeatedly back and forth.

The new subway, which is about 1½ miles long with two intermediate stations, connects two thickly populated sections of Tokyo for which surface lines had become inadequate, the terminals being at Uyeno and Asakusa, popular pleasure resorts. In their construction and equipment, the engineering features and general appearance are very similar to those of the subways of New York City. The excavation was open cut, roofed over with steel. It is of rectangular section and is located comparatively near the surface. The stations, even to the set spaces for advertising on the walls, are like those of New York City, and similar automatic turnstiles are used. The fare is 10 sen (4.6 cents). The possibility of earthquake disturbance received due consideration in the planning, and extra precautions were taken.

The subway was built by the privately owned Tokyo Underground Railway. The second part of the system, consisting of 1.3 miles between Uyeno and Manseibashi Stations, is now under way and will be open for traffic in about a year. The cost of the latter section will be about 3,000,000 yen ($1,300,000), or less than two-thirds of the cost per mile for the first section, owing to more favorable terrain and as a result of the experience gained in the construction of the first section. When the other sections under contemplation are finished the entire city will be traversed and traffic will be facilitated between the outskirts and the business center of Tokyo.

The tunnel is 12 ft. high from the rails, 24 ft. wide, increasing to 36 ft. at the stations. It is double tracked with 100-lb. rails, 4 ft. 8½ in. gage.

Ten all-steel cars make up the initial rolling stock. These were built in Nagoya by the Nippon Sharyo Kaisha and their motors and control equipment were made by the General Electric Company. Each of the cars has two 120-hp. motors, and the maximum speed is 35 m.p.h., the schedule speed being 15½ m.p.h. Lighting equipment and accessories were furnished by the Tokyo Electric Company. The seats are longitudinal, and for standing passengers there are enameled metal hand loops overhead which swing away from the center of the aisle when not in use. Each car accommodates 40 seated passengers and 80 standing.

Two 1,000-kw. rotary converters in the substation supply the 600-volt direct current. The transformers were supplied by the Shibaura Engineering Works. To insure continuous operation the substation is provided with two different sources of power supply and the lighting and signal equipments have three sources of supply.

New Rolling Stock for London Underground Railways

Contracts have been placed for the following new equipment for the London Underground Railway companies, London, England:

For the Metropolitan District Railway, 101 car bodies, 184 trucks, 538 traction motors, and 263 control equipments.

For the Charing Cross & Hampstead and the City & South London Railways, 112 cars, 224 trucks, 128 traction motors, 127 control equipments, and 170 car bodies.

For the Baker Street & Waterloo Railway, 162 cars, 116 traction motors, and 57 control equipments.

Beside the above, 136 car bodies, 612 bogies, and 266 traction motors have been ordered conjointly for the Charing Cross & Hampstead, the City & South London, and the Great Northern & Piccadilly Railways, and 67 control equipments for the last-mentioned line.

With the exception of the 112 cars for the Hampstead line, the whole of the above will replace old cars now in service. It is hoped to have a large proportion of the new equipment in service by the end of this year, and the remainder early in 1929. All the orders have been placed with British firms. The new cars will be fitted with air-operated doors, in place of the gate system.

London Season Ticket Arrangements

To simplify purchase of season tickets on the London Underground Railways, London, England, the companies have decided that all season tickets will be issued from the station booking offices beginning July 1, just as are ordinary tickets. It will no longer be necessary for the passenger to call at appointed season ticket offices or to await tickets at their home stations sent from those offices. There has recently been a remarkable growth in the number of season tickets issued, and it is expected that the new arrangement will lead to further increase.

Bow Trolley Experiments

In Great Britain practically no use has been made of the bow collector for tramcars, the ordinary wheel trolley being in general service. On the continent of Europe the bow is better known. Two leading British municipal tramway authorities now intend to try it out. Birmingham is equipping 50 cars with the bow, and Glasgow is about to experiment on a somewhat smaller scale.

Spanish Railways Contemplate Electrification

Electrification of certain mountain sections of the Spanish railways and part of the Catalan system where traffic is intense, amounting in all to 1,200 miles, is now under consideration by a committee in Madrid, Spain. The committee expects to make its report within three months. The Minister of Public Works has set aside 300,000,000 pesetas (approximately $50,000,000) for electrification, in the extraordinary budget of national reorganization.

The sections to be electrified are about 350 miles in the Norte system, and a somewhat shorter mileage in the Madrid-Alicante system. The latter sections are in the Pyrenees and in Catalonia.

Success of the electrification of the Pajares Tunnel, which includes very steep gradients, has encouraged the Spanish railway companies, although it is not expected that the substitution of electric traction for steam will prove equally advantageous everywhere in Spain. This is what the committee has to determine, and its task is difficult owing to the lack of comparable statistics.

Successful electrification in Spain is largely linked with the creation of a power belt around the whole country. This great work is being considered by the Ministry of Labor, which is collecting data and inviting technical proposals. It is stated that two American concerns are among the firms which through Spanish associates are undertaking to advise the Ministry. This power belt would tap water power or the so-called "white coal" in the Pyrenees and Cantabrian mountains and on the Ebro, Duero (as arranged in the recent Hispano-Portuguese agreement), Tagus and Guadalquivir and, finally, the brown coal deposits in the Teruel region.

Pending the fulfillment of the more elaborate program, it seems certain that the Spanish railways will continue to electrify such sections as may be feasible.

Improvement on German State Line

Single-phase motor-car service has been begun by the German State Railway system between Leipzig and Halle and between Leipzig and Magdeburg, 23 and 77 miles apart, respectively. The service is for local passengers, and is given by two-car trains. The through trains are hauled by electric locomotives.

Recent Bus Developments

Increased Fare Sought on Washington Suburban Line

An appeal for relief in the form of a 10-cent cash fare, or three tickets for 25 cents for the bus line operating on Bladensburg Road, between Fifteenth and H Streets Northeast, Washington, D. C., and Laurel, Md., has been made to the Public Utilities Commission by William F. Ham, president of the Washington Railway & Electric Company. The new schedule contemplates the issuance of free transfers between the buses and the cars on the payment of a 10-cent cash fare. Ticket users would be required to pay 2 cents additional for a transfer.

The existing rates of fare on the Bladensburg bus line are the same as those on the car lines of the railway. Free transfers are issued between the buses and the street cars at Fifteenth and H Streets Northeast under a five-year agreement between the commission and the company, which expired on April 11.

Mr. Ham's plea for a higher bus fare was made at a public hearing called specifically by the commission to determine whether the transfer arrangement contained in the five-year agreement should be disturbed. He declared that the bus line suffered a loss of $44,511 in the five-year period, beginning April 11, 1923, when buses were substituted for rail service on Bladensburg Road.

Bus Line Rearrangements Look to Unification

What is believed to be a long step toward the ultimate unification of all methods of local transportation in Cincinnati, Ohio, was announced on June 22 by E. D. Gilman, public utilities director, in the transfer by purchase of a number of bus lines, in the securing of one independent competitor by the Cincinnati Street Railway and in the effacement of one company from the field. This result is a partial accomplishment of a plan set up in the Beeler report, urged by C. O. Sherrill, City Manager, and other officials for co-ordination that will include later operation of the municipal rapid transit system.

The transfers of bus properties are expected to avoid destructive competition and to provide a better distribution of lines serving sparsely settled territory. The Cincinnati Street Railway is to purchase the Cincinnati, Hamilton & Dayton Traction Company's bus connection from the Blue Bus Company, a connection operated from Government Square, in the heart of the city, to the interurban traction terminal on Spring Grove Avenue, a distance of about 6 miles. The Mount Airy line, serving a sparsely settled community, operated by the Cincinnati Street Railway, is to be taken over by the City Transit Company, an independent. City Transit will also obtain from the Blue Bus Company five other lines feeding suburbs. All changes are to be effective July 1.

In commenting on the changes, Walter A. Draper, president of the Cincinnati Street Railway, said:

The rearrangement of certain bus lines is a step in the direction of unification of operations. I have several times expressed the opinion that while complete unification is logical and ultimately desirable, the time had not been reached when this should be brought about, because, in my opinion, it can be accomplished gradually at less cost to the railway system (which is the car-riding public of Cincinnati) than if it were done immediately.

The Beeler report recommends such unification as one of the necessary steps in connection with the operation of the Rapid Transit line. The changes secured by the city are all in this direction and will materially help the whole transportation system. It is a practical recognition of the soundness of the theory of unified operation.

Detroit Buses Run at Loss

Expert Mayo assigns cause to pioneering nature of lines. Suggests bids for 50 vehicles be rejected and new proposals called for 67 40-passenger autos

WITH administrative and overhead costs of the Detroit Department of Street Railways properly allocated between the rail and the coach lines the loss for the motor bus division for the year 1927 was $260,492. This is shown in a report submitted to members of the Street Railway Commission by William B. Mayo, advisory engineer for the D. S. R.

The report was prepared for the commission as the result of a survey of bus operating and bus accounting systems, ordered by Mayor Lodge and the commission on March 12, 1928, at a session of the commission at which Commissioners Gorman and Barlum questioned the correctness of figures on the cost of bus operation in the monthly report of William M. Hauser, then auditor of the D.S.R. Mr. Gorman said that Mr. Hauser's figures for cost of bus operation for February, 1928, given as 25.12 cents a mile were too low and that the real figure was nearer 34 cents a bus-mile. Mr. Barlum pointed out, however, that since many of the department's motor coach lines are pioneering into new and undeveloped territory they are not expected to show a profit.

In his survey of motor coach operations Mr. Mayo was assisted by H. M. Gould, former assistant general manager of the D.S.R. Mr. Mayo is chief engineer of the Ford Motor Company and is a former general manager of the D.S.R.

The occasion for the desire for verification of figures of bus operation arose in connection with the consideration of bids submitted to the department on Feb. 23 for furnishing 25 to 50 new buses. In his recent report Mr. Mayo recommends that the former bids be rejected and that "for reasons of economy in operation," sixty-seven 40-passenger street car type coaches be purchased for use as follows: on the Plymouth line, eight; Ford-McGraw line, eleven; Livernois line, twenty-two; Conant line, seventeen; and for spares, nine.

It is further cited that by rejecting the bids now under consideration, a more careful consideration will be permitted of the specifications under which additional equipment is to be purchased, "a reasonable stipulation in the light of recent developments in coach construction."

The report states that the success of the bus enterprise is premised on a knowledge and proper application of production costs.

Sections of the report are quoted as follows:

Because of the distribution of population in the outlying sections of the city, some of the D.S.R. coach lines are of a pioneering nature and will continue to be so for some time, and any default accruing from such operations must necessarily be offset by a profit from coach lines in more settled districts or else from the rail lines.

There is nothing new in a situation of this kind as the same condition exists in respect to rail lines serving sparsely settled districts not only in Detroit but elsewhere. Business principles dictate that the number and amount of pioneering lines should be kept to a minimum, unless some form of subsidy is forthcoming, such as a direct contribution from the party or parties desiring the operation of such lines, or an indirect subsidy in the form of a general fare increase.

That D.S.R. motor coach operations comprise about 20 per cent of the department's activities is set forth, and it is stated that it might properly be expected that the former would bear a proportion of the interest, sinking fund and managerial charges, which is not now the case.

$260,492 Bus Loss

It is in the setting of these proportionate costs against bus operation in 1927 that the Mayo report shows a loss of $260,492, for the year in the motor bus division, whereas the department's financial statement for the year ending Dec. 31, 1927, shows "there is an inferred profit amounting to $231,656 from coach operation. Mr. Mayo says:

Not only should the proper allocation of costs be made between the rail lines and the coach lines, but it should be determined which lines are paying their way and which are not. This refers to both the rail and coach lines, but more especially to the

latter, as they are used to a great extent in a pioneering type of service with a tendency for such use to increase because of a shifting in population to the outlying districts.

In referring to individual lines the report states that by allocating proportionate costs for insurance, interest, sinking fund, etc., the Chalmers line actually operated at a loss of $17,190 and similarly the Livernois line showed a deficit of $14,768 rather than a net profit of $19,893. The Chalmers line, as shown in the department's financial statement, showed a profit of $50,127.

In regard to the uses to which various types of coaches might be put the report says:

The 21-passenger coach has a definite use in sparsely settled territory and also in some thickly settled territory where frequent headway is necessary or desirable. The 29-passenger coach is the logical vehicle where the 21-passenger coach does not give the requisite capacity, while the 40-passenger and the 61-passenger coaches are admittedly for use where the loading is concentrated. For the economical use of vehicles continuous research should be made of population, traffic and transportation trends.

Mr. Mayo recommends that the Jefferson Avenue express service, now running between St Antoine Street and Lillibridge Avenue be extended easterly 2 miles to the city limits and that after a suitable trial period a plebiscite be taken to ascertain the opinion of the riders. Here the report says:

If it is found that the cost of such service is greater than street car service alone, the plebiscite might also be employed to ascertain the reaction of an increase in the fare to cover the extra cost of a faster service.

The shifting of population to the outlying districts warrants a faster service than that given by any vehicle stopping five to eight times per mile, and a faster service if it costs more, warrants a higher rate of return.

Figures are available which show that the per capita riding of mass transportation vehicles is decreasing, thereby making it necessary to employ means other than those used in the past if such vehicles are to retain their position in the transportation field.

Schedule changes, the elimination of certain outlying coach lines, or their amalgamation with other lines are contained in the engineers' suggestions and recommendations in the report cover shop and garage services, time keeping and material issuing methods, with recommendations for cutting costs and eliminating duplication of effort.

Trial Operation on St. Joseph Line in Prospect

Motor coaches will be operated parallel to the Grand Avenue car line of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., starting about July 1, according to Fred E. Henderson, superintendent of the railway department. A permit to operate the coaches for 60 days was asked by the company and granted by the City Council, and the company is now awaiting the arrival of the new equipment. Three coaches will be operated at the regular street car fare, with transfers acceptable on all street car lines except Grand Avenue.

Extension of New Jersey Bus Service

The Port Authority of New York announced on June 27 that the two new bridges between Staten Island and New Jersey would be opened officially for traffic at 5 a.m. the following day.

At the same time the Public Service Interstate Transportation Company announced that it would operate bus lines between St. George and Elizabethport and Perth Amboy over the new bridges beginning June 29.

By acquiring the crosstown service and the Paterson-Lodi bus lines the Public Service Co-ordinated Transport now controls every passenger bus operating wholly within Paterson. Both of these companies are affiliated with the Public Service Corporation of New Jersey.

Competitive Rights Sought

Chicago Motor Coach Company's petitions for 100 miles of new routes being heard by Illinois Utility Commission

PLANS for a major expansion of the lines of the Chicago Motor Coach Company to cover approximately 100 additional miles on 40 streets in all sections of the city of Chicago are involved in hearings now being conducted by the Illinois Commerce Commission in Chicago.

Three petitions for certificates of convenience and necessity, one each for west, north and south side extensions, are being heard one by one in a series that is expected to extend through most of the summer. With its present 145 miles of route mileage, the Chicago Motor Coach company would, in case the applications are granted, operate a total of 245 route-miles. The motor coach company operates 456 single and double-deck buses at present and is adding to its fleet each month.

The Chicago Surface Lines and several city Aldermen have been attempting to obtain permission from the commission to operate buses on many of the same street as a part of, and in supplement to, the surface lines system with a 7-cent fare and free transfers to connecting car lines.

In a similar project contemplating bus service on Addison Street between Sheridan Road and the west city limits, for which privilege both the motor coach and surface lines companies had applied, the commerce commission last month granted the petition of the bus company.

The legality of the right of the Illinois Commerce Commission to empower bus lines to operate in Chicago streets without a franchise has been pending in the Illinois Supreme Court for more than two years.

Bus Extension Planned by East St. Louis Company

The East St. Louis & Suburban Railway filed with the Illinois Commerce Commission at Springfield, Ill., on June 21, three applications for permission to abandon electric railway service in St. Clair and Madison Counties and substitute buses. The company would abandon electric railway service from the northern city limits of Collinsville to Edwardsville; through service from Collinsville to Edgemont, and all passenger service from St. Louis and East St. Louis to O'Fallon and Lebanon, Ill., via Edgemont and French Village. It has also asked the right to take up its tracks between Collinsville and Edwardsville from French Village to Long's Junction, on the outskirts of Collinsville, and from Lebanon to O'Fallon.

Simultaneous with these applications the Blue Goose Motor Company, Inc., the bus subsidiary of the railway, filed requests to operate bus service from Collinsville to Edwardsville, from Edgemont to Collinsville and the Eads Bridge station in St. Louis, Mo., through East St. Louis via Eighth Street, St. Clair Avenue and Illinois Highway No. 12 to French Village, O'Fallon and Lebanon, Ill. This company now operates a de luxe motor coach service from the Eads Bridge station to Belleville, Alton and Vandalia, Ill.

Hollywood Board Wins on Improved Services

A petition of the Hollywood, Cal., Chamber of Commerce for a permit to operate a crosstown bus service in Hollywood, Cal., was denied by the Board of Public Utilities on June 19. The board did grant permits, however, for crosstown extensions totaling 6 miles, to the Los Angeles Railway and Pacific Electric Railway motor coach divisions with the approval of the Hollywood Chamber of Commerce.

North Shore Feeder System Transferred to Subsidiary

The Metropolitan Motor Coach Company will, on July 1, take over the extensive motor coach service of the Chicago, North Shore & Milwaukee Railroad. In the official announcement on June 26 Fred A. Klock, general manager of the Metropolitan system, said: "We will continue to operate coaches over established routes on regular schedules as cross-country feeders to North Shore Line trains. Bringing the bus lines under a centralized management, however, will permit of more efficient operation such as should be of great benefit to motor coach patrons."

Service of the Metropolitan Motor Coach Company has been restricted in the past to the operation of coaches on limited schedules between the Chicago Loop and downtown Milwaukee. Upon taking over the North Shore

Line's bus facilities it will extend its operations over twelve routes connecting North Shore communities with principal resorts in the northern Illinois and southern Wisconsin lake regions and important communities to the west of the rail lines. The Metropolitan Motor Coach Company operates the popularly known "Marigold Coaches." All the coaches of the Metropolitan system are painted goldenrod with green trim and bear the monogram reading "Marigold Coaches—Metropolitan System."

Other companies included in this network of motor coach lines serving communities throughout the Chicago metropolitan area are: The Western Motor Coach Company, operating coaches between Chicago and western suburbs in the Fox River Valley; the Niles Center Transit Company, furnishing service between Chicago and suburban points to the northwest; the Northwestern Transit Company, operating local bus service in Oak Park, Ill., and the Evanston Bus Company, furnishing local coach service in Evanston, Ill. The new Union Bus Depot, at Roosevelt Road and Wabash Avenue in the downtown section of Chicago, is the main terminal for all coaches of the Metropolitan system operating in and out of Chicago.

Service Between Joliet and Chicago Arranged

The Chicago & Joliet Transportation Company, the Illinois Traction System and the Alton Transportation Company, the first and the last bus subsidiaries of electric railways, have been granted certificates of convenience and necessity for the operation of bus routes which will hook up a Chicago-St. Louis through schedule and are believed to be a forerunner of the granting of one certificate, covering the entire route, to one of the companies, as soon as satisfactory schedules and agreements are worked out among the three transportation concerns.

The Chicago & Joliet will run between Chicago and Joliet, the Alton Transportation between Joliet and Carlinville and the Illinois Traction System from Carlinville to St. Louis. The franchised companies plan to establish from two to four buses each way daily within the next 60 days with more frequent trips between the Joliet and the Chicago terminals.

Substitution in Prospect in Lincoln

A. H. Cuppley, manager of the University Transit Corporation, Champaign, Ill., was in conference with Lincoln, Ill., city officials recently and as a result it is likely that bus service will be installed, probably by July 1. The bus lines will supplant the railway service, suspended on May 15. Bids will be received by the city on July 23, for junking the cars, tracks and all other equipment.

Financial *and* Corporate

Three Class "A" Massachusetts Roads

The Springfield Street Railway, Springfield, Mass., is one of three electric railways in the state whose securities are listed by the Department of Public Utilities as legal investments at this time for Massachusetts savings banks. The other two are the Boston Elevated Railway and the Union Street Railway, New Bedford.

Capper of Kansas Seeks Help on Washington Merger

Senator Capper, chairman of the Senate Committee on the District of Columbia, in a letter to the Bureau of Efficiency on June 22, requested that the bureau make a study of the plan now under consideration for the merger of the street railways of the District of Columbia. Mr. Capper said in part:

"I should be glad, if, during the recess of Congress, your bureau could study the railway merger problem in Washington, as presented for the consideration of our committee in the proposed unification agreement and joint resolution. I leave to your own discretion the amount and character of your study of this matter.

"The sub-committee of which I am chairman, under authority of a Senate resolution, is authorized to expend not exceeding $10,000 for expert assistance, and we have engaged Dr. Milo R. Maltbie, to assist us. There is no reason, however, why we should not have the benefit of an independent investigation conducted by your bureau, if you are willing to undertake a study of the problem and have available whatever assistance may be needed.

"I leave to your judgment the form and plan of your investigation, as well as its scope, but the full committee and the Senate, as well, would be better able to deal with the problem of the merger if equipped with information on these subjects:

1. Fair value, for rate-making purposes, of the properties to be merged.

2. Physical condition of the properties, including equipment.

3. Condition of income and profit accounts of the carriers (whether accurately and uniformly kept in accordance with standard practice.)

4. Present depreciation reserves and provisions for reserve after merger.

5. Comparison of rates of fares in other cities.

6. Comparison of operating costs ratio in Washington and elsewhere.

7. Comparison of fixed costs ratio and general administration expense in Washington and elsewhere.

8. Comparison of power cost to street railways now and after merger. Practice of railways in other cities as to purchase or manufacture of power.

9. Possible economies through merged operation.

10. Car-miles operated per revenue passenger here and elsewhere (to determine possible economies in routing, etc.).

11. Future of bus relationship to railway operation, and particularly, question of transfer charges.

"I should like to have your comments, in due time, upon any features of the proposed merger agreement that you care to discuss after investigation. If, your study of the situation convinces you that the merger proposal is the best possible under the circumstances, I shall be glad to have your reasons for that opinion."

Conferences Look to Ontario Acquisition

Negotiations are under way looking to the acquisition of the Windsor, Essex & Lake Shore Railway, a 36-mile railway extending from Windsor to Leamington, Ont., Canada, by the municipalities and its operation on their behalf by the Hydro-Electric Power Commission.

J. F. Collins Receiver as Part of Readjustment Plan

John F. Collins, vice-president and general manager, has been named receiver of the Michigan Electric Railway, operating city lines in Lansing, Battle Creek, Kalamazoo and Jackson and interurban lines between these cities, and to Owosso and St. Johns, by U. S. District Judge Charles S. Simons in Detroit. The move is a forerunner of a general reorganization of the company, to be negotiated at an early date.

The appointment of Mr. Collins as receiver marks the third post that he is occupying for Michigan electric lines in that capacity, he having been named receiver for the Detroit, Jackson & Chicago Railway and the Michigan Railroad some time ago.

Mr. Collins was also acting for the Michigan United Railways, when it was reorganized into the Michigan Electric Railway in 1923.

Lack of business, due to competition of the automobile and buses over concrete highways is ascribed as the reason for the inability of the Michigan Electric to pay its bond interest since Jan. 1, 1925. To date the accrued interest amounts to $1,550,000.

When the Michigan United Railways went into the hands of a receiver in 1920, a similar condition existed, and in 1923, when a reorganization was effected, bondholders agreed to accept 50 cents on the dollar. Approximately 255 miles of electric railway lines are

operated by it, having an appraised value of $15,000,000.

The receivership, according to Mr. Collins, will bring no immediate changes in the personnel of the road, and business will be carried on as usual, both in Jackson and in other cities where the lines touch.

Meanwhile the company will continue its efforts to secure franchises to operate trucks and buses on highways paralleling its lines, Mr. Collins announced. Hearings on this subject have already been held before the State Utilities Commission, and a ruling is expected to come within a few weeks.

The Michigan Electric Railway, if it is given franchises on state highways, would operate a stcre to door system, used its facilities to carry on the work. Whether interurban or city street car lines would be abandoned in the event the motor freight franchise would be granted, would depend on its future income from these sources, officials of the company have declared.

Wants Municipal Road Out of Politics

Superintendent of San Francisco system sees this as immediate need. Confidence of public in system shaken. Condemns construction of extensions for purposes of political expediency

NO ACTION has been taken on the report made by Superintendent Boeken of the San Francisco Municipal Railway, San Francisco, Cal., to the Board of Public Works on the future financial outlook for the system. It will be recalled that Mr. Boeken said that it must be plain that in order to remove the railway, as well as other public utilities, as far as possible from political control and influence, it is imperative that a non-political public utility commission be created and be intrusted with the future destinies of all of San Francisco's public utilities.

Twice has Mr. Boeken been called before meetings by the Mayor and the Supervisors and cross-examined, but he has stuck to his guns. The superintendent submitted his report with the hope that it "will bring clearly to the mind of everyone just what the railway has done, is doing and will be able to do in the future on a 5-cent fare if a proper policy is adopted." He is confident that "if the recommendations and suggestions are carried out there need be no cause for alarm as to the future financial welfare of the railway in so far as it is now developed." He says in conclusion:

It is unfortunate that the confidence of the public in those intrusted with the welfare of the Municipal Railway has been shaken, at least to a certain extent, as evidenced by the defeat of the proposed bond issues for extensions last year.

The yielding to unreasonable requests for extensions, increased service, etc., which resulted in using up large sums of money from the reserve funds, requests that in some instances had very little merit and deserved very little consideration and which did not have the unqualified indorsement of those competent to pass upon such matters, is no doubt largely responsible for this loss of confidence.

It is vitally important that anything hinting of politics be removed from the future policies and operation of the Municipal Railway, to the end that public confidence shall be fully restored.

Of the ability of the system to expand he says:

There is no doubt but that the ability of the system to pioneer and develop new districts, furnish through service to those districts long before the revenue received warranted the same, all on a 5-cent fare and without any additional financing therefor (moneys being taken from reserve funds to buy new equipment, lay new tracks, start bus lines, etc.), has been overrated, and with the completion of the Judah Street line the moneys in the old depreciation fund will be practically exhausted.

These expenditures helped to develop certain districts and added to the assessment roll of the city, but the increase in revenue to the Municipal Railway was in no way in keeping with the increased cost of operation.

The loss in the operation of buses causes operating deficits which make serious inroads on the reserve funds and call for grave consideration. Mr. Boeken says:

While the Municipal Railway's ability to do all these things on a 5-cent fare has been marveled at, it would have been wiser had a different policy of financing been pursued, to the end that the reserves for depreciation, etc., had been kept to a healthy level, thereby saving the necessitv of undoing some of these acts.

The total bonds issued for the railway was $5,481,000, as against a present road and equipment account of $8,636,839, showing a difference of $3,155,839 spent for additions and betterments, as of June 30, 1927. But the superintendent says:

In the face of the growing ratio of operating expense to revenue the depletion of the reserve funds to an ebb so low was not wise and some other method of financing some of these extensions should have been followed. If only the extensions indorsed by those qualified to pass on such matters are submitted to the people at a bond election they will receive the hearty support of the voters.

RATIO OF OPERATING EXPENSE TO REVENUE, IN PER CENT

1918	1919	1920	1921	1922
59⅛	69¼	75	73⅛	74⅜
1923	1924	1925	1926	1927
77	77⅜	78	79⅜	84⅛

A statement of funded debt was offered to show what the Municipal Railway has done in the way of paying off the original debt. Almost half of the bonds have been retired, and the balance is being paid off at the rate of $200,000 a year. The report says:

It will not be possible, nor does it seem fair, in view of the present high cost of operation, to expect the Municipal Railway to be able, out of receipts, to set aside 3 per cent of the total cost of the road and equipment, amounting to more than $250,000 a year, as provided for by Ordinance No. 7060, May 1, 1926, for replacement, reconstruction and depreciation, and at the same time pay off the original debt of the system to the extent of $200,000 a year.

The result of operation for the calendar year 1927 indicates that about $140,000 would have been all that could have been placed in the depreciation fund had there been no other funds available to meet the bond redemption payments. Due to the fact that reserves, in so far as the old depreciation fund is concerned, will be practically all used up in the completion of the Judah Street Line, it will be necessary to look to the present depreciation fund for relief in meeting the semi-annual bond redemption payments. Mr. Boeken then says:

With certain savings to be made, as recommended in this report, and with a gradual increase in receipts, as indicated, of more than 2 per cent since November, 1927, it should be possible without resorting to any drastic measures in the way of service reduction (which I believe would

STATEMENT OF FUNDED DEBT AT SAN FRANCISCO

	Issue	Total Issued	Annual Maturity	Interest Rate Per Cent	Final Redemption	Unmatured	Retired
Geary Street	1910	$1,900,000	$95,000	4½	July 1, 1934	$665,000	$1,235,000
Market Street	1910	81,000	3,000 and 6,000	4½	July 1, 1934	30,000	51,000
Municipal Railway	1913	3,500,000	100,000	5	Dec. 1, 1952	2,500,000	1,000,000
Totals		$5,481,000	$198 000 and 201,000			$3,195,000	$2,286,000

Note—Geary Street and Market Street redemption date is July 1 of each year.
Municipal Railway redemption date is December of each year.

OBLIGATIONS TO BE MET

Bond redemption, July 1, 1928	$96,000
Bond interest (Municipal Railway bonds) June 1, 1928	62,500
Bond interest (Geary Street and Market Street bonds), July 1, 1928	15,637
Market Street Railway account, Crossing Litigation	32,000
Total obligations	$206,137

AVAILABLE RESOURCES AT SAN FRANCISCO

Cash balance, Municipal Railway operative fund, Jan. 31, 1928	$61,943
Accrued interest on securities owned	12,089
Due account West Portal Avenue	2,715
Due from Harbor Commission	8,228
Estimated subsidy from Harbor Commission on, five months at $475 (Feb. 1 to July 1, 1928)	2,375
Estimated income from operations, February to July, 1928	*25,045
Total resources	$112,397
Estimated deficit	$93,739
In addition to the resources listed above, there are Accounts Receivable as follows:	
Due from general fund account Twin Peaks Tunnel	$32,152
Due from general fund account Stockton Street Tunnel	48,971
Due from general fund account Ocean Shore Switching	1,000
Total accounts receivable	$82,123
Unencumbered balance accident reserve fund, Jan. 31, 1928	$109,856
Unencumbered balance depreciation reserve fund, Jan. 31, 1928	378,781
Unencumbered balance depreciation fund Jan. 31, 1928	51,547
	$540,186

NOTE:—The construction of a garage, estimated at $50,000, including land, is considered very necessary for the housing and repairing of buses.

* For the seven months ending Jan. 31, 1928, operating revenue showed an increase of $37,377.78, or 1.8938 per cent. During the same period operating expenses increased $88,721.63, or 5.3153 per cent. Assuming the same ratios of increase in revenues and expenses for the remaining five months of the fiscal year will leave a net income of $25,045.97, after deducting $107,960.50 for Depreciation reserve and $36,250 for Accident reserve.

be unwise) materially to build up the depreciation fund, at least to a greater extent than was done last year. Any deficits in the future might well be considered as "Deferred Depreciation Liabilities" to be repaid as soon as the annual bond redemption payments are reduced, which will be in 1934.

A very clear idea of the state of Municipal Railway finances, as of Jan. 31, 1928, since operating under the provisions of Ordinance No. 7060 of the Board of Supervisors, effective May 1, 1926, is conveyed in the accompanying statement of obligations to be met.

INCREASE IN RECEIPTS FOR PAST FIVE YEARS

Calendar Year	Receipts	Increase Over Previous Year	
		Amount	Per Cent
1922	$2,922,720		
1923	3,077,991	$155,270	5.3125
1924	3,202,252	124,261	4.0371
1925	3,328,099	125,847	3.9300
1926	3,341,940	13,840	.4159
1927	3,355,981	14,041	.4202

In summing up the car line schedules, it did not appear to Mr. Boeken that any appreciable reduction in service could wisely be made; in fact, while slight reductions might be reasonably made on some lines, the saving would hardly meet the increases properly due other lines. The superintendent said that the excellent record made by the men who operate the cars, good roadbed and perfect condition in which the rolling stock has been maintained have, to a great extent, been responsible for keeping down accidents and made possible the large saving under the amount estimated as necessary.

Since May 1, 1926, 2½ per cent of the gross passenger revenue has been set aside for accident reserves, with $100,000 from the former fund as an initial deposit.

In commenting on the item "Revenue Credits" Mr. Boeken says it is not a proper method to pursue, as no like allowance is made to street car lines for transfers received from bus lines, the result being that bus lines are credited with 7½ cents and the car lines with 2½ cents of each round-trip fare.

A table of bus fare rates charged by the various railways operating buses was introduced to bring out the fact that the Municipal Railway, with a charge of 5 cents with nothing additional for a transfer, is receiving a much lower rate of fare than the average of 8.48 for 245 other comparable installations.

Mr. Boeken said the elimination of transfers between buses and street cars would not create an unreasonable rate of fare, taking into consideration the length of route, etc., and he recommended that these transfer privileges be discontinued.

The estimated increase resulting from the recommendations made in the report approximate $50,000 a year and "will very materially build up our reserve funds." He frowned upon any further reduction of schedules.

Loss on Bamberger Line $6,642

A loss of $6,642 was suffered by the Bamberger Electric Railroad, Salt Lake City, Utah, in 1927. The reports show the operating revenues were $559,229, or $14,118 less than in 1926. Operating expenses were $444,711, or $156 less than in 1926, leaving the net revenue from railway operations at $114,578. This is a sum $13,961 higher than the preceding year. From a gross income of $82,996 the company had total deductions amounting to $89,639.

TOTAL LOSS ALL SAN FRANCISCO MUNICIPAL BUS ROUTES

	Calendar Year 1927	Five Years
Receipts	$98,144	$269,825
Mileage	691,814	2,194,720
Number of passengers (cash)	1,962,401	5,397,801
Number of transfers	977,039	3,334,115
Number of quartermaster tickets	300	723
Number of school tickets	55,368	186,458
Loss exclusive of revenue tickets	$108,679	$279,524
Loss including revenue credits	82,853	191,469
Operating cost per mile	.29896	.25031
Operating revenue per mile, including revenue credits*	.17920	.16307
Operating revenue per mile exclusive of revenue credits	.14187	.12294

* The item "Revenue Credits" consists almost wholly of an allowance of 2½ cents for each transfer received on buses from street cars.

Receiver Likely for Auburn & Syracuse Road

T. C. Cherry, president of the Auburn & Syracuse Electric Railroad, Syracuse, N. Y., is slated for appointment as receiver of the company. More than a year ago the company defaulted in the payment of the interest on its bonds. Since then a protective committee representing the bondholders has been at work securing pledges of the bonds. That committee now has about finished its task. Mr. Cherry is receiver of the Empire State Railroad. Recent moves in connection with both of these companies presage their probable early reorganization.

$155,344 Deficit in Indianapolis

Total net earnings of the Indianapolis Street Railway, Indianapolis, Ind., less taxes for the year ended Dec. 31, 1927, were $940,770. From this figure $639,914 was subtracted for interest deductions, leaving a surplus exclusive of accrued depreciation of $300,855. After the consideration of deductions from this surplus the balance was a deficit of $155,344. These figures were disclosed in the annual report of the company and presented at the annual meeting of the stockholders June 13, 1928.

EARNINGS AND OPERATING EXPENSES OF THE INDIANAPOLIS STREET RAILWAY

Earnings	1927	1926
Passenger receipts—		
City lines	$4,313,446	$4,425,529
Transfer receipts—		
City lines	293,938	310,866
Miscellaneous earnings—		
Track rentals	807,285	782,398
Gross earnings	$5,414,670	$5,518,794
Operating expenses—		
Maintenance of way and structures	$588,132	$610,914
Maintenance of equipment	499,122	502,982
Total maintenance	$1,087,255	$1,113,896
Operation of power plant and substation	$760,689	$756,813
Operation of cars and buses	1,911,591	2,028,500
General expenses	418,440	444,135
Total operating expenses	$4,177,976	$4,343,346
Net earnings	$1,236,693	$1,175,447
Less taxes	295,923	294,872
Net earnings, ess taxes	$940,770	$880,575

On the subject of buses the report says that the company recognized the necessity of a co-ordinated system of street railway and bus transportation in the city of Indianapolis and so through an order of the Public Service Commission acquired the entire capital stock of the People's Motor Coach Company. At the present time 45 buses are being operated by the People's Motor Coach Company and 27 by the Indianapolis Street Railway.

During the year the erection and installation of equipment of five new substations were completed. Many im-

provements in replacement and renewal work were also effected.

Benefits resulting to employees and their families from the operation of the pension fund and benefit association justified the company's annual contribution of $5,000. During the year 1927 $30,354 was paid to employees and beneficiaries out of these two organizations.

Bonds to Finance Improvements on Indiana Line

Authority to issue $1,000,000 of 25-year 6 per cent first mortgage bonds and to issue 10,000 shares of common stock and sell 100 shares at $100 each was asked in a petition filed with the Indiana Public Service Commission recently by the Indianapolis & Southeastern Railroad. The company recently took over the property of the Indianapolis & Cincinnati Traction Company following its sale under foreclosure. The petition sets out that proceeds from the securities are to be used to consummate the deal and make other purchases and additions, including ten new cars to cost $185,000.

Amendments Sought to Central Public Service Charter

At a meeting to be held on July 9 stockholders of the Central Public Service Corporation, Chicago, Ill., will be asked to approve amendments to the corporation's charter whereby the class A stock will be given full rights of participation with the common stock in both earnings and surplus in liquidation. It is proposed to give the class A stock priority over the common stock to the extent of $1.75 a share annually in earnings and $30 a share in liquidation. In addition the class A stock is to participate equally with the common stock in earnings and surplus in liquidation after the common stock has received an amount equivalent to class A priority. President Pierce said:

The very material increase in the properties of Central Public Service Corporation, combined with the normal growth in the company's business, has made it advisable to augment the present features of the class A stock in a manner to make it attractive to a wider class of investors.

The present limitations with respect to dividends and to surplus in the event of liquidation are such that possibilities of material market appreciation are negligible. Furthermore, the vast number of investors in utility common stocks have not been interested in the Central Public Service class A because of its definite limitation in participating in the future of the properties.

The gross earnings of the corporation are at the rate of $13,500,000 annually at the present time and the balance available for dividends on the preferred, class A, and common stocks is more than $1,800,000, or several times the amount required. The class A stock is currently paying dividends at the rate of $1.75 yearly.

The Central Public Service Corporation recently came into ownership of the Rockford, Portsmouth, Huntington, Roanoke and Lynchburg railways.

Personal Items

T. A. Kenney Allied Vice-President

Officer of Hodenpyl-Hardy companies and chairman of railway association's finance committee in executive post with new consolidated company

T. A. KENNEY has been elected a vice-president and director of the Allied Power & Light Corporation, New York, formed recently to consolidate the interests of Hodenpyl, Hardy & Company, Inc., and Stevens & Wood, Inc. He was recently made a director of the Commonwealth Power Corporation.

Mr. Kenney's entire business career has been spent in the utility business.

T. A. Kenney

In 1912 he joined the Hodenpyl-Hardy organization in the capacity of manager of the production and transmission department of the Consumers Power Company, with headquarters at Jackson, Mich. That company was then consolidating a great many widely scattered hydro-electric companies in the state and interconnecting them—all of which required further pioneering work. This resulted in the development and successful operation of the first 140,000-volt transmission system. Four years later he came to New York as assistant to B. C. Cobb in charge of operations of the Hodenpyl-Hardy properties, one of the largest public utility groups in the United States.

Mr. Kenney was born in Mechanicsville, N. Y., on Jan. 5, 1882. After he left school, Mr. Kenney entered the employ of the Hudson River Power Transmission Company, which subsequently became a part of the Adirondack Water Power Corporation. This early association, which afforded him experience at first hand with the electrical industry, included not only high voltage power transmission (so-called)—12,000 volts, but local electric distribution, industrial power application and electric railway operation as well.

In addition to his executive duties, Mr. Kenney has been prominently identified with the National Electric Light Association and the American Electric Railway Association activities. He is at present a member of the public policy committee of the National Electric Light Association, and in addition to being a member of the executive committee of the American Electric Railway Association is chairman of the finance committee of that organization.

In addition to his duties with the Commonwealth Power Corporation and the Allied Power & Light Corporation, Mr. Kenney is vice-president of the following companies: The Tennessee Electric Power Company, Northern Ohio Power & Light Company, Consumers Power Company (Michigan) and Nashville Railway & Light Company. He is a member of the board of directors of the Northern Ohio Power & Light Company, Northern Ohio Power Company, Consumers Power Company, Tennessee Electric Power Company, Electric Railway Securities Corporation, Southern Michigan Light & Power Company and Nashville Railway & Light Company.

B. H. Saunders Chairman of North Jersey Commission

Bertram H. Saunders, Paterson, N. J., has been elected chairman of the North Jersey Transit Commission to fill the unexpired term of Daniel A. Garber, Ridgewood, who resigned following his recent appointment as general manager of the Association of General Contractors, with headquarters in Washington. This is a position which has taken Mr. Garber to the Mississippi River territory as a member of a government subcommittee on flood control and has necessitated his continued absence from New Jersey.

Mr. Saunders and Mr. Garber were appointed by Governor Silzer of New Jersey on the original commission set up by the State Legislature in 1922 to study means of improving mass transportation in northern New Jersey. Mr. Saunders served as chairman from 1924 until 1926, and was replaced by Mr. Garber that year.

W. C. Slade Heads New England Street Railway Club

Walter C. Slade, vice-president of the United Electric Railways, Providence, R. I., since 1925, was recently elected president of the New England Street Railway Club at the meeting held in Boston on May 24. Mr. Slade has been identified with the Providence property since September 1915 when he became superintendent of power and lines of the company then known as the Rhode Island Company. Mr. Slade's first position was with the General Electric Company at Pittsfield, Mass. His work

in Providence has been especially noteworthy for the modernization program affecting the power system which involved an expenditure of slightly more than $2,000,000.

Mr. Slade was born in Providence in 1885 and was graduated from Brown University with the degree of Ph.D. in 1907. Later he was graduated from the Massachusetts Institute of Technology.

As a result of an error in the telegraphic account of the meeting which appeared recently in the JOURNAL it was made to appear that Ralph Bauer, one of the speakers at the meeting, had been elected president.

M. R. BOYLAN, vice-president of Public Service Co-ordinated Transport, Newark, N. J., and Martin Schrieber, manager of plant and equipment of the company, sailed on the *Majestic* on June 22 on a visit to London, Paris and Berlin. They will, so far as the opportunity presents, study co-ordinated transportation in its possible application to the lines of the company of which they are officers. They plan to return to the United States in August.

R. P. Stevens Elected by Commonwealth Power

R. P. Stevens, president of Stevens & Wood, which was recently linked with Hodenpyl, Hardy & Company in the Allied Power & Light Combination, has been elected vice-president, director and member of the executive committee of the Commonwealth Power Corporation, in which the new utility company owns a substantial interest. T. A. Kenney, as noted elsewhere, and H. S. Scarritt, member of Bonbright & Company, have also been elected to the Commonwealth board. They succeed Earl S. Colman, W. M. Flook and Waldo S. Reed.

C. T. DeHore Heads Reorganized Company

Charles T. DeHore and L. E. Eastman, purchasers of the property of the Indianapolis & Cincinnati Traction Company at receivers' sale, are among the organizers and incorporators of the Indianapolis & Southeastern Railroad, the successor company. Mr. DeHore became president and Mr. Eastman vice-president of the new company. Other incorporators were Frederick D. Rose, Muncie, banker; A. M. Miller, Rushville; Miss Theresa Reardon and Donald L. Smith, attorney.

JOHN H. DELANEY, chairman of the Board of Transportation, New York, N. Y., was reappointed to that position for a period of six years on June 23. Mr. Delaney's term did not expire until July 1, 1930, but the term of Commissioner Frank X. Sullivan was about to expire. Commissioner Sullivan was sworn in for the rest of Commissioner Delaney's term.

Luke C. Bradley Leaves Providence

President of Rhode Island Public Service to become connected with Electric Bond & Share Company

LUKE C. BRADLEY, president of the Rhode Island Public Service Company, which some time ago took over the United Electric Railways and the Narragansett Electric Lighting Company, announced on June 23 that he will submit his resignation to the directors of the company at their July meeting. The resignation is to become effective Aug. 1. He will assume an executive position with the Electric Bond & Share Company, New York.

Mr. Bradley's statement announcing his resignation follows in part:

I am resigning to become associated in an executive capacity with the Electric Bond & Share Company of New York City. I am leaving Providence with real regret and only because of the larger opportunity presented to me.

Luke C. Bradley

Above all I regret to sever my connection with the men and women of the United Electric Railways and the Narragansett Electric Company, from whom I have received the fullest co-operation and loyal support.

Early in February, 1927, Mr. Bradley was elected president of the service company, to succeed Louis C. Gerry. Mr. Bradley resigned a similar position with the Virginia Electric & Power Company to accept the Providence offer.

Associated with Stone & Webster, Inc., Boston, in executive positions for many years, Mr. Bradley had varied experience as directing head of utility companies in different parts of the country. As president of the Virginia company, he had direct supervision over electric light and power properties, electric railways, bus systems and gas properties operating in more than 40 cities in the states of Virginia and North Carolina.

Mr. Bradley was also executive vice-president and division manager of utility properties under the management of Stone & Webster in the Southwest serving more than 100 towns and cities. He is recognized as one of the most successful executives in the public utility field.

The Electric Bond & Share Company, with which Mr. Bradley is to be affiliated, supervises probably the largest number of electric light and power companies in the United States.

F. D. Comerford to Succeed Mr. Bradley in Providence

Frank D. Comerford, president of the New England Power Association, will probably be elected to succeed Luke C. Bradley as head of the Rhode Island Public Service Company.

It is learned also that William C. Bell, formerly general manager of the Rhode Island Public Service Company and recently elected vice-president of the power association, which controls the service company, will supervise operations of both the Narragansett Electric Company and the United Electric Railways, which make up the service company. Frank L. Swan, successor to Mr. Bell as general manager of the service company, will continue in that capacity.

No changes are expected in executive positions of either the Narragansett Electric Company or the United Electric Railways.

In addition to heading the parent company, Mr. Comerford is a director of the Public Service Company. He is only 34 years old, and was named last November to succeed Henry I. Harriman as head of the power association, which controls public utilities throughout New England.

Obituary

FREDERICK HUNTINGTON PARKE, a veteran engineer of the Westinghouse Air Brake Company at Wilmerding, Pa., died on June 16. He became connected with the Westinghouse Machine Company at East Pittsburgh, early in his career, remaining with that organization until 1898, when he entered the employ of the Westinghouse Air Brake Company. Soon he was sent to Russia to assist in the construction of the air brake plant at St. Petersburg and in the formation of the engineering organization. He remained in Russia until 1902 when he returned to Pittsburgh. Since then he has been at the Wilmerding works, where at the time of his death he was general engineer. Mr. Parke received his early education at St. John's School in Manlius, N. Y. He was graduated from Cornell University as a mechanical engineer in the class of 1892.

WILLIAM B. JOHNSON, sales representative for Ross F. Hayes, railway supplies, New York, N. Y., died on May 27. Mr. Johnson was 28 years old.

PAUL V. CLODIO, formerly sales manager of the Bragg-Kliesrath Corporation, Long Island City, N. Y., died recently.

Manufactures and the Markets

$1,000,000 for Montreal Track

Of the principal track jobs being done by the Montreal Tramways, Montreal, Canada, this year, two are for extension of the company's lines farther into the outlying sections. On Delorimier Avenue, the double track is being extended from Rachel to Masson Streets, about 1 mile. On this job the rails will be welded instead of using plates.

The other extension into new territory is on Van Horne Avenue. Double tracks on this street will be extended for approximately 1½ miles, from Hartland Avenue, the present terminus of that line, to Cote des Neiges Road.

Two important city jobs are: On St. Denis Street, between Craig and St. Catherine Streets, where new tracks are being substituted for old, the job being about half accomplished at this date; and on Craig Street, from St. Denis to Papineau Streets, where the tracks also are being renewed. In addition there are quite a number of minor jobs, including a few intersections.

One million dollars is being spent by the company on this work during the present year, which is an average appropriation for the construction and reconstruction activity of the company for one year.

D. S. R. Track Improvements Finished This Year

Approximately $1,000,000 is to be expended during this summer on track rehabilitation by the Detroit Street Railway, Detroit, Mich. This will make the system modern as far as tracks are concerned.

The new rails, ties and pavement laid last year on Woodward Avenue from the Boulevard to Philadelphia Avenue, will be extended north several blocks this year, while the plans also call for new equipment in Grand River Avenue from Trumbull Avenue west. A number of construction projects are now under way.

New York Cars to Have Safety Devices

The New York Transit Commission has made public an order to all electric railways in the city to install additional safety devices. The order followed hearings before Commissioner Lockwood at which it was found that of 1,110 one-man cars in operation, 85 were without safety devices, and 510 were only partially equipped. The order provides specifically that all one-man cars shall be equipped with the following devices:

1. Sliding or folding doors, interlocked with either the controller or the air brake system.

2. The so-called "dead man button," which requires the weight of the motorman's hand on the controller handle, or his foot on the control valve. When either hand or foot is removed from the operating position, the power is cut off and the brakes automatically are set.

3. An emergency exit in addition to the regular entrance door.

The companies are directed to equip 25 per cent of their one-man cars with the devices within six months, an additional 25 per cent within a year, and the remainder in from eighteen months to two years.

Improved Facilities for Steel in Miami Valley

Linking of the American Rolling Mill Company and the Hamilton Iron & Coke Company by the transportation of a ladle of hot metal from the blast furnace at Hamilton, Ohio, to the East Works of Armco at Middletown, Ohio, by way of a special track built by the Baltimore & Ohio Railroad, marks another epochal event in the industrial life of the Miami Valley. The event heralds the beginning of a new era in steel making in the valley, which has already become a great factor in the commerce and industry of the world, as it will tend to permanently stabilize the industry in this location.

Not only in steel making, but also in railroad transportation, is this event widely significant. Molten metal will be carried daily over 10 miles of track specially constructed for the purpose. Due to the concentrated load of such large tonnage, it was necessary to design and build a special bridge over the Miami River having almost 50 per cent greater capacity than any other railroad bridge ever built. It requires about 2½ hours to make a round trip to Middletown and there will be an average of four trips every 24 hours.

Three specially designed mixer ladles, double lined with fire brick, are used to carry the molten metal, which can, when necessary, be held in the ladle 48 hours. The capacity of these ladles is 150 tons each. The metal is poured from the large ladle car into a small open ladle, from which it is poured directly into the

Specifications on Ten Monongahela Cars

Five interurban and five city type cars are being built for the Monongahela-West Penn Public Service Company, Fairmont, W. Va., by the G. C. Kuhlman Car Company, as mentioned in the April 21 issue of the JOURNAL. They are of the one-man, two-man, motor driven, double-end, double-truck type.

Each car is 45 ft. 3 in. long, 8 ft. 6 in. wide and weighs 32,000 lb. The city type cars have a 30-in. seat spacing and accommodate 48 passengers. The interurban cars have a 33-in. seat spacing and seat 44 passengers. Window post spacing is 42 in. on all cars. The seats are wood in the city cars and leather upholstered in the interurban cars. The bodies are of semi-steel construction with arch roofs and folding end doors. Each truck is equipped with two inside-hung motors, and 22-in. rolled steel wheels. Further details are given in the accompanying specifications.

Weights:	
Car body	16,500 lb.
Trucks	9,000 lb.
Equipment	6,500 lb.
Total	32,000 lb.
Bolster centers	23 ft. 4 in.
Length over all	45 ft. 3 in.
Length over body posts	33 ft. 3 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 6 in.
Height, rail to trolley base	10 ft. ¼ in.
Window post spacing	42 in.
Body	Semi-steel
Roof	Arch
Doors	End, folding
Air brakes	Westinghouse
Armature bearings	Ball
Axles	Brill
Car signal system	Faraday
Compressors	Westinghouse DH-16
Conduit	Flexible, Duratube
Control	K-75-A
Curtain material	Pantasote
Destination signs	Railway standard
Door mechanism	National Pneumatic
Finish	Glidden Ripolin enamel
Floor covering	Linoleum—interurban cars
Gears and pinions	Westinghouse W-N drive
Glass	D. S. A. selected
Hand brakes	Peacock
Heat insulating material	Celotex
Heaters	Consolidated Car Heating Company
Headlights	O-B
Headlining	Agosote
Interior trim	Mahogany
Journal bearings	Plain
Journal boxes	Brill
Lamp fixtures	Ivanhoe
Motors	Four Westinghouse No. 1425, inside hung
Painting scheme	Orange
Roof material	Wood, canvas covered
Safety car devices	Safety Car Devices Company
Sash fixtures	Adams-Westlake
Seats	Brill
Seat spacing	City cars, 30 in.; interurban cars, 33 in.
Seating material	City cars, wood; interurban, Leather
Steps	Folding and stationary
Step treads	Kass
Trolley	O-B
Trolley base	Westinghouse
Trolley wheels	Westinghouse
Trucks	Brill 177-E1-X
Ventilators	Brill
Wheels, type	Rolled steel 22 in. diameter
Wheelguards	H-B

open hearth furnaces for the necessary refining process. This constitutes an important economy over the regular practice of charging cold pig iron into the open hearth, which practice requires many hours of high temperature to bring it to a molten state. The new practice saves much fuel, time, labor and wear on the furnace.

It is expected that the new arrangement will not only work out to the material advantages of the three interests, the railroad, the furnace company, and the rolling mill company, who cooperated in making it possible, but will be of considerable influence in the increased growth of the cities of Hamilton and Middletown and the improved facilities will further enlarge the market for steel products.

Talk on British Market at Advertising Convention

J. Heritage Peters, head of the Heritage Peters Advertising Service, Ltd., Coventry, England, is to be one of the speakers at the International Advertising Association Convention at Detroit in July. Mr. Peters is scheduled to make several addresses while he is in this country. He will discuss the peculiarities of the British market and will illustrate how American advertising has to be refashioned to appeal to the British reader.

Conference Held on Shipping Tags

Manufacturers of shipping tags held a preliminary conference at the Department of Commerce on June 25, under the auspices of the Division of Simplified Practice, Bureau of Standards, and considered a report that had been compiled from a survey of variety among manufacturers.

This conference concluded that further study of all phases of the situation, as revealed by the report, would be necessary before a tentative recommendation could be presented for final action. A committee was appointed to make this study, which will include nomenclature to clearly define stock, including thicknesses, sizes of tags and color of stock. George Schuster, representing the Division of Simplified Practice, will assist this committee in making the study.

The personnel of the committee is as follows: O. L. Moore, chairman, secretary, Tag Manufacturers' Association, Chicago; William R. Eastwood, Reyburn Manufacturing Company, Philadelphia; E. B. Graupner, International Tag Company, Chicago; George M. Huey, Denney Tag Company, West Chester, Pa.; H. E. Reynolds, Dennison Manufacturing Company, Framingham, Mass.

ROLLING STOCK

BRYAN-COLLEGE TRACTION COMPANY, Bryan, Tex., will purchase one new car.

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

	June 26, 1928
Metals—New York	
Copper electrolytic, cents per lb	14.525
Copper wires, cents per lb	16.625
Lead, cents per lb	6.30
Zinc, cents per lb	6.525
Tin, Straits, cents per lb	46.125
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, .o.b. vessel, Hampton Roads, gross tons	4.175
Somerset mine run, f.o.b. mines, net ons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.8
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.6
Kansas screenings, Kansas City, net tons	2.35
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	5.3
Weather rppf wire base, N.Y., cents per lb.	17.125
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bb lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb	13.75
Turpentine (bbl. lots), N. Y., per gal	$0.6125

NEW YORK STATE RAILWAYS, Rochester, N. Y., is rebuilding cars purchased from the New York & Harlem Railway.

PACIFIC ELECTRIC RAILWAY, Los Angeles, Cal., has ordered eighteen all-steel interurban cars and ten all-steel local passenger cars from the St. Louis Car Company, St. Louis, Mo.

DETROIT DEPARTMENT OF STREET RAILWAYS, Detroit, Mich., has been advised by W. B. Mayo to reject former bids on 25 to 50 new buses and to purchase sixty-seven 40-passenger street car type coaches.

COMMUNITY TRACTION COMPANY, Toledo, Ohio, is trying out two Twin Coaches of 40-passenger capacity on the Upton Avenue line.

CHICAGO & WEST TOWNS RAILWAY, Oak Park, Ill., has accepted delivery of five Mack four-cylinder chassis, 225-in. wheelbase buses.

CONNECTICUT COMPANY, New Haven, Conn., has accepted delivery of four Mack four-cylinder chassis, 230-in. wheelbase coaches.

TRACK AND LINE

BRITISH COLUMBIA ELECTRIC RAILWAY, Vancouver, B. C., Canada, has ordered $88,000 worth of underground cable for use in proposed underground subways from the Main Street subway and the subway being constructed to serve the New Westminster elevator.

MONTREAL TRAMWAYS, Montreal, Canada, plans about 11.9 miles of single track extension this year and about 14.55 miles of track renewals. A petition from residents has been laid before City Council for the extension of track on Rosemount Boulevard to the Franciscan monastery.

SASKATOON MUNICIPAL RAILWAY, Saskatoon, Sask., Canada, has applied to the local government board for approval of expenditures of $23,000 for double tracking existing lines.

ARKANSAS POWER & LIGHT COMPANY, Pine Bluff, Ark., is constructing new track on Ash Street from Second Avenue to Rollin Street.

SEATTLE MUNICIPAL STREET RAILWAY, Seattle, Wash., has received a bid from Bethlehem Steel Company of $33,195 for eight pieces of special track work.

SHOPS AND BUILDINGS

OKLAHOMA RAILWAY, Oklahoma City, Okla., is remodeling and extending the waiting room at its terminal station in Oklahoma City, at a cost of approximately $25,000.

PETERSBURGH, HOPEWELL & CITY POINT RAILWAY, Petersburgh, Va., has had its carhouse and two cars destroyed by fire. The loss is estimated at $30,000.

CHICAGO & JOLIET ELECTRIC RAILWAY, Joliet, Ill., will begin installation of an automatic electric substation at Lemont, July 1. C. K. Gibbon, Schenectady, N. Y., is preparing plans and will have charge of the installation which is expected to be completed by August 1.

PACIFIC GAS & ELECTRIC COMPANY, San Francisco, Cal., has approved a fund of $278,000 for a substation.

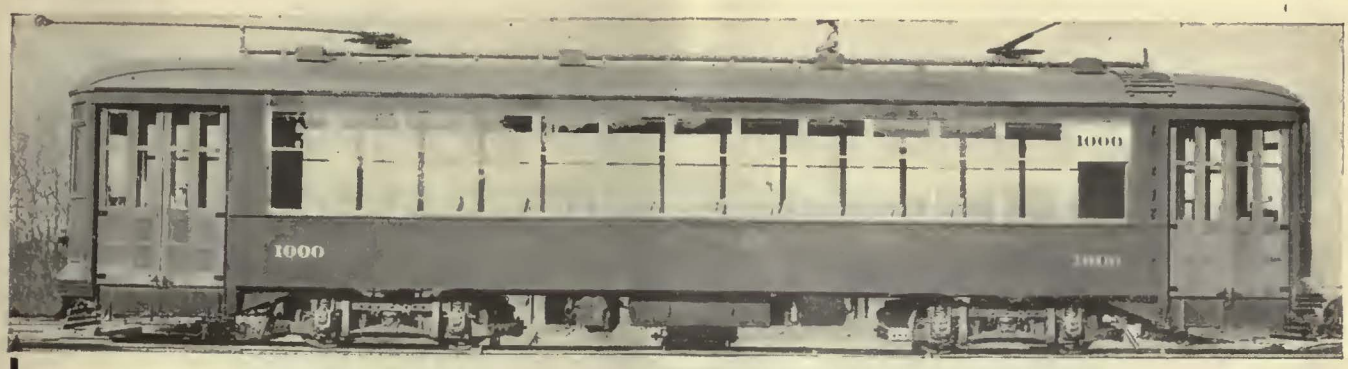
PHILADELPHIA RAPID TRANSIT COMPANY, Philadelphia, Pa., will have erected a one-story brick and steel surface car terminal building at the corner of Broad Street and Olney Avenue. The work will be done by the Rapid Transit Construction Company at an estimated cost of $40,000.

TRADE NOTES

WALTER JACKSON, Mount Vernon, N. Y., fare and motor bus consultant, sailed for Europe on June 27 on the *Berengaria* to make transportation studies in his specialties as in past years. He will study fare problems in the larger cities and will spend part of his time on vacation in Southern France and Austria. Communications to reach London by Sept. 5 may be addressed to him care of J. P. Thomas, operating manager, London Underground Railways. Mr. Jackson plans to return in time for the American Electric Railway Association Convention in September at Cleveland, Ohio.

ROLLER-SMITH COMPANY, New York, announces that the state of Texas is now being handled by John A. Coleman, 1006 Washington Avenue, Houston, Tex., and the states of Colorado, Utah, Wyoming and northern New Mexico are now being handled by H. T. Weeks, U. S. National Bank Building, Denver, Col.

FRED W. ROTH, who has been with the Ohio Brass Company for the past eleven years introducing and selling its car equipment devices in the South, Southwest and Middle West, has now joined the supply sales division of the J. G. Brill Company, for which he will travel the Eastern and Southern states.



Typical exterior of one of the twenty new cars for the New Orleans Public Service, Inc.

The Peacock Staffless

Interior view of one of the twenty cars for the New Orleans Public Service, Inc.

Twenty more for New Orleans—

equipped with

"Peacock" Staffless Brakes!

*Reg. U. S. Pat. Off.

Again the New Orleans Public Service, Inc., repeats on "Peacock" Staffless Brakes!

Twenty all-steel, one-man, two-man, double-truck, double-end cars, thus equipped, were placed in service about February 1st. These new cars are but a small part of the present rehabilitation plan for the Company. And on all of the new rolling stock "Peacock" Staffless Brakes are standard equipment!

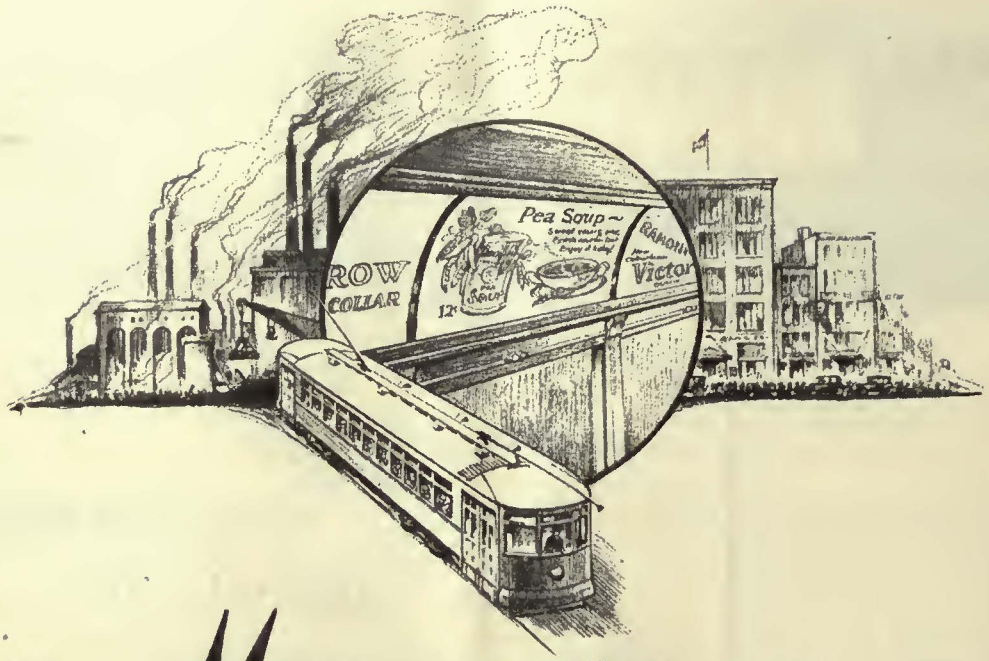
Their reliability and dependability are factors that influence repeat orders from operators throughout this country and Canada.

Many advantageous features especially adapt "Peacock" Staffless Brakes to modern cars. Shall we tell you about them?

National Brake Company, Inc.

890 Ellicott Square Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Co., Ltd., Montreal, Canada



Mutual Service

TO the manufacturers and distributors of America and the street railway systems that transport the millions of America's potential buyers, Collier offers a mutual service.

This service has brought the street railway riders in thousands of cities and towns throughout the country to look upon car cards as extremely useful and pleasing features of up-to-date street car service. It has given national and local advertisers a medium thru which they can get their messages to selected territories easily, economically and convincingly.

Our business is one of service—service to the street railway industry, service to America's national and local advertisers, service to the millions of people who daily ride on street cars.

Barron G. Collier
INCORPORATED

CANDLER BUILDING
NEW YORK, N. Y.

New York *to* Miami—
STUDEBAKER *Comfort all the Way!*

"Headin' South" in Studebaker busses means more comfort for passengers—more business for the Scenic Transportation Co., which operates three Studebaker busses between New York and Miami.

The Scenic Transportation Company, realizing the vital importance of selecting the type of bus that would successfully meet every requirement, bought Studebaker "Seminole" busses after a thorough investigation. Studebaker won the order because this equipment cost less to buy and less to run. Proof of economy was found in the experience of hundreds of Studebaker bus operators who reported low operating and maintenance expense, low depreciation, long life.

Each day the New York-Miami busses average 325 miles, stopping at night at good hotels in principal cities. So popular is this new line, that, on February 4, the demand for seats was so heavy on the north-bound trip that 24 passengers were turned away.

Pronounced Rider Appeal

Ability to perform under all conditions with train schedule regularity is an established reputation of the "Seminole" on this long run. The deep leather cushions, set at restful angles with plenty of knee room, insure a relaxed, comfortable ride. Wide windows, ample ventilation, and odor-free heating are features that attract riders and insure profitable operation to the operator.

* * *

first cost
operating cost
maintenance
depreciation

Lower

Studebaker Bus Models and Prices

75 Junior Chassis—158-inch W. B.
Chassis only, single or dual rear wheels $2410
15-Pass. Cross-Seat Sedan 4520

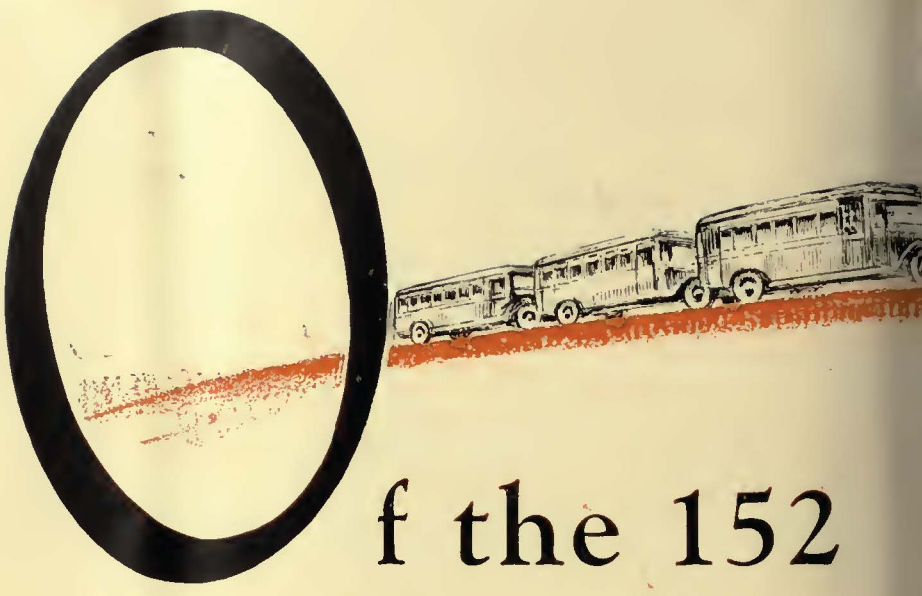
76 Special Chassis—184-inch W. B.
Chassis only, single or dual rear wheels $2775
15-Pass. Cross-Seat Sedan 5275
20-Pass. Parlor Car De Luxe 6395
22-Pass. Seminole Observation Parlor Car 6395

75 Heavy Duty Chassis—184-inch W. B.
Chassis only, dual rear wheels $3275
21-Pass. St. Car Bus 5895

All prices f.o.b. factory. Purchase can be arranged on Studebaker's liberal budget payment plan

STUDEBAKERS ARE PROFIT MAKERS

have re-ordered

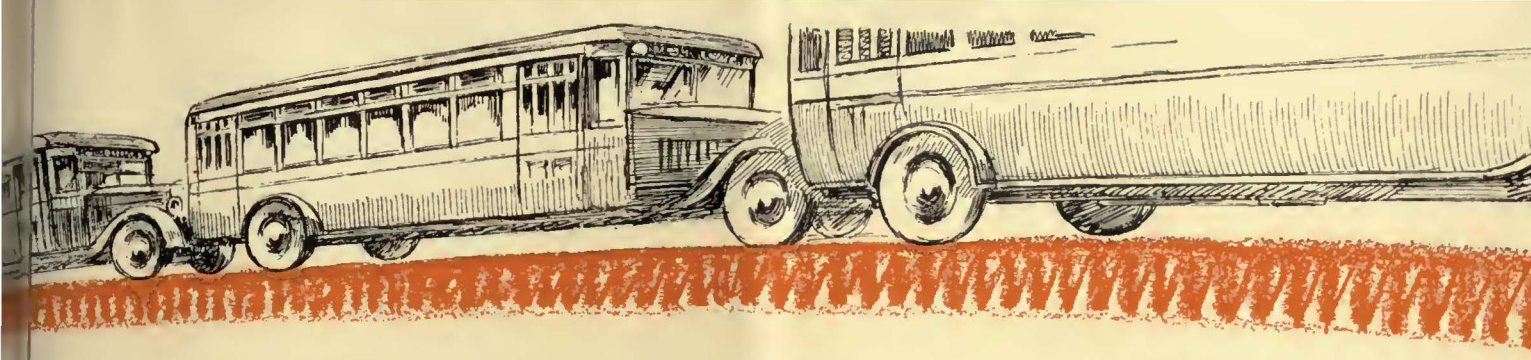


Of the 152 companies who operate 5 or more Yellow Coaches, 124 or 82% have placed repeat orders *at least* once!

98 of these companies or 64½% have placed repeat orders *at least* twice!

These 124 companies have placed a total of 535 repeat orders *and operate a total of*

4231 YELLOW COACHES



Yellow Coach fleets

of 5 or more coaches

(Compiled to April 30, 1928)

Fleets of 100 or more:

			Coaches	Reorders
1.	Public Service Transportation Company,	Newark, N. J.	819	11
2.	Philadelphia Rural Transit Company,	Philadelphia, Pa.	573	6
3.	Chicago Motor Coach Company,	Chicago, Ill.	436	26
4.	Peoples Motor Bus Company,	St. Louis, Mo.	189	14

Fleets of 50 to 99 Units:

5.	Peoples Motor Coach Company,	Detroit, Mich.	87	7
6.	International Bus Company,	Buffalo, N. Y.	81	5
7.	Connecticut Company,	New Haven, Conn.	74	11
8.	Fifth Avenue Coach Company,	New York, N. Y.	70	6
9.	New England Transportation Company,	New Haven, Conn.	68	4
10.	Shore Line Motor Coach Company,	Gary, Ind.	65	20
11.	Toronto Transportation Commission,	Toronto, Ont., Can.	61	7
12.	Montreal Tramways Company,	Montreal, Que., Can.	60	7
13.	Milwaukee Electric Railway & Light Company,	Milwaukee, Wis.	55	13
14.	Northern Ohio Power & Light Company,	Akron, Ohio	55	8
15.	Washington Railway & Electric Company,	Washington, D. C.	53	15

Fleets of 25 to 49 Units:

16.	Worcester Consolidated Street Railway,	Worcester, Mass.	43	7
17.	Boston & Maine Transportation Company,	Boston, Mass.	42	4
18.	Department of Street Railways,	Detroit, Mich.	41	
19.	Detroit Motorbus Company,	Detroit, Mich.	40	
20.	Washington Rapid Transit Company,	Washington, D. C.	36	2
21.	Indianapolis Street Railway Company,	Indianapolis, Ind.	33	6
22.	Camel City Coach Company,	Winston-Salem, N. C.	32	7
23.	Chester Valley Bus Line, Inc.,	West Chester, Pa.	31	4
24.	North Shore Bus Company, Inc.,	Flushing, L. I., N. Y.	30	13
25.	Atlantic Coast Transportation Company,	Allenhurst, N. J.	29	5
26.	Springfield Street Railway Company,	Springfield, Mass.	29	7
27.	Pittsburgh Motor Coach Company,	Pittsburgh, Pa.	28	5
28.	Colonial Motor Coach Company,	Watertown, N. Y.	27	1
29.	Los Angeles Railway,	Los Angeles, Calif.	26	12
30.	Boston Elevated Railway Company,	Boston, Mass.	25	9
31.	Kansas City Railways,	Kansas City, Mo.	25	1

Fleets of 10 to 24 Units:

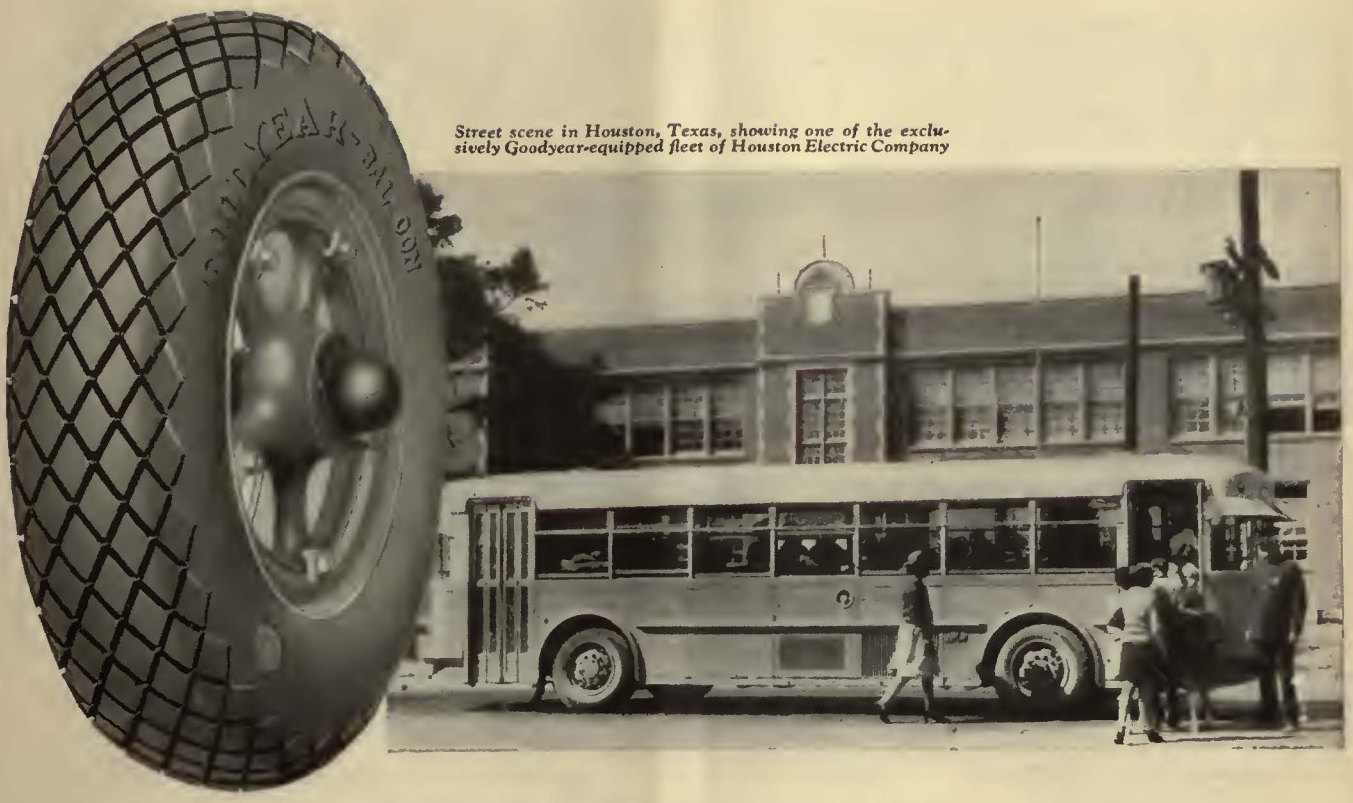
32.	Baltimore & Ohio R.R. Company,	Baltimore, Md.	21	3
33.	Blue Bus Company,	Cincinnati, Ohio	21	4
34.	De Camp Bus Lines, Inc.,	Livingston, N. J.	21	8
35.	Illinois Power & Light Company,	Peoria, Ill.	21	6
36.	Southern Pacific Motor Transportation Company,	Portland, Ore.	21	4
37.	Capital Traction Company,	Washington, D. C.	22	7
38.	Gary Street Railways,	Gary, Ind.	22	6
39.	Portland Electric Power Company,	Portland, Ore.	22	5
40.	Arrow Bus Line Interstate Company,	Montclair, N. J.	21	2
41.	White Transit Company,	Wilkes-Barre, Pa.	20	14
42.	British Columbia Rapid Transit Company,	Vancouver, B. C.	19	8
43.	Illinois Power & Light Company,	Galesburg, Ill.	19	6
44.	Northland Transportation Company,	Minneapolis, Minn.	19	3
45.	Houston Electric Company,	Houston, Texas	18	8
46.	New Orleans Public Service Company,	New Orleans, La.	18	3
47.	Midland Trail Transit Company,	Charleston, W. Va.	17	4
48.	Butler-Newark Bus Line, Inc.,	Newark, N. J.	16	2
49.	Danbury Power & Transportation Company,	Danbury, Conn.	16	2
50.	Dominion Power & Transmission Company,	Hamilton, Ont., Can.	16	2
51.	Evanston Bus Company,	Evanston, Ill.	16	6
52.	North Coast Transportation Company,	Tacoma, Wash.	16	4
53.	United Electric Railways Company,	Providence, R. I.	16	2
54.	Wisconsin Power & Light Company,	Madison, Wis.	15	4
55.	Illinois Power & Light Company,	Decatur, Ill.	14	2
56.	Interstate Coach Company,	Spokane, Wash.	14	4
57.	Kentucky Coach Company,	Lexington, Ky.	14	4
58.	Miami Beach Electric Company,	Miami, Fla.	14	
59.	Valley Bus Company,	Cincinnati, Ohio.	14	5
60.	Illinois Power & Light Company,	Quincy, Ill.	13	2
61.	Monongahela West Penn. Public Service Company,	Fairmont, W. Va.	13	5
62.	Topeka Railway Company,	Topeka, Kans.	13	2
63.	United Motor Coach Company,	Des Plaines, Ill.	13	4
64.	Cannonball Transportation Company,	Portsmouth, Ohio	12	2
65.	Community Traction Company,	Toledo, Ohio	12	1

Fleets of 10 to 24 Units (Continued)

			Coaches	Reorders
66.	Egyptian Transportation Company,	Marion, Ill.	12	6
67.	Oklahoma Railway Company,	Oklahoma City, Okla.	12	3
68.	Tennessee Transportation Company,	Nashville, Tenn.	12	
69.	Brooklyn Bus Corpocation,	Brooklyn, N. Y.	11	1
70.	Louisville Railway Company,	Louisville, Ky.	11	1
71.	San Antonio Public Service Company,	San Antonio, Texas	11	3
72.	A. B. & W. Rapid Transit Company,	Alexandria, Va.	10	
73.	Atlanta Coach Company,	Atlanta, Ga.	10	
74.	Chicago, North Shore & Milwaukee R.R. Company,	Chicago, Ill.	10	2
75.	Cleveland Railway Company,	Cleveland, Ohio	10	
76.	Consolidated Cab Company, Ltd.,	Montreal, Que., Can.	10	3
77.	Grove Street Crosstown Bus Line,	Irvington, N. J.	10	
78.	Key System Transit Company,	Oakland, Calif.	10	2
79.	New York & Philadelphia Bus Line, Inc.,	Brooklyn, N. Y.	10	1
80.	Southern Public Utilities Company,	Winston-Salem, N. C.	10	3

Fleets of 5 to 9 Units:

81.	Denver & Interurban Motor Coach,	Denver, Colo.	9	3
82.	East St. Louis & Suburban Railway,	East St. Louis, Ill.	9	5
83.	Edwards Motor Transit Company, Inc.,	Dullois, Pa.	9	4
84.	Erie Coach Company,	Erie, Pa.	9	4
85.	Louisiana Electric Company, Inc.,	Lake Charles, La.	9	
86.	Rockford & Interurban Railway Company,	Rockford, Ill.	9	1
87.	Twin City Motor Bus Company,	Minneapolis, Minn.	9	
88.	Wisconsin Public Service Company,	Green Bay, Wis.	9	4
89.	Gray Line Motor Tours,	Chicago, Ill.	8	3
90.	Municipal Railways,	St. Petersburg, Fla.	8	
91.	Tennessee Electric Power Company,	Chattanooga, Tenn.	8	2
92.	Central Passenger Railway Company,	Atlantic City, N. J.	7	2
93.	Illinois Power & Light Company,	Danville, Ill.	7	1
94.	Kentucky Utilities Company, Inc.,	Paducah, Ky.	7	1
95.	Logan Valley Bus Company,	Altoona, Pa.	7	1
96.	New Jersey Interurban Coach Company,	Camden, N. J.	7	4
97.	Portland-Seattle Stage Line,	Tacoma, Wash.	7	3
98.	Red Bird Transit Company,	Charleston, W. Va.	7	
99.	Schuylkill Transportation Company,	Philadelphia, Pa.	7	5
100.	Shawnee-Tecumseh Traction Company,	Muskogee, Okla.	7	1
101.	Smith Motor Coach Lines,	Memphis, Tenn.	7	4
102.	Tri-City Railway Company,	Davenport, Ia.	7	1
103.	West Ridge Transportation Company,	Girard, Pa.	7	4
104.	Wyoming Auto Bus Company,	Wilkes-Barre, Pa.	7	2
105.	Bay Cities Transit Company,	Santa Monica, Calif.	6	1
106.	Consolidated Coach Company,	Lexington, Ky.	6	2
107.	Delaware, New Jersey Transportation Company,	Bridgeton, N. J.	6	1
108.	Durham Public Service Company,	Durham, N. C.	6	3
109.	Eastern Massachusetts Street Railway,	Boston, Mass.	6	
110.	Eastern Texas Electric Company,	Beaumont, Texas	6	1
111.	Illinois Power & Light Company,	Granite City, Ill.	6	
112.	Illinois Power & Light Company,	Oskaloosa, Ia.	6	
113.	Interstate State Lines,	Topeka, Kans.	6	1
114.	Key West Electric Company,	Key West, Fla.	6	
115.	Kingston Consolidated Railway Company,	Kingston, N. Y.	6	1
116.	LaCrosse & Southeastern Railway,	LaCrosse, Wis.	6	4
117.	London Street Railway Company,	London, Ont., Can.	6	3
118.	Madison Railways Company,	Madison, Wis.	6	1
119.	Midland Trail Bus Line, Inc.,	Olney, Ill.	6	1
120.	Northwestern Transit Company,	Oak Park, Ill.	6	1
121.	Philadelphia Suburban Transportation Company,	Philadelphia, Pa.	6	
122.	Roanoke Railway & Electric Company,	Roanoke, Va.	6	
123.	Sao Paulo Railway, Light & Power Company,	Sao Paulo, Brazil	6	
124.	Chicago, South Bend & Northern Indiana Railway,	South Bend, Ind.	6	4
125.	Springfield Traction Company,	Springfield, Mo.	6	2
126.	Sutherland-Tiajuana Stages,	San Diego, Calif.	6	2
127.	Blue Goose Motor Coach Company, Inc.,	East St. Louis, Mo.	5	1
128.	Blue Line Stage Company,	Walla Walla, Wash.	5	3
129.	Campbell & Cuddy Motor Tours,	Boston, Mass.	5	3
130.	Citizens Traction Company,	Oil City, Pa.	5	1
131.	Colorado Springs & Interurban R. R.,	Colorado Springs, Col.	5	2
132.	Empress Taxi & Sightseeing Company,	Victoria, B. C., Can.	5	4
133.	Ferguson-Wellston Bus Company,	Ferguson, Mo.	5	4
134.	Greyhound Lines,	Cincinnati, Ohio	5	1
135.	Illinois Power Company,	Springfield, Ill.	5	1
136.	Interurban Transportation Company,	Alexandria, La.	5	
137.	Kansas Public Service Company,	Atchison, Kans.	5	2
138.	Metropolitan Coach Company,	Chicago, Ill.	5	
139.	Montgomery Bus Company,	Bryn Mawr, Pa.	5	
140.	Nashville, Chattanooga & St. Louis Railway,	Nashville, Tenn.	5	1
141.	Niles Center Bus Line,	Niles Center, Ill.	5	1
142.	Olympia Grays Harbor Transportation Company,	Olympia, Wash.	5	2
143.	Pacific Electric Railway Company,	Los Angeles, Calif.	5	
144.	Pennsylvania-Ohio Power & Light Company,	Youngstown, Ohio	5	
145.	Reliable Motor Coach Company,	Monticello, N. Y.	5	5
146.	Richmond-Washington Coach Company,	Alexandria, Va.	5	2
147.	Sunflower Stage Lines,	Kansas City, Mo.	5	
148.	Terre Haute, Indianapolis & Eastern Traction Company,	Indianapolis, Ind.	5	1
149.	Union Transfer Company, Inc.,	Nashville, Tenn.	5	
150.	Wuer Bus Company, Inc.,	Easton, Pa.	5	1
151.	Western Motor Coach Company,	Chicago, Ill.	5	
152.	Yellow Cab Company,	Oklahoma City, Okla.	5	



Street scene in Houston, Texas, showing one of the exclusively Goodyear-equipped fleet of Houston Electric Company

HOUSTON ELECTRIC

for four years now has used Goodyears EXCLUSIVELY

Houston Electric Company operates a fleet of 63 motor buses.

These buses last year delivered a total mileage of 1,521,441 bus miles. This year, they are expected to run in excess of 2,000,000 miles.

For four years now, Houston Electric Company buses have been equipped with Goodyear Bus Tires *exclusively.*

That amount of service and that length of service furnish the strongest testimonial to the quality and economy of Goodyear Tires.

If there were any better tires, Houston Electric Company's policy of using the best would dictate their use.

If there were anything as good at lower costs, Houston Electric's regard for economical public service would insure their use.

Houston Electric uses Goodyears *exclusively.*

* * *

Goodyear Bus Tires have many *exclusive* features. They have the All-Weather Tread for Traction and Safety. They are made of SUPER-TWIST—Goodyear's extra-elastic and extra-durable cord fabric—for long wear, for road insurance against blowouts and bruises, and for balloon-effect cushioning.

They combine these exclusive features with a low-per-mile cost that shows up on the right side of the traffic ledger.

If you want these tire advantages, at no more first cost and at less final cost, equip *your* buses with Goodyears *exclusively.*

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service

GOODYEAR

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

STONE & WEBSTER
Incorporated
Design and Construction
Examinations Reports Appraisals
Industrial and Public Service Properties
NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION
Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
Appraisals—Management
52 Vanderbilt Ave. New York

SANDERSON & PORTER
ENGINEERS
PUBLIC UTILITIES & INDUSTRIALS
Design Construction Management
Examinations Reports Valuations
CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST
Consulting Engineers
Appraisals Reports Rates Service Investigation
Studies on Financial and Physical Rehabilitation
Reorganization Operation Management
683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

STEVENS & WOOD
INCORPORATED
ENGINEERS AND CONSTRUCTORS
120 BROADWAY, NEW YORK
ENGINEERING CONSTRUCTION — YOUNGSTOWN, O. CHICAGO, ILL. — FINANCING MANAGEMENT

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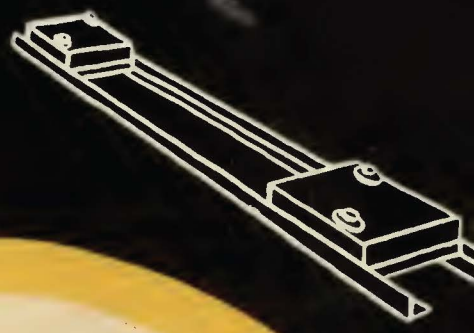

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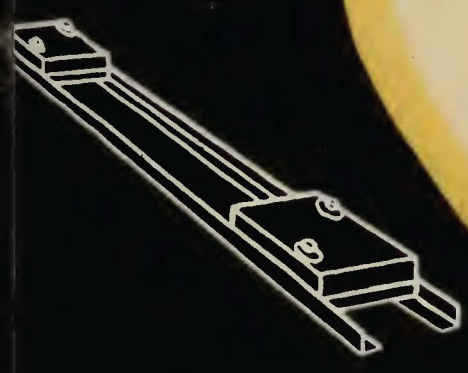

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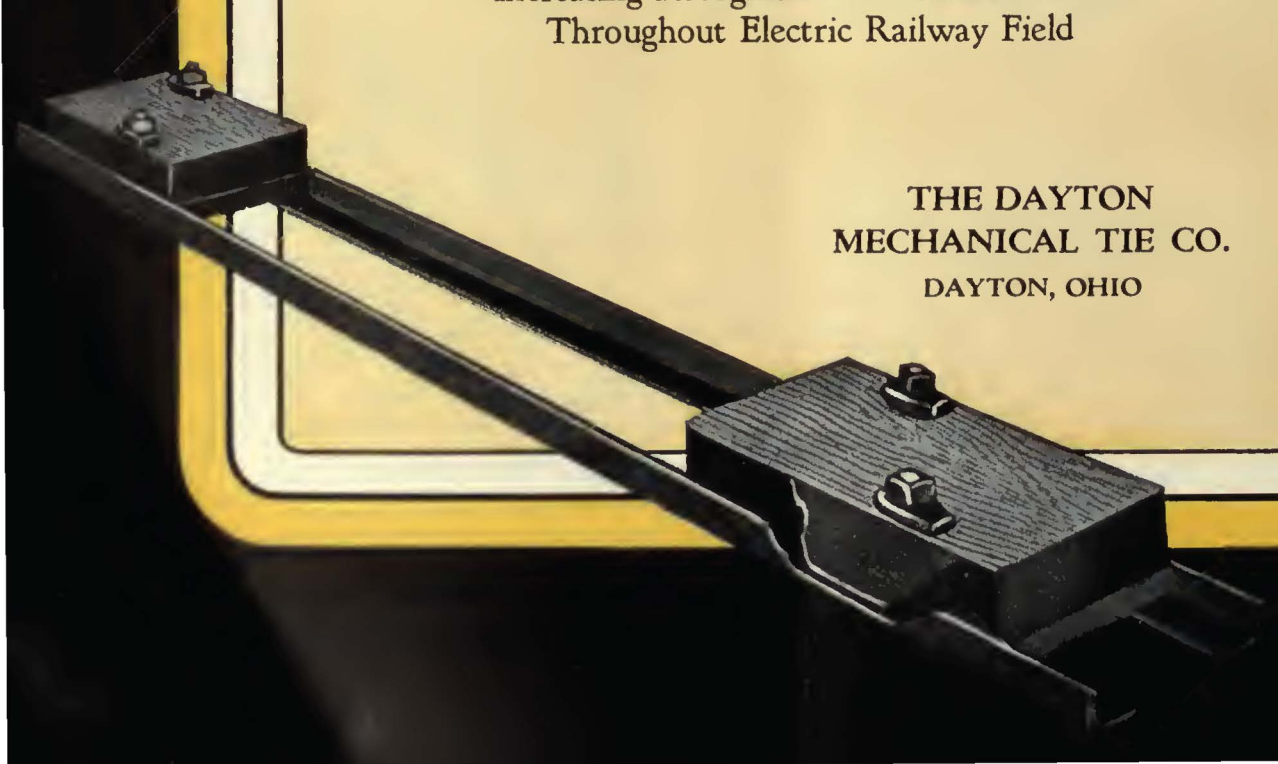

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

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0301

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I CAN manage your street railway property regardless of location, size or local difficulties. PW-108, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MANAGER or general superintendent; fifteen years' successful experience. PW-116, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, wide experience, established successful record, every class of transportation, progressive, efficient, capable getting results under any condition; available short notice; fine references. PW-117, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

If you are in charge of employment and need good men—

Or you are an individual seeking a better position—

ADVERTISE
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35 years of age, raised in the practical school of things, has had an unusually broad, practical, executive experience that has contacted practically every basic industry known in the United States, as well as many collateral industries.

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His experience and ability are such as to make his service of large value to financial interests where there are, from time to time, varying problems to be solved.

Will consider connections with the right people and where the future appears to be compensating.

Available in fifteen to thirty days.

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225 Broadway, New York City

"Searchlight"
is
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Advertising

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

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

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Tr. Br. Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatoc regulators, voltage current & synchronizing
American Brown Boveri Elec. Corp.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

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Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Illinois Steel Co.
Westinghouse E. & M. Co.

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
Inter. Cash Reg. Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings, Anti-Friction
Timken Roller Bearing Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co., A.

Bearings, Roller
Timken Roller Bearing Co.

Bearings, Thrust
Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Htg. Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Brill Co. The J. G.

Boilers
Babcock & Wilcox Co.

Bolts & Nuts, Track
Illinois Steel Co.

Bolts, Case Hardened
Bemis Car Truck Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Books
McGraw-Hill Book Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & F'dry Co.
Bemis Car Truck Co.
Brill Co., The J. G.

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
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon
General Electric Co.
Morganite Brush Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co.

Brushholders
Columbia Machine Works
General Electric Co.

Buses
International Harvester Co.
Studebaker Corp. of America
Twin Coach Corp.
Versare Corp.

Buses, Motor
General Electric 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

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
General Electric Co.
Irvington Varn'h & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel 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.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Twin Coach Corp.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

Castings, Brass Composition or Copper
Cincinnati Car Co.
Columbia Machine Works

Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

Castings, Malleable
Timken Roller Bearing Co.

Castings, Malleable & Brass
Bemis Car Truck Co.
Columbia Machine Works

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Change Trays
Cincinnati Car Co.

Circuit-Breakers
American Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.

Coil Banding and Winding Machines
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Coils, Coke 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.
Inter. Cash Reg. Co., The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condensor Papers
Irvington Varn'h & Ins. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Works
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Columbia Machine Works
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.

Copper Wire
American Brass Co.
Anaconda Cop. Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Brass Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
Inter. Cash Reg. Co., The
Roebling's Sons Co., John A.
Silver Lake Co.

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Elec. Service Supplies Co.

Couplers Car
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols-Lintern Co.

Cranes, Hoists & Lifts
Electric Service Supplies Co

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Tr. Br. Co.

Dealer's Machinery & Second Hand Equipment
Salzberg Co., Inc., H. E.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Works
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.

Doors & Door Fixtures
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Doors, Folding Vestibule
National Pneumatic Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electrical Wires and Cables
American Steel & Wire Co.
John A. Roebling's Sons Co.

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Beeler, John A.
Bibbins, Roland J.
Day & Zimmermann, Inc.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClelland & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J. G.

Engines, Gasoline
Waukesha Motor Corp.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Cash Reg. Co.
Percy Mfg. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.
National Cash Reg. Co.

Fences, Woven Wire & Fence Posts.
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Floodlights
Electric Service Supplies Co.
General Electric Co.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co.
General Electric Co.

(Continued on page 40)

Ohio Brass Co.
Westinghouse E. & M. Co.

Furnace, Electric
American Brown Boveri Elec. Corp.

Fuses and Fuse Boxes
Columbia Machine Works
Consolidated Car Htg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gas Electric Drive for Buses
General Electric Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co. The J. G.
Cincinnati Car Co.

Gear Blanks
Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Works
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall & Co., R. D.

Generators
American Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
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Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

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Guard Rails, Tee Rail & Manganese
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Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Columbia Machine Works
Elec. Service Supplies Co.
Nuttall & Co., R. D.
Ohio Brass Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Columbia Machine Works

Heaters, Bus
Nichols-Lintern Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car Stove
Smith Heater Co., Peter

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Works

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic
Westinghouse Tr. Brake Co.

Industrial Tractors
International Harvester Co.

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American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co.

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General Electric Co.
Irvington Varn'h & Ins. Co.
Okonite Co.

Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

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Insulating Varnishes
Irvington Varnish & Ins. Co.

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Elec. Service Supplies Co.
Irvington Varn'h & Ins. Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

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Irvington Varn'h & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Ohio Brass Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varn'h & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.

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Brill Co., The J. G.
Cincinnati Car Co.

Lamp Guards and Fixtures
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Cincinnati Car Co.

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Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Diesel Electric
American Brown Boveri Elec. Corp.

Locomotives, Electric
American Brown Boveri Elec. Corp.
Cincinnati Car Co.
General Electric Co.
Westinghouse E. & M. Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr.. & Co.

Manganese Steel Castings
Bemis Car Truck Co.
Lorain Steel Co.

Manganese, Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.

Manganese Steel Switches Frogs and Crossings
Bethlehem Steel Co.
Lorain Ajax Corp.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Mirrors, Inside & Outside
Cincinnati Car Co.

Motor Buses. (See Buses)

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Motor, Generators & Controls for Electric Buses
General Electric Co.

Motor, Generator Sets
American Brown Boveri Elec. Corp.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.

Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.

Omnibuses (See Buses)

Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Tr. Brake Co.

Paints and Varnishes (Insulating
Elec. Service Supplies Co.
Irvington Varn'h & Ins. Co.

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National Ry. Appliance Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.

Pinions (See Gears)

Pins, Case Hardened
Bemis Car Truck Co.

Pins, Case Hardened, Wood and Iron
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Works
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Supplies Co.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
Intern. Creos. & Const. Co.

Poles and Ties, Treated
Bell Lumber Co.
Intern. Creos. & Const. Co.

Poles, Trolley
Elec. Service Supplies Co.
Nuttall & Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Portable Grinders
Railway Trackwork Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Saving Devices
National Ry. Appliance Co.

Pressings, Special Steel
Cincinnati Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

Punches, Ticket
Inter. Cash Reg. Co., The

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Illinois Steel Co.
Rail Joint Co.

Rail Joints, Welded
Lorain Steel Co.

Rail Welding
Railway Trackwork Corp.
Una Welding & Bonding Co.

Rails, Steel
Carnegie Steel Co.
Illinois Steel Co.

Railway Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Rectifiers, Mercury Arc Power
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Cincinnati Car Co.
Elec. Service Supplies Co.
Inter. Cash Reg. Co., The
Money Meters, Inc.

Reinforcement, Concrete
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Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
Westinghouse E. & M. Co.

Replacers, Car
Cincinnati Car Co.
Elec. Service Supplies Co.

Resistance
Consolidated Car Htg. Co.
General Electric Co.

Resistance, Wire and Tube
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.

Sash, Metal Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers Track)

Screw Drivers, Rubber Insulated
Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Second Hand Equipment
Salzberg Co., Inc., H. E.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shovels
Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
National Pneumatic Co.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Elec. Service Supplies Co.
Nachod and United States Electric Signal Co.

Signal Systems, Highway Crossing
Nachod and United States Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
Cincinnati Car Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Nuttall & Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow Plows
National Ry. Appliance Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Works

Snow Sweeper, Rattan
J. G. Brill Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varn'h & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
American Steel & Wire Co.
Illinois Steel Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs
National Ry. Appliance Co.

Springs, Car and Truck
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co. The J. G.
Cincinnati Car Co.
Standard Steel Works

Sprinklers, Track and Road
Brill Co., The J. G.

Steel, Electric Furnace
Timken Roller Bearing Co.

Steel, Open Hearth
Timken Roller Bearing Co.

Steel and Steel Products
American Steel & Wire Co.
Carnegie Steel Co.
Illinois Steel Co.

Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express)

Structural Steel
American Brown Boveri Elec. Corp.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches
American Brown Boveri Elec. Corp.
General Electric Co.

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo-Ajax Corp.

Switches, Track (See Track Special Work

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

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Tee Rail Special Track Work
Lorain Steel Co.
Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Telephone & Telegraph Wire
American Steel & Wire Co.
John A. Roeblings Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.)

Thermostats
Consolidated Car Htg. Co.
Gold Car Htg. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Tie plates
Illinois Steel Co.

Ties and Tie Rods, Steel
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
Goodyear Tire & Rub. Co.

Tokens
Johnson Fare Box Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

Tools, Track & Miscellaneous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Railway Trackwork Co.
Ramapo-Ajax Corp.

Towers and Transmission Structure
Westinghouse E. & M. Co.

Track Grinders
Railway Trackwak Co.
Ramapo-Ajax Corp.

Track, Special Work
Columbia Machine Works
Ramapo-Ajax Corp.

Trackless Trolley Cars
Brill Co., The J. G.

Transformers
American Brown Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety Stair, Car Step
Cincinnati Car Co.

Tree Wire
Okonite Co.
Okonite-Callender Cable Co.

Trolley Bases
Nuttall & Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Nuttall & Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
Twin Coach Corp.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Pins
Bemis Car Truck Co.

Trolley Wheel Bushings
Star Brass Works

Trolley Wheels (See Wheels Trolley)

Trolley Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Trucks, Motor
International Harvester Co.

Tubing, Steel
Timken Roller Bearing Co.

Tubing, Yellow and Black Flexible Varnish
Irvington Varn'h & Ins. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

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Westinghouse Tr. Br. Co.

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Irvington Varn'h & Ins. Co.

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Cincinnati Car Co.
Consolidated Car Htg. Co.
Nichols-Lintern Co.
Nat'l Ry. Appliance Co.
Railway Utility Co.

Welded Rail Joints
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.

Welding Processes and Apparatus
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding, Steel
Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire
American Steel & Wire Co.
Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire and Rods
Railway Trackwork Co.

Wheel Guards See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Griffin Wheel Co.

Wheels, Car, Steel & Steel Tire
Bemis Car Truck Co.
Carnegie Steel Co.
Illinois Steel Co.
Standard Steel Works

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Nat'l. Bearing Met. Corp.
Nuttall & Co., R. D.
Ohio Brass Co.
Star Brass Works

Wheels, Wrought Steel
Illinois Steel Co.

Whistles, Air
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Br. Co.

Window Guards & Fittings
Cincinnati Car Co.

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Wires and Cables
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American Steel & Wire Co.
Anaconda Copper Min. Co.
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1927 was the most successful year in the history of the Arkansas Power and Light Company, Little Rock, Arkansas.

As reported in the *Electric Railway Journal,* May 5, the very favorable net profits which accrued were attributed to their modernization program, started with the purchase of eight double-truck cars built by the American Car Company and followed by thirty single-truck cars purchased from the same company in 1926.

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