ELECTRIC RAILWAY JOURNAL

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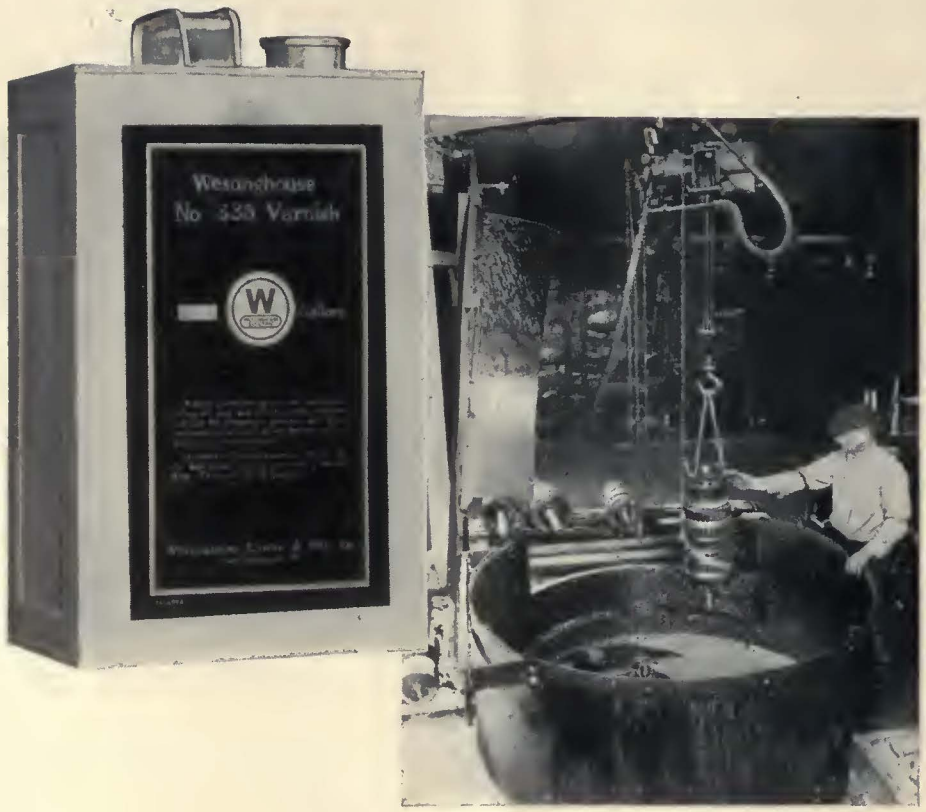

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London, England

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MARCH 31, 1928

The Far-Flung Influence of the Printed Word

MOST readers of the JOURNAL may not be aware of the widespread public attention which is given to articles appearing in the pages of their business paper. The JOURNAL's coverage of the local transportation industry, not only in America but throughout the world, has been a feature of this paper's service that is generally understood among both its subscribers and contributors. But the far-flung influence outside the industry of an article in the JOURNAL and the momentum of the printed word may not be so generally known. The story of a single recent article may prove of interest.

In the February 4, 1928, issue of the JOURNAL there was published an article by E. J. McIlraith on the effects of parking prohibition in Chicago's central business district. On the sixth, a leading New York newspaper, realizing the news interest in this article, quoted from it in its columns. Articles or editorials subsequently appeared in other cities, among which were Jamestown, Zanesville, Ohio, Buffalo, Detroit, Baltimore, Ann Arbor, Rochester, Superior, Wis., Perth Amboy, Anniston, Ala., and Birmingham, Mich. Doubtless there were many more which did not come to the JOURNAL's attention. It is impossible to predict how far or how long discussion of this single article will extend in the public press. But experience indicates that it is not unusual for an item like this to receive attention for several months, and to reach into the most out-of-the-way corners of the country.

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Why Not Invest In A Sure Thing

Dayton Tie Track

If Dayton Tie Track cost twice as much as ordinary track the investment might look too big, even considering its long life.

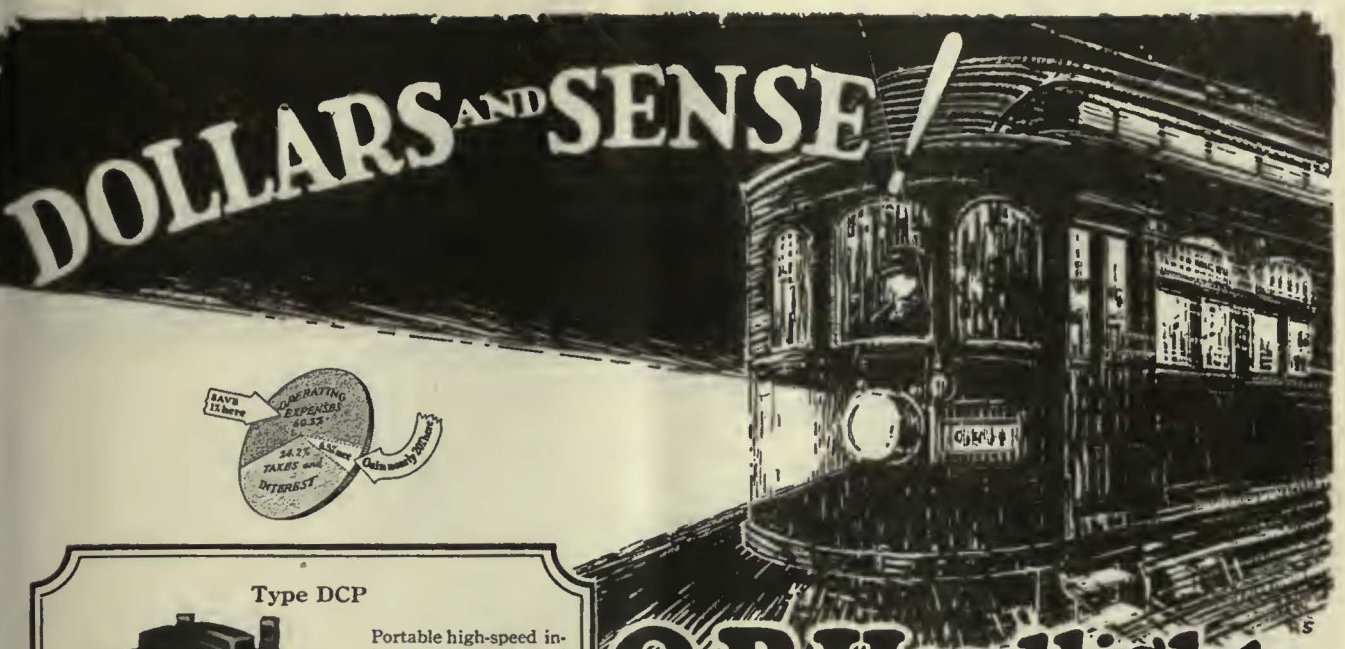
But, due to economies in concrete, etc., it actually costs less—it has been laid for $8 per lineal foot—including tearing up of old pavement, rails, concrete, ties, and relaying new pavement.

The scientific construction of the Tie makes it immune to forces which ordinarily destroy track.

We can *show* you Dayton Tie Track is a sure thing.

The Dayton Mechanical Tie Co.

DAYTON, OHIO

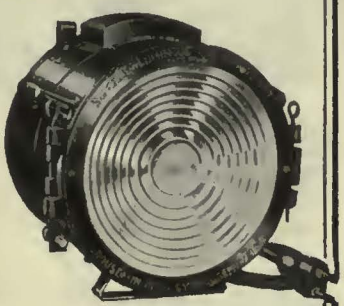


Type DCP

Portable high-speed interurban type, 500-watt lamp in mogul base; 11-in. dia. crystal ray glass or nickel plated copper reflector; maximum incandescent illumination. Also furnished with medium screw base. Has Two-way focusing mechanism. Page 755 of O-B Catalog No. 20.

Type LAA

Portable, luminous arc type headlight for high-speed interurban service. Illuminates track far enough ahead to permit safe braking of car at sixty miles per hour. Arc will hold when voltage has fallen to 50% of normal. Has incandescent dimmer lights. Clear inverted semaphore lens. Page 754 of O-B Catalog No. 20.



Type SDS

An incandescent headlight for ordinary interurban service. Mounts without cutting a hole in dash. 12-in. parabolic reflector of Crystal Ray glass, Gold Ray glass or of Sterling Ray nickel on copper, as desired. Accomodates any 56 to 250-watt, 105-130-volt focus type Mazda headlight lamp in adjustable lamp receptacle. Also furnished in portable type SDP. Page 755 of O-B Catalog No. 20.

O-B Headlights Give Speed, Safety —and Savings

TO successfully compete with other means of transportation, interurban cars must operate at a high rate of speed. To do so with safety—another equally important factor—requires adequate illumination of the track.

By designing O-B Imperial Headlights to give maximum lighting efficiency, both speed and safety factors are provided for. It is in this manner that headlights lower operating and maintenance costs —enabling the operator to make most efficient use of power and air—to run train with less nerve strain and greater assurance of safety.

Furthermore, O-B Imperials, designed and built to meet your particular operating requirements, lower maintenance charges on the headlights themselves.

O-B Imperials are available for every operating condition and for every type of car. Three popular types are illustrated. Complete particulars will be gladly forwarded upon request to

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

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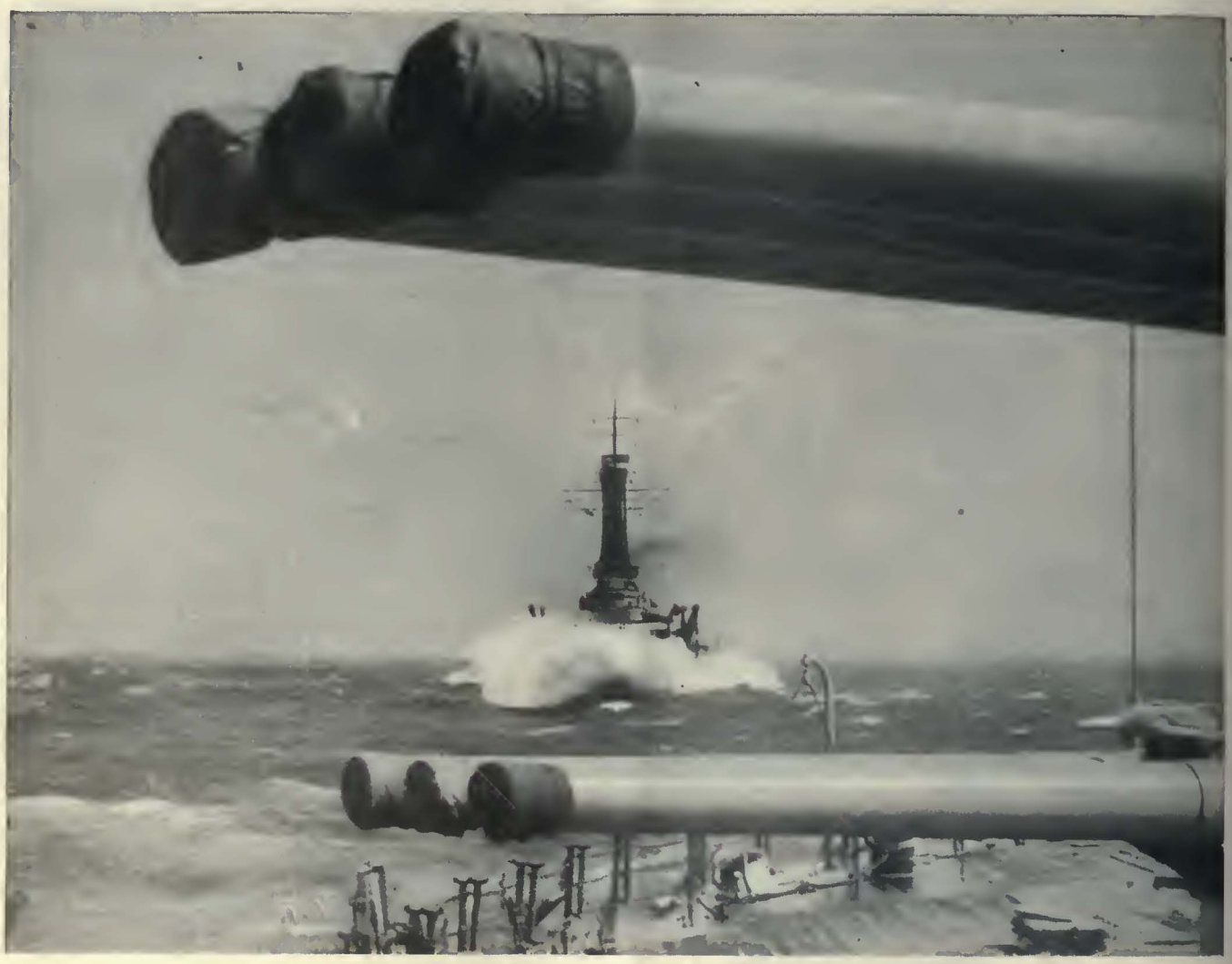

PROTECTION

Large slices of the taxpayers' money go to insure national protection.

Expensive protective organizations patrol our cities.

We are accustomed to pay well for protection and consider the cost a good investment.

Seldom is greater protection secured without additional cost, but the Davis "One Wear" Steel Wheel is an exception.

Protection against wheel failure from impact load is doubled by the use of a special heat-treated steel with the unusual physical properties.

Davis "One Wear" Steel Wheels are the safest steel wheels you can buy.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

AN INSPECTION TOUR OF THE WELL-EQUIPPED CAR

An ideal floor covering—

WEAR-PROOF MATS

Add attractiveness and safety to your car interiors by covering the aisles with Wear-Proof Mats.

These mats combine attractiveness, safety, sanitation and resiliency with economy. They roll up like a rug and cannot turn up at the edges, nor slip nor warp. They may be used on both sides, have an indefinite life and are absolutely guaranteed for a period of five years under the most extreme service conditions. They are supplied in any rectangular shape and in one or more pieces.

Let us send you complete particulars and a sample of Wear-Proof Mats and of other Keystone Equipment found on the modern well-equipped car.

Ask for ESSCO Catalog No. 7

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

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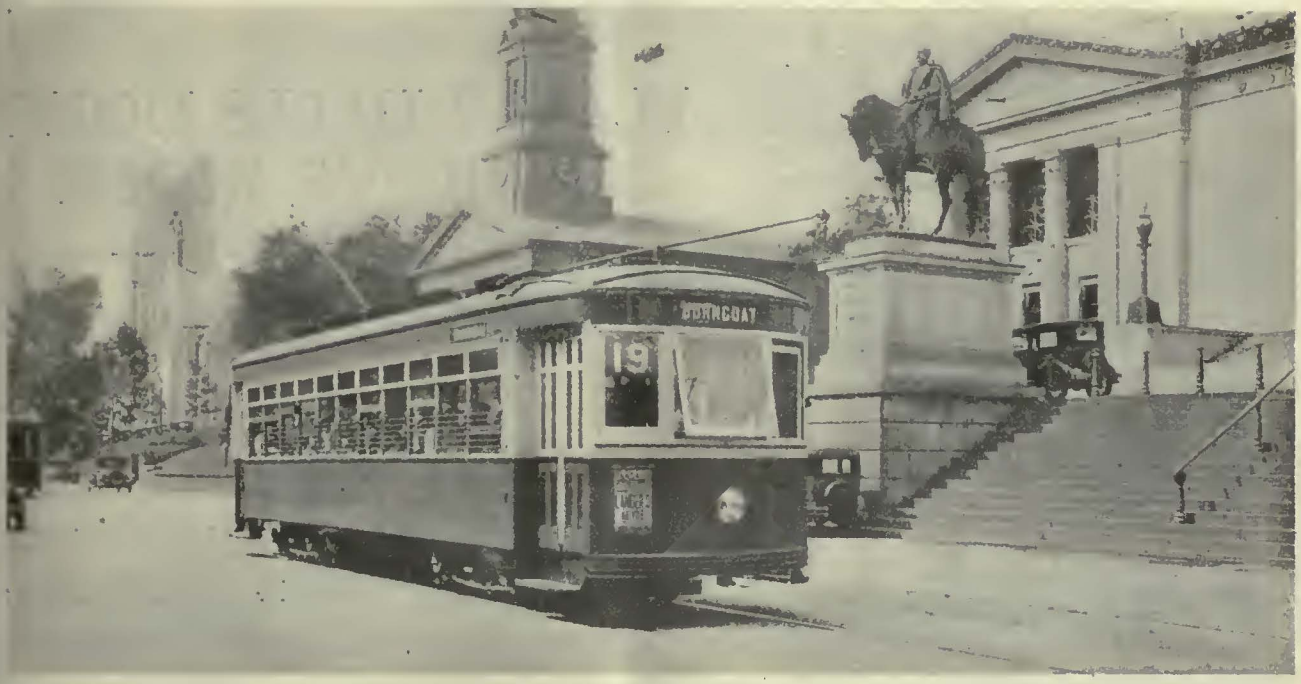
MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL



Why the Variable Load Brake is a *Better* Brake

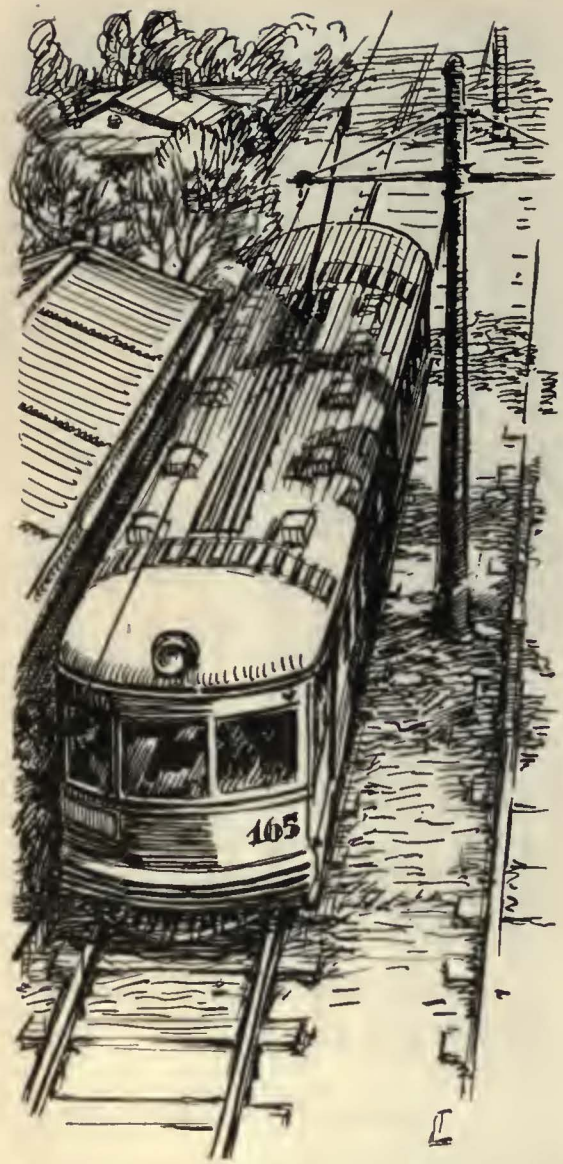
1. Greater Safety . . . same degree of retarding force on loaded and empty cars.
2. Reduced Delays . . . short stops permit cars to keep abreast of the traffic stream.
3. Faster Schedules . . . uniformly quick stops permit longer peak speed operation.

The illustration shows one of the fifty cars recently put into service by the Worcester Consolidated Street Railway —they are all equipped with the Westinghouse Variable Load Brake.

The Westinghouse Variable Load Brake automatically adjusts brake cylinder pressure as car weight changes —permitting maximum retarding rate throughout range of passenger loading.

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

WESTINGHOUSE TRACTION BRAKES



FLAT WHEELS DON'T IMPROVE RIDER RELATIONS—

How about your *wheels?*

Passengers don't tolerate the miserable riding qualities of "flat", badly worn or inaccurate wheels.

Standard Wheels and Axles check O. K. from standpoints of passenger comfort and long, economical wear.

Rolled Steel Wheels *Armature Shafts* *Axles and Springs*

"FOR EVERY TYPE OF CAR

IN EVERY TYPE OF SERVICE"

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

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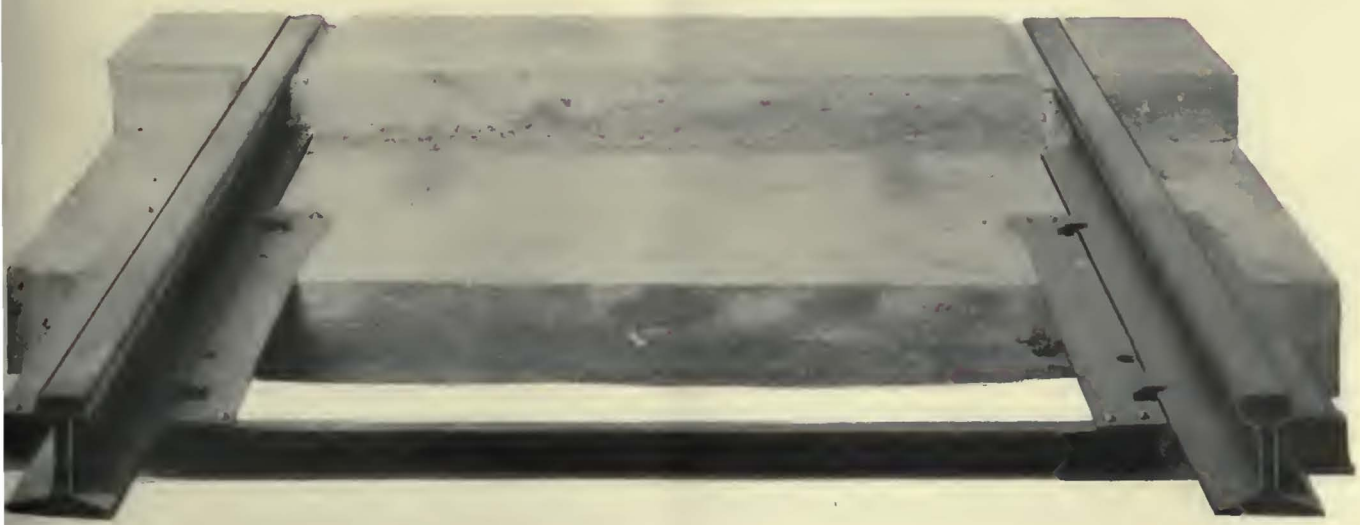
STYLES IN TRACK CONSTRUCTION

7

This is No. 7 of a series on paved track design with STEEL TWIN TIES as used in over 45% of the cities of over 200,000 population in the United States. No. 8 will appear in an early issue.

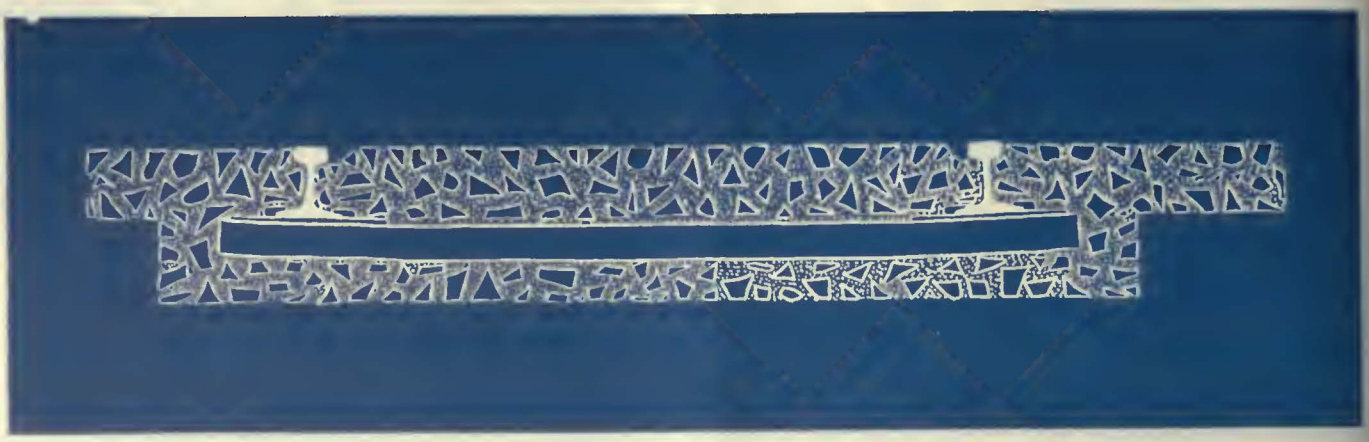
No. 1 Cincinnati
No. 2 Boston
No. 3 Detroit
No. 4 Philadelphia
No. 5 Kansas City
No. 6 Cleveland
No. 7 Washington
No. 8 Buffalo



STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION

In Washington



STEEL TWIN TIES are furnished for the Washington Railway and Electric Company with the ends bent upward 1 in 25 to cant the rail and are punched for 100 lb. AEREA rail, for all their overhead trolley construction. The rails are Thermit welded and the track is paved with concrete laid monolithic with the foundation.

Complete detailed drawings and specifications will be sent on request.

Engineers of The International Steel Tie Company have played no small part in the design of better, more lasting track. We have in our files a fund of data on paved track construction that is at your disposal. We will be pleased to discuss with you your paved track problems, and to help you start your modernization program right. Steel Twin Ties are the first step toward better service, and lower initial and maintenance costs.

The International Steel Tie Co.
Cleveland, Ohio

TWIN TIES ARE ALL STEEL

TREADLE-IZATION

plays a part in

MODERNIZATION

by adding to the Safety, Speed and Comfort of the Modern Car

CONSTANTLY NP BETTER

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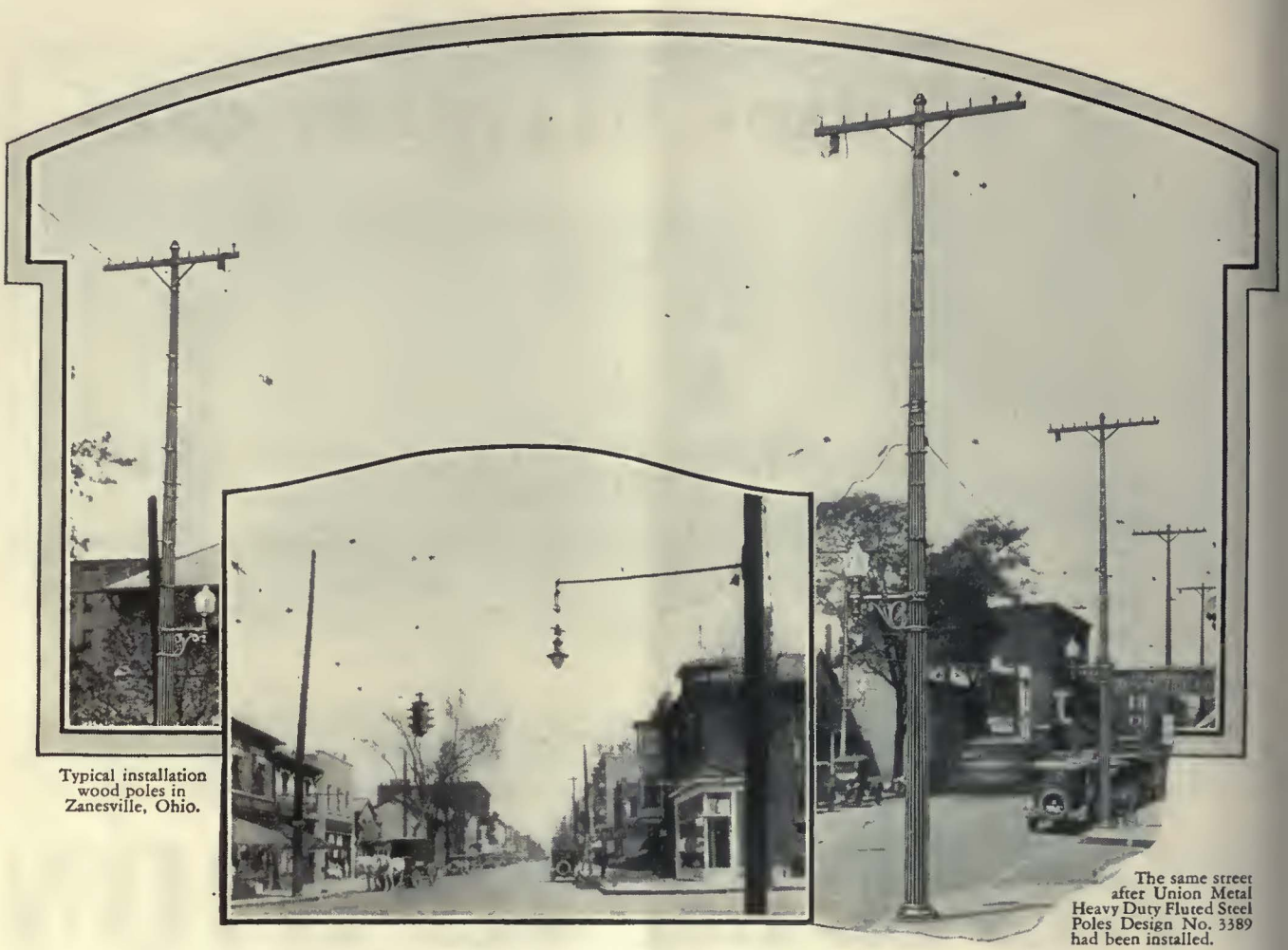

Typical installation wood poles in Zanesville, Ohio.

The same street after Union Metal Heavy Duty Fluted Steel Poles Design No. 3389 had been installed.

Zanesville Beautifies the Curb Line

CIVILIZATION moves rapidly, eliminating the makeshifts and making obsolete the practices of yesterday. Thus ornamental steel poles for transmission and distribution lines are replacing the old-style, ugly wooden poles just as the electric light displaced the kerosene lamp.

Take Zanesville, Ohio, for instance. There, 525 Union Metal Heavy Duty Fluted Steel Poles will soon replace the cumbersome wooden ones along the curb line. The first section of the new system is now installed and carries both the trolley-span wires and the over-head equipment. Instead of irregular rows of wooden poles of varying size, clean cut, artistic Union Metal poles extend in straight lines down the street, adding much to the dignity of the thoroughfare.

Zanesville is reaping the benefits of Union Metal advantages: the low installation and maintenance costs, the ease and speed of replacement, proper ventilation, the anchor rod construction and the unusual strength and durability.

Many other cities are having the same experience. Write for detailed information and see how Union Metal poles can be adapted to your own local requirements.

THE UNION METAL MANUFACTURING CO.
General Offices and Factory, Canton, Ohio
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UNION METAL
DISTRIBUTION AND TRANSMISSION POLES

SERIES 508

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27-PASSENGER PARLOR COACH
29-PASSENGER PARLOR OBSERVATION COACH

SERIES 601-602

23-PASSENGER URBAN COACH
21-PASSENGER URBAN COACH
16-PASSENGER PARLOR COACH

SERIES 510

60-PASSENGER DOUBLE DECK COACH

SERIES 511

40-PASSENGER METROPOLITAN ALL-STEEL COACH

Revenue TRANSPORTATION

The perfect adaptability of the A.C.F line to the widest variety of operating conditions evidences A.C.F *revenue-transportation* experience.

The A.C.F operator has the coaches to get the business, and to increase it, by handling it right.

More passenger miles, as well as low cost per mile, are required for maximum return.

A.C.F coaches are qualifying in critical service, under the same strict cost-keeping applied to any other type of revenue-transportation equipment!

AMERICAN CAR AND FOUNDRY MOTORS COMPANY
30 Church Street, New York

a.c.f

a.c.f Hall-Scott

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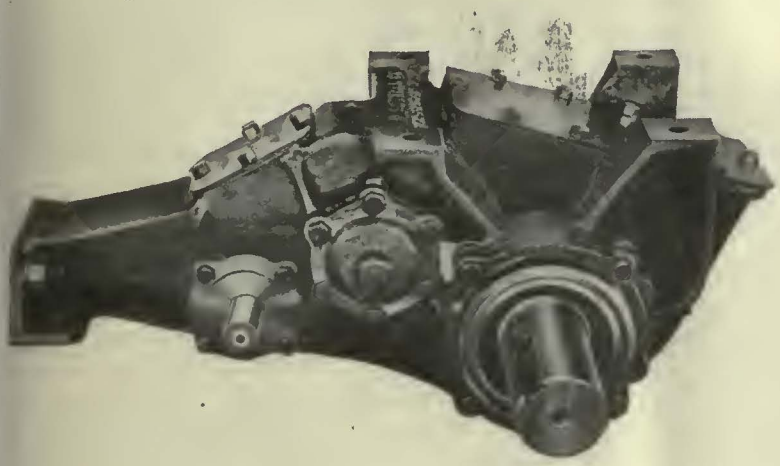
Cost" and "Light Weight With Strength" are accomplished facts finding expression in the design and construction of Cincinnati BALANCED Lightweight Cars. They are reducing costs and boosting revenue wherever they serve the public. And while they are accomplishing this they are establishing, too, new and higher standards of comfort in the minds of the public.

Your decided opinions on the relation of car design to the sale of transportation cannot suffer through an intimate acquaintance with the Four Features as presented by the Cincinnati Car Company. How soon will it be convenient for you to talk things over?

CINCINNATI CAR COMPANY
Cincinnati, Ohio

CINCINNATI BALANCED LIGHTWEIGHT CARS

The Public must be pleased!



With the new conception of the electric car as the most *popular* of public transportation agencies, car designers have stressed safety, comfort and appearance. The public *must* be pleased. Satisfied passengers will pay for your equipment.

The W-N Drive (a Westinghouse-Nuttall development) for use with light-weight, high-speed motors has already attracted wide and favorable interest. The industry has been quick to sense its advantages to themselves and to the riding public—smoother starting, quiet operation, rapid acceleration and greater all-round efficiency. Here are some features of the popularity of the new W-N Drive: Heat-treated hardened helical gears, Timken roller bearings, Oil-tight steel gear case, high ratio of speed reduction.

If you want to wear the smile of *genuine satisfaction*, and see that smile on every conductor's face—on every face around the car barn, here's a sure fire prescription:

Put on some Nuttall US 20-A Trolley bases. Timken Tapered Roller Bearings insure durability and sensitiveness, permitting the trolley to swivel freely and instantly follow changes in trolley wire alignment.

The design is such that the base actually hangs on the bearings and not on the center pin; "cocking" strains are evenly distributed; all wearing parts are hardened; and lubrication is taken care of by a twice a year oiling system. Heavy shunts conduct the current around bearings and moving parts, so you can forget arcing troubles.

Gear noise has a definite effect on passenger good will. People do not enjoy riding on cars on which the gears screech and grumble as if in agony. Why put their good will to the test of screeching gears? It's unnecessary.

Nuttall Helical Gears with their smooth, quiet operation will eliminate this source of annoyance. Their meshing is like the turning of a screw, smooth, continuous and vibrationless. Because of the Nuttall BP Heat Treatment, they show a service life substantially so much longer that they are warranted on this score alone.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

*All Westinghouse Elec. & Mfg. Co. District Offices are Sales Representatives for Nuttall Railway Products

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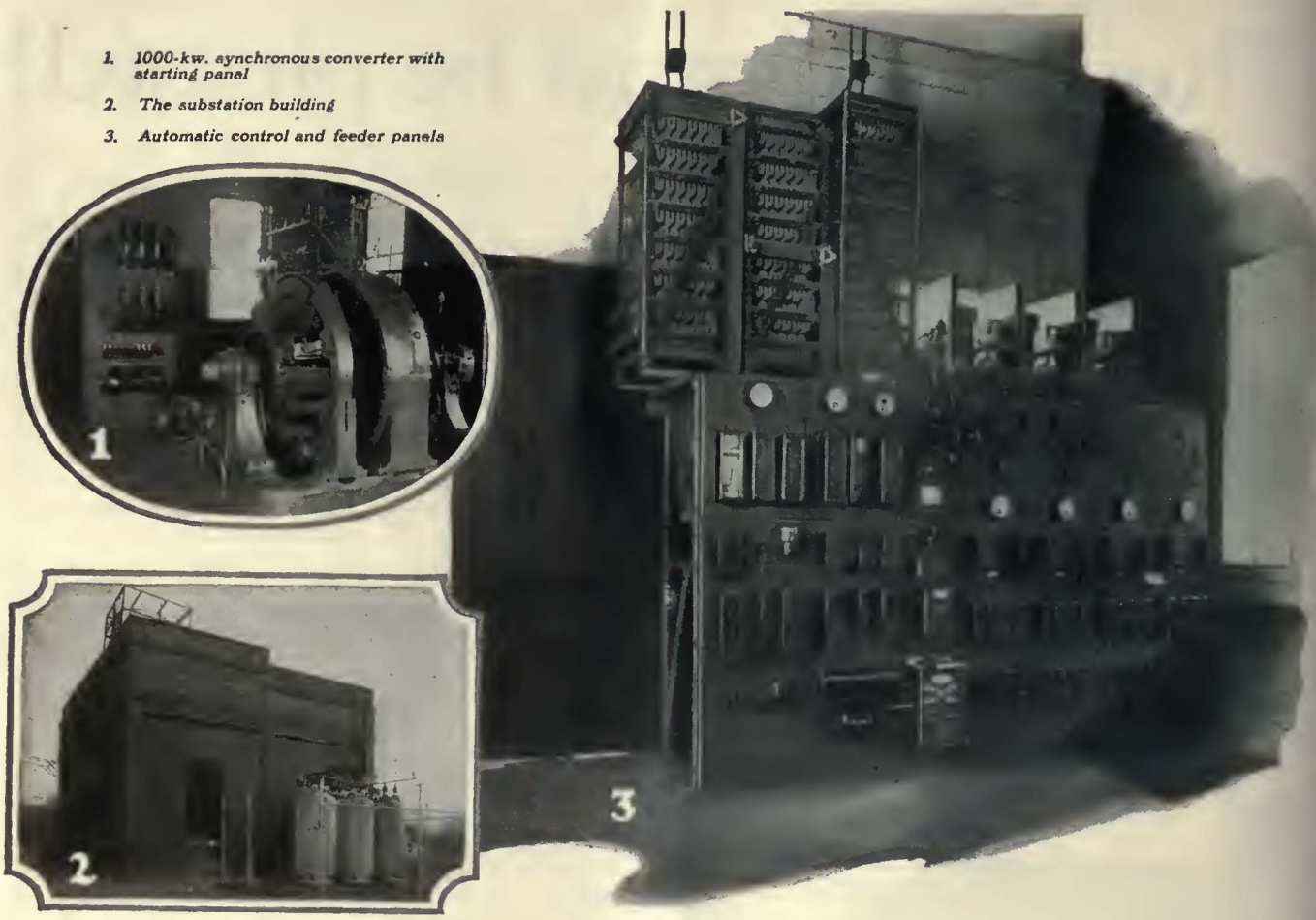
Nuttall

1. *1000-kw. synchronous converter with starting panel*
2. *The substation building*
3. *Automatic control and feeder panels*



Only 2 Outages in 2 years— and both were brief

The Owenton Automatic Substation of the Birmingham (Ala.) Electric Company, in operation since February 1925, has had only two outages. Neither was caused by failure of equipment inside the station. In both cases repairs were quickly made and operation was promptly resumed.

Power is brought into this station at 13,200 volts, 3 phase, 60 cycles, through the transformers to the starting equipment and to the machine. The four outgoing 600-volt d-c. feeders are each protected by Type JR high-speed circuit breakers.

A time switch starts service at 4:45 A.M. and automatically shuts it down at 8:30 P.M. During the day the voltage on the trolley circuit controls the action. If the voltage is high, the converter automatically shuts down; when the voltage is low the station automatically starts up.

The first automatic railway substation was placed in service by General Electric in 1914. The success of these early installations was so marked that the idea spread rapidly and there are now more than 325 G-E automatic switching equipments operating in railway service of all types.

GENERAL ELECTRIC

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

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, *Editor*

Volume 71 New York, Saturday, March 31, 1928 *Number* 13

Terminable Permits of Advantage Both to Investors and Consumers

MORE rapid adoption of the terminable permit, in place of the fixed term franchise has not come, according to Prof. E. R. Dillavou in this paper for March 24, because of two important things: First, the type of law to be enacted and, second, the kind of regulation best adapted to its use. When these two questions are settled he feels the way will be open for its more general adoption. Since the life of the utility becomes indefinite, the terms of the agreement become doubly important. But if it is now possible to draw up franchise laws that are satisfactory and will stand the test of the courts, there is no reason why they cannot be drawn for the terminable permit equally well.

As to the question of regulation, there is a great difference of opinion. Rates and service must be adjusted from time to time so that the utility can provide adequately for the community's wants, earn a fair return on the capital invested, and attract new capital as well as lay aside a sum sufficient to permit the utility to perpetuate itself.

Any fair-thinking body of men should be able to regulate in this manner. Naturally, local regulation is preferable, particularly with respect to service, since those intrusted with the duty are able to determine more closely the needs of the public. The ever-present difficulty, however, is that local politicians will not permit regulation to be so fair as when the supervisory power is removed outside their jurisdiction. Keep men of this type out of office and local regulation is easy.

The advantages of the terminable permit are so great that sight of them should not be lost for an instant. The plan has been adopted to a greater or lesser extent in nine states, and it can well be extended to all the states. As Professor Dillavou points out, the benefits are certain—neither the investors nor the consumers should be deprived of the advantages which are derived from the use of terminable permits.

From the City of the Unusual

STARTLING in what it may portend is another move made by Mitten Management, Inc. It has to do with a working arrangement entered into by Mr. Mitten with the Amalgamated Association. In the quiet and calm of Atlantic City the Mittens and the Mahons, as the official statement puts it—meaning T. E. Mitten and A. A. Mitten and W. D. Mahon and O. L. Mahon, father and son respectively, through the good offices of W. Jett Lauck, former member of the War Labor Board, were brought to see the planet Mars in the same way through the same end of the telescope.

It is a significant move. Of that there is no doubt. On that account the official statement covering the agreement is published in full elsewhere in this issue. Naturally, things immediate and things futuristic have been read into the document by the commentators. It was only to be expected that there should be some speculation. It may be that the real significance of the agreement now reached is contained between the lines rather than in them, but so far as Philadelphia and Buffalo are concerned, conditions there are to remain as at present, in order that the standard of economic excellence of these companies be the criterion by which union performance in co-operation with Mitten Management on other properties is to be measured.

As for the future, it is specifically stated in the memorandum that when co-operation between the Amalgamated and Mitten Management has developed to a point where the results are equal to those obtained on the Philadelphia and Buffalo properties, the matter of union-management agreements on these properties may be discussed and be made the basis of further agreement. The memorandum has been referred to as "one of the most extraordinary developments in the long history of the labor movement." That statement may, of course, turn out to be no exaggeration. In any event, the move just made is one that will again turn the attention of the industry to Philadelphia, the city of the unusual in railway operation and publicity.

Will the Trackless Trolley Regain Favor?

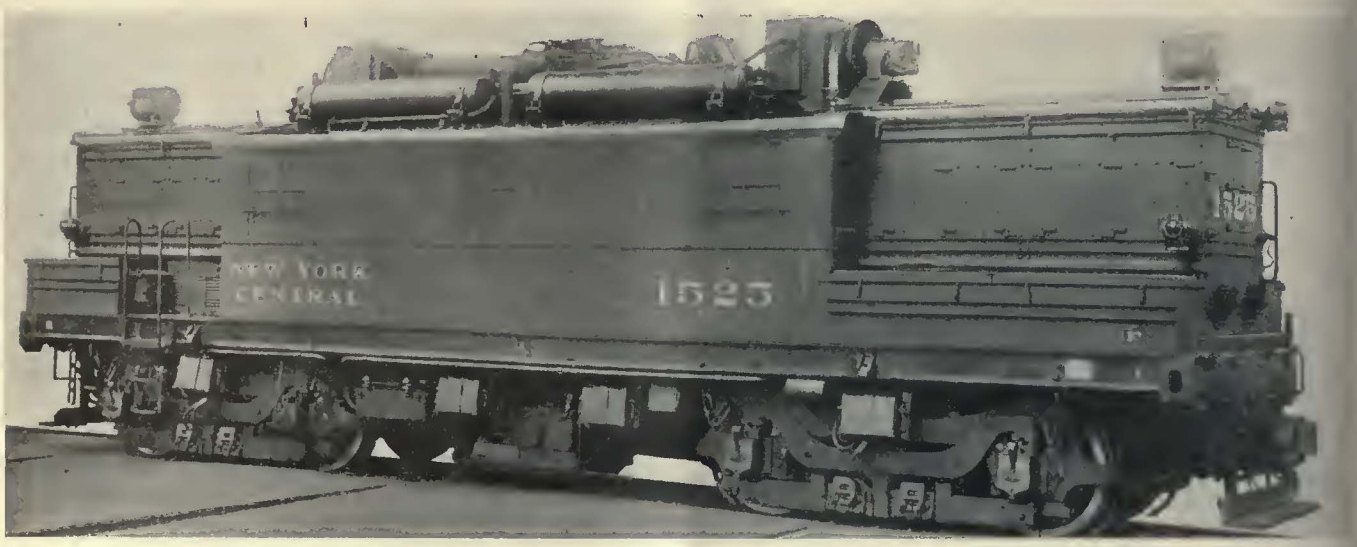
WHETHER or not there is an opportunity for the resurrection of the trackless trolley in this country, is a transportation question that justifies serious consideration. During the past several years this vehicle has not made much headway and after arousing some interest its popularity has actually waned. This in itself, however, is far from convincing evidence that the trolley-operated trackless vehicle does not have a place of considerable importance in the scheme of local transportation.

An analysis of the inherent characteristics of the trolley bus reveals no basic limitation. On the other hand there are indications which point strongly in the direction of a revived interest in its possibilities. Rapid strides have been made in the design of chassis for highway transportation vehicles since the early trackless trolleys were tried in this country. There has been likewise, rapid progress in the design of electric motors and control for highway vehicles. Although these latter developments have come about because of the attention given gas-electric drive for buses, they make available new equipment adaptable for the trackless trolley which opens up entirely new design possibilities for the latter vehicle in comparison with what was available at the time of early attempts.

There are two important factors, other than design, to be considered in determining the possibilities of the

Combination Switching Locomotive Meets Unusual Requirements

Locomotive of New York Central uses either a battery charged by an oil engine-generator, or external power from overhead or third rail



Combination switching locomotive designed for different characters of service in New York City yards

TESTS were conducted recently by the New York Central Railroad of a new battery-oil-electric locomotive, designed for switching service in the New York City terminals and yards. It is primarily intended for use in the freight yards on the west side which are not electrified and where part of the time the locomotives are required to operate through city streets. Switching service requires that a locomotive respond quickly to applications of power, which in turn means that a relatively large amount of power must be available for short periods, even though the average energy requirement over an eight-hour shift is small. In order to secure this fast action from this locomotive it is equipped with a storage battery of relatively large capacity which can easily supply the high momentary currents required for switching service.

Since the locomotive will be used mainly in yards not electrified, the engine generator set, consisting of a 300-hp. oil engine connected direct to a 200-kw. generator is arranged for charging the battery. This engine is capable of supplying ample power to keep the battery fully charged for all switching service. The generator is so designed that if it is run at the same time power is being supplied to the traction motors it will divide the load with the storage battery under periods of heavy output without overloading the engine, and will return automatically to charging the battery as soon as the load has decreased. The voltage at light load is so proportioned that there is no danger of overcharging the battery.

As the generator capacity is more than enough to supply the average energy requirement of the locomotive over an eight-hour shift, it will not have to be run all the time. This is especially advantageous in connection with work in the lower west side. At places where switching locomotives have to go inside of buildings the locomotive can be operated from the battery alone.

It should be noted that the engine is run at constant speed under the control of the governor, and this permits the maximum fuel economy to be obtained.

The storage battery consists of 218 cells, the maximum number so far used for locomotive service. This number is made possible by grounding the mid-point.

As the locomotive will be called on at times to operate over tracks which are electrified, third-rail shoes are provided and also an overhead collector. This permits the engine and battery to be disconnected from the traction motors when running in electrified districts. As the west side electrification is extended this feature will become more and more important. The third-rail shoes are of the folding type to permit operation in city streets.

The mechanical portion was built and the locomotive equipped by the American Locomotive Company at its Schenectady plant. The storage battery was supplied by the Electric Storage Battery Company and all other electrical equipment by the General Electric Company. The oil engine was furnished by the Ingersoll-Rand Company.

The locomotive was designed by the New York Central Railroad's electrical engineering department working with the General Electric Company, the Electric Storage Battery Company and the Ingersoll-Rand Company.

Locomotive is Swivel Truck Type

The locomotive is of the swivel truck type. The cab has three sections, the batteries being carried in the end sections and the oil engine in the central section.

The running gear consists of two four-wheel swivel equalized trucks. The truck frames are of the Commonwealth cast steel type with transoms and pedestals cast integral. These are carried on semi-elliptic springs to the equalizers which in turn are carried on the journal boxes through quiver springs. The transom is a hollow box casting which serves as a duct for the motor ventilation. Truck center plates are carried on the transom and the air for ventilation is conducted through the center of these plates into the transom and from there distributed to the two motors carried on the truck. Wheels are solid rolled steel with 44-in. diameter. The axle diameters are 8 in. at the motor bearings, and 9 in. at the gear fit, with 8x14-in. collarless journals.

The cab platform is a Commonwealth steel casting. The cab itself is of structural material riveted to the platform. The storage batteries are arranged in three tiers convenient of access from the outside. The central section of the cab has in addition to the power plant and the control apparatus, two small operating compartments for the enginemen. Good vision along the track is obtained from the engineer's seat as the battery section does not project sufficiently to interfere.

Doors give access to each operating compartment from the outside and to the power plant compartment from the operating compartments. There is a hatch in the roof of the central compartment directly above the oil engine to permit its removal.

Electrical Equipment Designed for Both Internal and External Power

The locomotive is equipped with four GE-286, 600-volt d.c. single-geared commutating pole traction motors. Each motor is geared to the driving axle through a 72-tooth gear and seventeen-tooth pinion. These motors and the gear ratio are the same as used on the New York Central Class Q electric switching locomotives. The continuous rating of the motor is 330 hp. at 600 volts and the one hour rating 415 hp. at 600 volts. At this rating of the motors the locomotive will develop a tractive effort of 34,000 lb. It will develop a tractive effort of 60,000 lb. with 900 amperes per motor. The operating characteristics of the locomotive and the tractive efforts available at various speed are shown in the accompanying group of curves.

WEIGHTS, DIMENSIONS AND BATTERY CHARACTERISTICS OF THE LOCOMOTIVE

Weights

Locomotive complete	257,000 lb.
Mechanical equipment	110,000 lb.
Battery	34,300 lb.
Motors	36,400 lb.
Engine and generator	28,800 lb.
Radiators and fans	2,700 lb.
Control	18,800 lb.
Air compressor and brakes	4,800 lb.
Miscellaneous	21,200 lb.

Dimensions

Length over coupler pulling faces	46 ft. 8 in.
Wheelbase	34 ft. 1 in.
Rigid wheelbase	8 ft. 3 in.
Height	14 ft. 8 in.
Width	10 ft. 2 in.
Tractive effort one-hour rating of motors	34,000 lb.
Speed at one-hour rating	18 m.p.h. on external power 8 m.p.h. on internal power
Maximum speed	40 m.p.h.

Battery Characteristics

Ampere-hour capacity at six-hour rate	680
Average volts at six-hour rate	432
Kilowatt-hour capacity at six-hour rate	294
Maximum discharge rate in amperes	3,000
Maximum kilowatt discharge rate	180
Approximate weight of battery, pounds	34,300

The battery sections are narrow enough to permit an unobstructed view by the engineer

Two motor blower sets furnish air for ventilation of the traction motors. Air for the air brakes is supplied by one CP-26-C4 compressor having a displacement of 120 cu.ft. of air per minute when running at 600 volts.

The control is type PCL, non-automatic with individual electro-pneumatic contactors. It is arranged for operation from either end of the locomotive. It is also arranged to permit the following methods of operation:

1. Internal power: (a) From storage battery alone. (b) from storage battery and engine-generator together.
2. External power: (a) From third rail. (b) From overhead.

The control is arranged to connect the traction motors automatically to internal power should the external power fail at any time (which may be due to running off the end of the third rail) and to restore the connection automatically to external power when the controller is shut off after external power is again available. Indicating lights show whether operation is from internal or external power.

Resistance steps are used for accelerating the locomotive both with internal and external power. The controller steps and motor groupings are as follows:

Ten resistance steps, motors connected four in series.

One running position, motors connected four in series.

Six resistance steps, motors connected two in parallel. Two such groups in series.

One running position, motors connected two in parallel. Two such groups in series.

Seven resistance steps, motors connected four in parallel.

One running position, motors connected four in parallel.

The locomotive is protected against short circuits by a type JR high-speed circuit breaker. The individual mo-

tors are protected against overloads by overload relays which trip out the high-speed circuit breaker.

Storage Battery Has 680 Amp.-Hr. Capacity

The storage battery consists of 218 cells of MVA-41 Exide-ironclad battery. The ampere-hour capacity of the battery is 680 and the kilowatt-hour capacity 294 at the six-hour rate of discharge. All cells are connected in series for connection to the generator and traction motors but the mid-point is grounded to reduce the maximum potential to ground.

The control, lights, etc., are connected between each terminal of the battery and ground and arranged to equalize so far as possible any unbalanced loads on the two halves of the battery. The control is always connected to the battery even when running on third rail.

The locomotive has a complete metering equipment to assist in studying its utility for service and determining what, if any, modifications should be made in the equipment for future locomotives of this type. Ammeters and voltmeters at each operating position indicate the current of one traction motor and the voltage on the traction motor circuits. A speed recorder indicates and records the speed in miles per hour and registers the total miles traveled.

An ampere-hour meter indicates the state of charge of the battery. The zero point of the scale indicates full charge and the pointer moves forward or backward to indicate the ampere hours drawn from or supplied to the battery. An integrating ampere-hour meter connected in the battery circuit has two sets of dials, one of which indicates the total ampere-hours of discharge and the other the total ampere-hours of charge. One integrating watt-hour meter indicates the total energy passing through the traction motor circuits while another indicates the total energy delivered from the engine-generator set.

Oil Engine Is Constant-Speed Type; Has Direct Fuel Injection

A 300-hp. oil engine direct connected to a generator is provided for charging the battery. The generator is built with a drooping characteristic to match the voltage characteristics of the battery and to furnish power to the traction motors in parallel with the battery under various conditions without overloading the engine, or overcharging the battery. The engine generator set is started by running the generator as a motor from the battery.

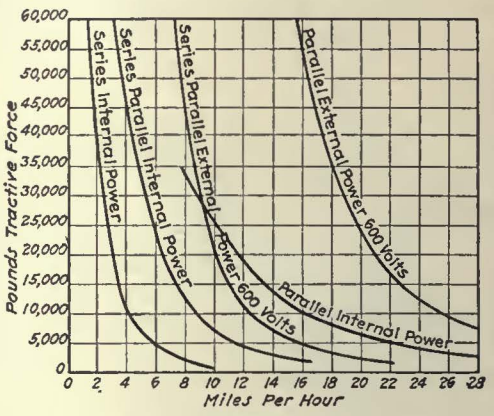
The engine is of the vertical, six-cylinder, four-cycle, single-acting, constant-speed type having direct fuel oil injection. The cylinders have 10 in. diameter and 12-in. stroke. Cylinders, cylinder heads, and combustion chambers are completely water jacketed.

Fuel oil is injected by two opposed spray nozzles in each combustion chamber, to which oil is delivered under pressure by an injection pump driven from the main shaft. No compressed air is used for fuel injection. Ignition is produced by the heat of compression only. One fuel injection pump serves all cylinders. The fuel oil distribution is obtained by a distributor timed to admit oil to the spray nozzles of each cylinder in their proper firing order. The storage tanks have a capacity of 200 gal. of fuel oil and are sufficient to operate the engine at full load for about ten hours.

The lubricating system is entirely enclosed and of the forced feed type. Lubricating oil is pumped to the moving parts of the engine by a gear-driven pump in the crankcase. Oil in contact with the cylinder walls is passed through a filter and returned to the crank case oil reservoir.

A closed cooling water system is used on the engine. The water is circulated by a centrifugal pump driven from the crankshaft. Radiators for cooling the engine circulating water are on the roof. These radiators are made in two sections, each ventilated by a motor-driven fan.

The engine is the same type as that used on a large



Tractive efforts at various speeds, operating from internal or external power

number of oil-electric locomotives, with the exception that on this locomotive it is run at constant speed under the control of the governor.

The accompanying table gives the approximate weights and dimensions of the completed locomotive.

Combating the Would-Be Good Samaritan

NEARLY every electric railway company is losing considerable revenue because automobile owners insist on picking up not only their friends for short trips, but also total strangers who could just as well ride to their destinations on a near-by car line. The loss of this patronage, in the aggregate, is a considerable amount. One of the companies which has attempted to combat this evil is that at Little Rock, Ark., and the means followed by the Arkansas Power & Light Company have an interest for others who are trying to reduce losses of this character.

One method used is to carry occasionally in its advertising space in the daily papers accounts of injuries or losses suffered by automobile owners who followed this practice. Such an advertisement the early part of this year cited the case of a St. Louis professor who was atttacked by two young men he had picked up and carried in his car, as well as of a suit brought in a local court against the automobile owner by such a free passenger for $500 damages for an alleged sprained wrist he claimed to have sustained while riding in the Good Samaritan's automobile. Still another case was mentioned where a local man had to pay $5,000 damages to an automobile guest who claimed to have been injured in an accident while taking a social ride in his host's car.

In the advertising which has been carried on this subject the company has made no definite appeal to the public to discontinue the practice on the ground that the street railway is being deprived of just revenue. It is the belief of the company that the public is not particularly interested in this phase of the problem.

Fast Schedules Bring Car Riders

By E. J. McIlraith
Staff Engineer Chicago Surface Lines,
Chicago, Ill.

The author, speaking before the meeting of the Illinois Electric Railway Association this month, showed clearly that fast schedules are within the ability of almost any electric railway, and without expenditures or complications

RARELY is attention paid to schedules and schedule-making. The title of this paper really calls for a discussion of fast schedules, or, in fact, consideration of speed, and not of the job of scheduling. We must assume in the beginning that schedules as written can be maintained on the street. A schedule that is not reasonably observed or that cannot be operated is, of course, undesirable. So we really are considering the advantages of fast operation or of quick transportation.

What is fast operation of street cars? Nearly all citizens today are automobile drivers. Those few who do not own automobiles or drive them, ride in them often enough so that practically everyone thinks in terms of automobile speeds, and it is speeds of the open road they remember. The word speed always seems to mean something over the legal speed limit. It is from 35 m.p.h. up, that represents the popular idea of speed today, and movement of less than 20 m.p.h. is a drag.

STREET cars need not apologize for being on the street, and operators should develop a recognition that each street car is as important as from 40 to 60 individual automobiles. Trainmen should be encouraged to operate safely at higher speeds. . . . Trainmen should be ready to avoid accidents but should not let automobiles assume superior rights.

Comparative Car and Auto Speeds

People are not accustomed to thinking of trips about town being made at an average speed of 15 m.p.h. from start to final stop, but if you ask a driver how fast he makes a given trip in town his likely answer would be "about 25 m.p.h." The average top speed while moving is what stands out in a driver's mind. So it sounds rather a contrast to mention average speed of a street car which in most systems would be an average of about 10 m.p.h. from terminal to terminal. The Chicago Surface Lines feels it has reason to be proud of its average speed between terminals, including time used at all intermediate stops, which is 11.2 m.p.h., and is higher than the speed of any other city system of which we know.

While such speeds sound low to the average citizen, who thinks in terms of his running speed not including slow-downs or stops, it is really unusual in driving in large cities for automobiles to average more than 15 m.p.h. between origin and destination. As congestion grows automobile speeds suffer seriously. Not much further increase for the street car can be expected. A vehicle making seven stops per mile, each of seven seconds' duration, cannot average as much as 15 m.p.h. even if on a private right-of-way. No matter how large motors are used the limitations of starting and stopping keep the average speed below 15 m.p.h. Of course with smaller motors a lower speed results. Increasing the number of stops per mile has an enormous influence, and increasing the length of stop is also a serious source of delay. The sense of greater speed is given to the passengers because between stops the street car may run as fast as 30 or 35 m.p.h.

Operation as fast as possible is an absolute necessity to get business in these days of impatience and of speeding automobiles. Saving in time without recklessness is the thing we must drive at. The customers must be rushed through the trip without being made conscious of any danger, but rather with a feeling of comfort and security. The street railway must establish in the minds of the people it wishes to serve the opinion that its service is regular and dependable and moves with the best possible speed and evident efficiency.

The train crew, whether one-man or two-man, must give the impression of prompt, efficient, alert attention to the job of moving the car safely and speedily over the street. This does not mean giving the passenger a sense of impatience and haste. The careful, efficient trainman who makes it most convenient for passengers to get on or off, who accelerates his car as rapidly as possible but smoothly, who brings the car to rest rapidly but skillfully, inspires confidence, and the passenger can be at the door ready to get off the moment the door opens instead of remaining clinging to something for safety.

It is not reckless haste that develops maximum speed, but competent, careful attention on the ways of eliminating waste of fractions of a second. Cars need not accelerate or brake at rates uncomfortable to passengers.

The big loss at present in braking efficiency is due to the slowness of getting braking under way. Many cars require two seconds for the braking pressure to build up in the cylinders and the brakes to get in contact with the wheels. In two seconds a car at 25 m.p.h. will move 75 feet.

Automobile brakes begin to function almost instantly, and no distance is lost between the time a man decides to brake and the time brakes are applied. Then, since automobile passengers are seated, the rate of braking can be more rapid than could be tolerated in a street car.

Further, the friction between rubber tires and pavement is better than the friction between the steel wheels and steel rails.

Improvement in braking will not come from increasing the rate of braking, but must come from reducing the wastage of time in getting the brakes applied. The present braking mechanism is not well suited to modern car operation.

The acceleration of cars can probably best be speeded up by automatic control. Of course, this is expensive, adds to maintenance costs and increases the chance of trouble. Thorough training of motormen will serve the same purpose. Motors of sufficient size are needed, but even with the best equipment the speed of a car will not be satisfactory unless the crew is alert, active and competent in saving moments of needless delay.

USUALLY remarkably good improvement in speed may be obtained with no other change than training of the entire organization from the manager down so as to have each one working actively to discover ways and means of eliminating waste of time and carelessness.

Few managements are today pressing the trainmen and the supervisory force to get this actual speed-up of the lines. The usual city crew gives the impression of leisure and indifference. There has been altogether too little attention paid to getting higher speed because most managements have accepted the idea that accident prevention demands slow speed and timidity. In many cities the motormen are actually afraid to move with certainty and as if they had a right to use the street. They are taught to hold back until all other traffic has gotten out of the way. Street cars need not apologize for being on the street, and operators should develop a recognition that each street car is as important as from 40 to 60 individual automobiles. Trainmen should be encouraged to operate safely at higher speeds. True accident prevention should build better operating principles into the minds of the trainmen, but not at the sacrifice of all their rights to move. Trainmen should be ready to avoid accidents, but should not let the automobiles assume superior rights. Analysis of accident causes does not show that fast operation properly handled creates accidents.

The training of the motorman and of the conductor, and the use of care to get them working in sympathy with a sound, well-planned viewpoint is a major portion of the problem of obtaining higher speed and lower accident costs.

If in the city that has the most intense use of streets, an average of 11.2 m.p.h. can be maintained for street cars, then in the smaller cities higher average speed should be possible because of relief from traffic interference and because of a smaller number of stops per mile. When speed is increased either the same number of cars will give a closer headway, or a smaller number of cars will maintain the same headway.

Increasing the speed by reducing wastes of time will certainly produce more business. It is the increased speed without the sacrifice of personal comfort for the passenger that is largely responsible for the growing business of the Chicago Surface Lines. In most large cities the street railway business is not growing. Perhaps a major part of the reason is because too little attention is given to increasing the rate of speed. Some cities are using more and more trains with longer headways. Perhaps the slower operation of trains and the longer headway has something to do with the decrease in the number of passengers obtained.

Many little things can become serious in producing low speed of operation. Here are a few that are within the control of the company without cost for changes in equipment:

Motorman accelerates slowly or brakes slowly.
Motorman stops car in the wrong place.
Doors opened slowly after the car has come to a complete rest.
Car equipped with interlocked door control.
Motorman coasts too much.
Brakes slack or braking equipment slow to operate.
Stops too close together.
Overhead wiring poorly set and requires slow speed to keep trolley wheel on the wire.
Car crew permitted to buy lunch, to stop for drink of water, to get transfers or change, or to visit carhouse at other points than terminals.
Track special work including curves in such condition as to require slow operation.
Switches operate hard.
Crew required to operate slowly over special work of all kinds when slow speed should only be necessary past facing switch points.
Low joints or broken rails.
Defective circuit breaker or circuit breaker set for too low current.
Improper setting of traffic lights or careless control by traffic officer.
Lack of safety zones at loading points.
Slow loading at heavy transfer points.

Of course many other small operating factors must be constantly watched, and should be continually improved upon.

A company need not wait to get new equipment, or to widen the doors, or to change the motors, or to make any other major and expensive change in order to improve its operating conditions. Usually remarkably good improvement in speed may be obtained with no other change than training and supervision of the operating force. This means training of the entire organization from the manager down so as to have each one working actively to discover ways and means of eliminating wastes of time and carelessness.

Most visitors to Chicago are looking for some big item that is responsible for the higher speed. They seem disappointed when informed that it is produced merely because of careful attention to the details. This attention to details is a measure of effectiveness of the management. If speed could be purchased by buying something which when installed would produce this speed all properties would probably have it.

All railways can be improved. We cannot ever expect to reach perfection; we can drive towards it, and should approach as nearly to it as can be accomplished with the resources under our control. Financial and political limitations are severe on all properties. Managements are not always able to accomplish what they most earnestly wish, but this does not justify failure to do the best possible with the given circumstances.

We should never be content that we have reached the ultimate limit of accomplishment, but we can often be content that we are making the most sincere effort towards that accomplishment.

The track yards at Paris are equipped with traveling cranes and other modern machinery

European Track Construction

in Paved Streets

Points of resemblance and points of difference as compared with American construction are given. Extensive use is made of alloy steels in special track work. Paris methods are given in detail

By Henry W. Blake
Senior Editor *Electric Railway Journal*

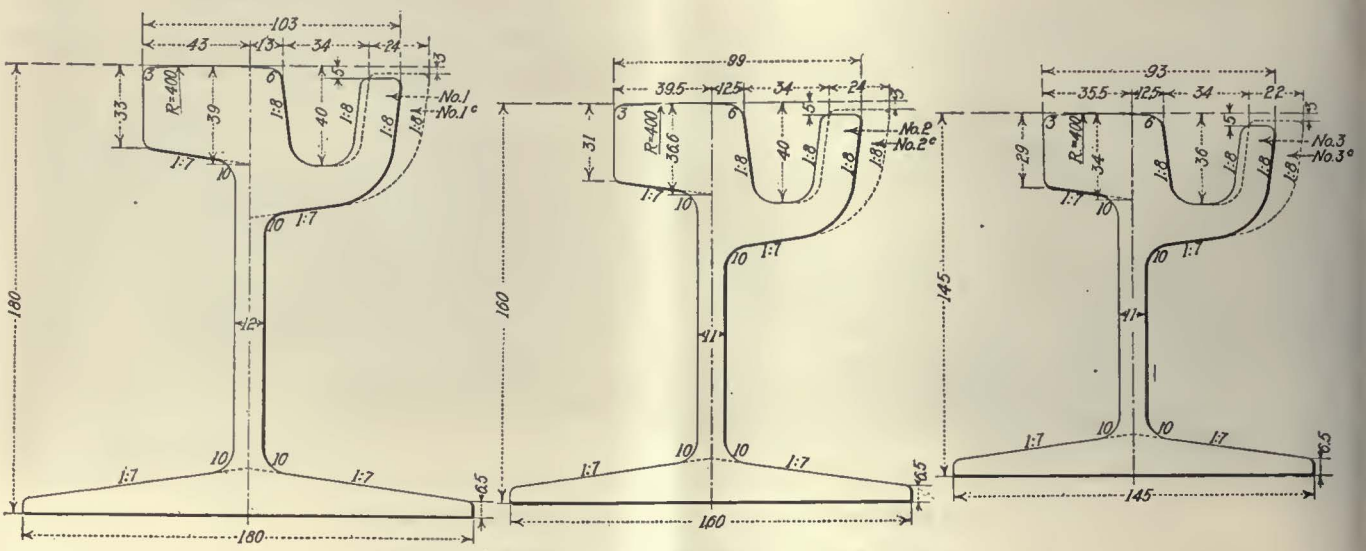
IN MANY ways European electric railway track construction is similar to that in America. Some track in paved streets is laid on wooden ties, and some is laid on metal ties or chairs embedded in concrete. The single-web girder rail, in distinction to the duplex rail with two webs, is now standard in Europe as in America. In straight track the usual rail length is 18 m., practically the same length as our 60-ft. rail. Rails as long as 24 m. (79 ft.) have been laid, but their use has not been continued owing to the inconvenience of handling them on the streets.

The three standard rail heights recommended at the International Electric Railway Convention in Paris in 1924 were 7.1, 6.3, and 5.7 in. (180, 160 and 145 mm.). These rails are illustrated on page 536, but have not yet been formally adopted by the Association. As will be noted, the width of the base equals the height in each case.

Manganese steel rail is generally used in special track work, although a number of the companies are experimenting with other alloy steels, such as chrome steel and nickel steel. Electrically operated track switches are used extensively.

The gage situation in Europe is practically the same as in the United States, though perhaps there is rather a larger proportion of narrow gage track. The two gages most generally used are 1,435 to 1,445 mm., which are practically the same as our 4 ft. 8½ in. standard gage, or a 1 meter (39½ in.). The latest tabulation available on gage is a report presented at the 1926 convention of

Track construction in downtown Naples. The timbers shown are simply to protect the fresh concrete and will be taken away after that has set



Sections of standard rails recommended at Paris convention

the International Street Railway Association. It showed that of 31 companies, mostly city lines, replying to a questionnaire, sixteen had standard gage, twelve a meter gage and three odd gages. A more extensive statement was given in a report at the 1910 convention of the same association. Although this report is now some eighteen years old, gages naturally are not changed often, so that it may be assumed that practically the same condition prevails today. At that meeting, 105 railway companies, mostly street railways, reported on gage as follows:

TABLE I—TRACK GAGES USED BY 103 EUROPEAN STREET RAILWAYS

Number of Roads	Gage of Track MM.	Gage of Track In.	Number of Roads	Gage of Track MM.	Gage of Track In.
1	891	35.0	31	1,435	56.5
1	915	36.0	7	1,440	56.7
48	1,000	39.4	4	1,445	56.9
1	1,050	41.3	1	1,450	57.1
3	1,100	43.3	1	1,453	57.2
1	1,345	53.0	2	1,458	57.4
1	1,416	55.7	2	1,524	60.0
1	1,430	56.3			

The two lines using the 1,524 mm. gage (5 ft.) were those in Moscow and St. Petersburg (now Leningrad).

Points of Difference Almost as Many

Having considered the points of resemblance between European and American electric railway track construction let us consider the points of difference. They are almost as many as the points of resemblance just referred to.

In the first place, the track construction in paved streets in the larger cities in Europe, at least in those visited by the writer during a recent trip, seemed on the whole to be more substantially built than that usual on similar properties in this country. This was especially noticeable in view of the much smaller and lighter cars operated.

Where wood ties are used, there is a tendency to employ the most durable kind. Oak is not uncommon, and wooden ties, when installed, are usually treated with a preservative. Some track is laid on steel ties and some on chairs embedded in concrete, with the rails kept to gage by tie rods. In the newer sections the installation of tracks on reservations in the center of the street is not uncommon. There is considerable construction of this kind in Berlin and Paris.

Thermit joints are used more extensively in straight track than is electric welding. Of the 36 companies that replied to a questionnaire on the subject of rail joints at the 1924 convention of the International Street Railway Association all but one were using thermit, although it was not standard on all of those so reporting. Bolted joints are also used quite extensively.

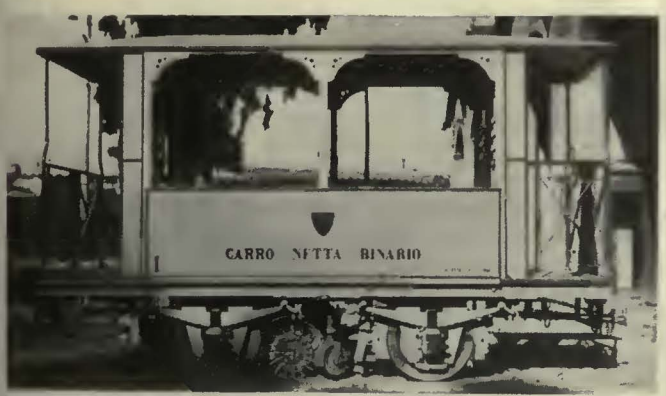
Rail-bending machines form part of the usual equipment of a track yard in Europe. The view at the left shows the rail bender at the Paris yards—The right-hand view shows the shelter housing the rail bender in the track yards of the Hamburg Street Railway. This shelter is directly in front of the company's large track storage house

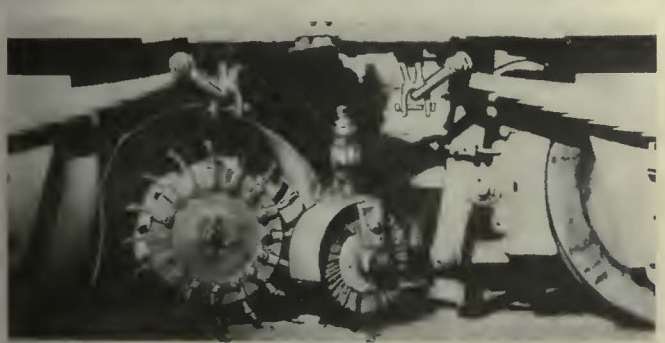
Track is often laid on reservations. The view at the left is from Berlin; that at the right from Dortmund

The groove in the rail is narrower than is customary in the United States, as will be seen from the sections reproduced. In fact, the groove in the rail is so narrow that it is not self-cleaning through the action of the car wheels, like most of the American grooved sections. Instead it has to be kept clean by track men who remove the dirt by an especially shaped shovel which they push before them, or by a digger which is carried on a car. Some companies have cars especially equipped for the purpose of keeping the head of the rail clean. Such a car, used on the Rome Municipal Tramways, is illustrated. It not only scrapes the dirt out of the groove in the rail and brushes it aside but it flushes the head of the rail with water from a reservoir carried on the car.

The continued use of a narrow groove on European tramways seems to be largely the fault of the city authorities. When narrow-tired horse-drawn vehicles were used, such a narrow groove may have been necessary to some extent. With automobiles now so general, there seems to be no reason against the use of a flaring groove.

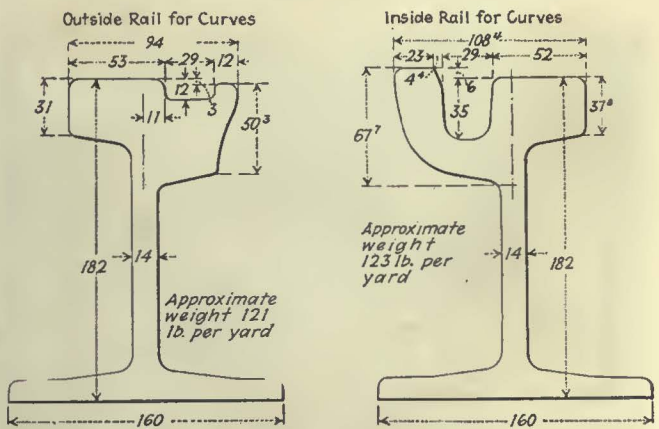
Paris is noted for its excellent special trackwork construction in paved streets





A work car cleans out the track groove and brushes the dirt away on the Rome Municipal Tramways. It also flushes the track. The upper view shows the complete car, the lower view shows the digging tool and rotary brush on a large scale

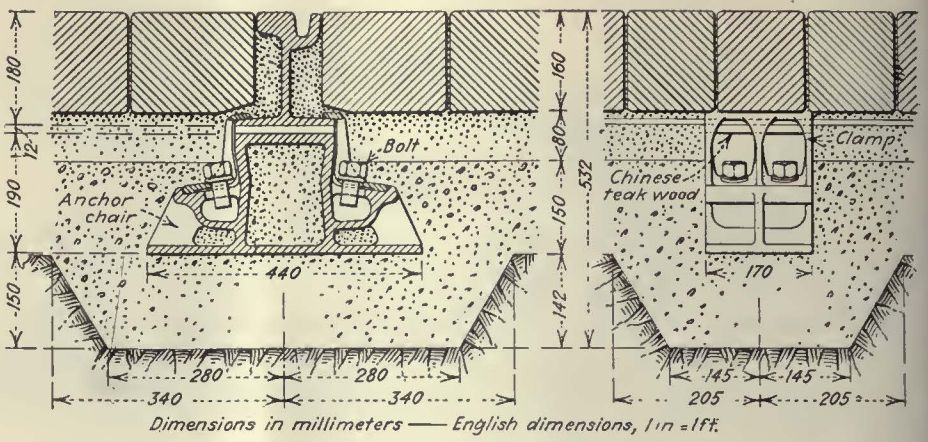
Alloy rail for places of great wear is used more generally than here, as on curves of short radius. More attention is given to the drainage of track, particularly of the track groove. It is almost universal to use groove



The outside rails on Paris curves up to 90 ft. radius use a shallow groove

drainage. The maintenance of track as a whole is better in Europe than in America. This is a noticeable factor in reducing the noise of car operation.

At least as much attention is given in Europe to the use of track machinery in the construction and rehabilitation of track. Thus, a great many of the larger electric railway companies have power rail-bending machines, which are built in a variety of patterns in Germany and England. With the English bending machine used in Rome, two men can bend a rail in fifteen minutes. Rails can be bent on this machine to a radius of 40½ ft. The use of rail machinery is not always extended, however, to track grinding. Corrugation is often removed by the reciprocating action of a block operated by two men rather than by a rotary grinder.



Section of standard track construction in Paris. The rails are held in chairs embedded in concrete

An attempt to give details of the varieties of street railway track in Europe would require as much space as a similar article on track construction in this country. Instead an account will be given of the methods of track construction on the Paris overhead trolley lines. Within the center of the city these lines use the underground conduit system with the rails on yokes. The accompanying particulars relate to the construction on which the overhead trolley is employed.

Track Construction in Paris

The standard rail of the Paris surface lines is 7.1 in. (180 mm.) high, weighs 104 lb. to the yard (52 kg. to the meter) and rests on cast iron chairs embedded in concrete. These chairs weigh 54½ lb. (24.8 kg.) each and are spaced 51.2 in. (1.3 m.) apart except at the joints where they are closer together. Between the base of the rail and the top of the chair is a flat piece of Chinese teakwood ½ in. (12 mm.) thick, to give resiliency to the track. The chair has a base $17\frac{3}{16}$ in. wide, or at right angles to the rail and $6\frac{9}{16}$ in. in the direction of the rail. Its shape is such that it is held firmly into the concrete to which it transmits its load. It holds the rail by two clamps with lock nuts on each side. No ties are used, but tie rods are installed midway between the chairs, or every 51.2 in. (1.3 m.) apart. Special trackwork is supported on chairs like straight track. These chairs are of the same height and similar in design to those used elsewhere but of a special shape to fit the base of the switch, mate or other part supported.

Manganese rail is used for the inside rail of all curves of less than 93 ft. (30 m.) radius. It is purchased in lengths of 5 m., 7 m., or 10 m. and is bent to shape in the company's track yards. A feature of curve construction in Paris is the use of a shallow groove for the outside rail of sharp radius curves. Its purpose is to allow the outside wheels of all cars to run on their flanges while passing around the curve so as to reduce grinding be-

TABLE II—LIST OF MATERIAL FOR 100 M. (328 FT.) OF SINGLE TRACK ON CHAIRS IN PARIS

Number in Wood Paving	Number in Stone Block Paving	Designation	Material	Unit Weight Kilograms	Unit Weight Pounds
200m.	200m.	Rail for straight track.	Rolled steel..	52.000*	104.0†
80	40	Tie rods.....	Rolled steel..	11.400	25.1
960	800	Bolt.....	Soft steel....	0.500	1.1
960	800	Lock nut.....	Spring steel..	0.070	0.15
160	160	Chair.....	Cast iron....	20.000	54.6
320	320	Clamp.....	Cast steel....	2.000	4.4
160	160	Wooden plate.....	Teak.....	0.270	0.59
1	1	Cross bond between rails.....	Copper.....	1.965	4.3
1	1	Cross bond between tracks.....	Copper.....	1.300	2.9
		For bolted joints			
11	11	Outside plate.....	Rolled steel..	45 a pair	99 a pair
11	11	Inside plate.....	Rolled steel..		
90	90	Bolt.....	Soft steel....	0.670	1.47
22	22	Rail bond.....	Copper.....	1.500	3.3
		For welded joints			
11	11	Portion of thermit....	.....	.....	.....

* Kilograms per meter. † Pounds per yard.

These two views show the method of laying track in Paris. It is first aligned, then mounted on wooden blocks, then the concrete is poured

tween the wheel flange and rail groove. Otherwise, the grinding would be considerable as most Paris cars are mounted on four 31½-in. wheels with a wheelbase of 11 ft. 10 in. This long wheelbase was adopted to reduce car nosing.

Besides its use of curves, manganese rail is standard for practically all crossings, switches and other special trackwork, and the throats of all such frogs are flange bearing. This practice undoubtedly has contributed greatly to noise reduction.

Other alloy steels, such as chrome steel and nickel steel, are also being tested for this purpose. The experience at the time of the visit of the writer to the property last summer was that manganese steel was more satisfactory, except that the other alloy rails had the advantage that thermit welds could be made to them more easily.

It will be noticed from all the Paris rail sections published that the head of the rail is absolutely flat. The treads of the wheels are also flat so that they have a bearing surface over the entire head of the rail. This design was adopted partly for the purpose of reducing rail corrugation and partly to reduce car nosing, which is thought to be greater where coned wheels are used.

Several photo engravings accompanying this article show the method of building track in Paris. It is not constructed from the bottom up but from the top down. After the trench has been dug, the track is laid in place with the chairs and tie rods attached. The track is then aligned and raised to position on wooden blocks. The final operation is to pour the concrete and then to lay the paving.

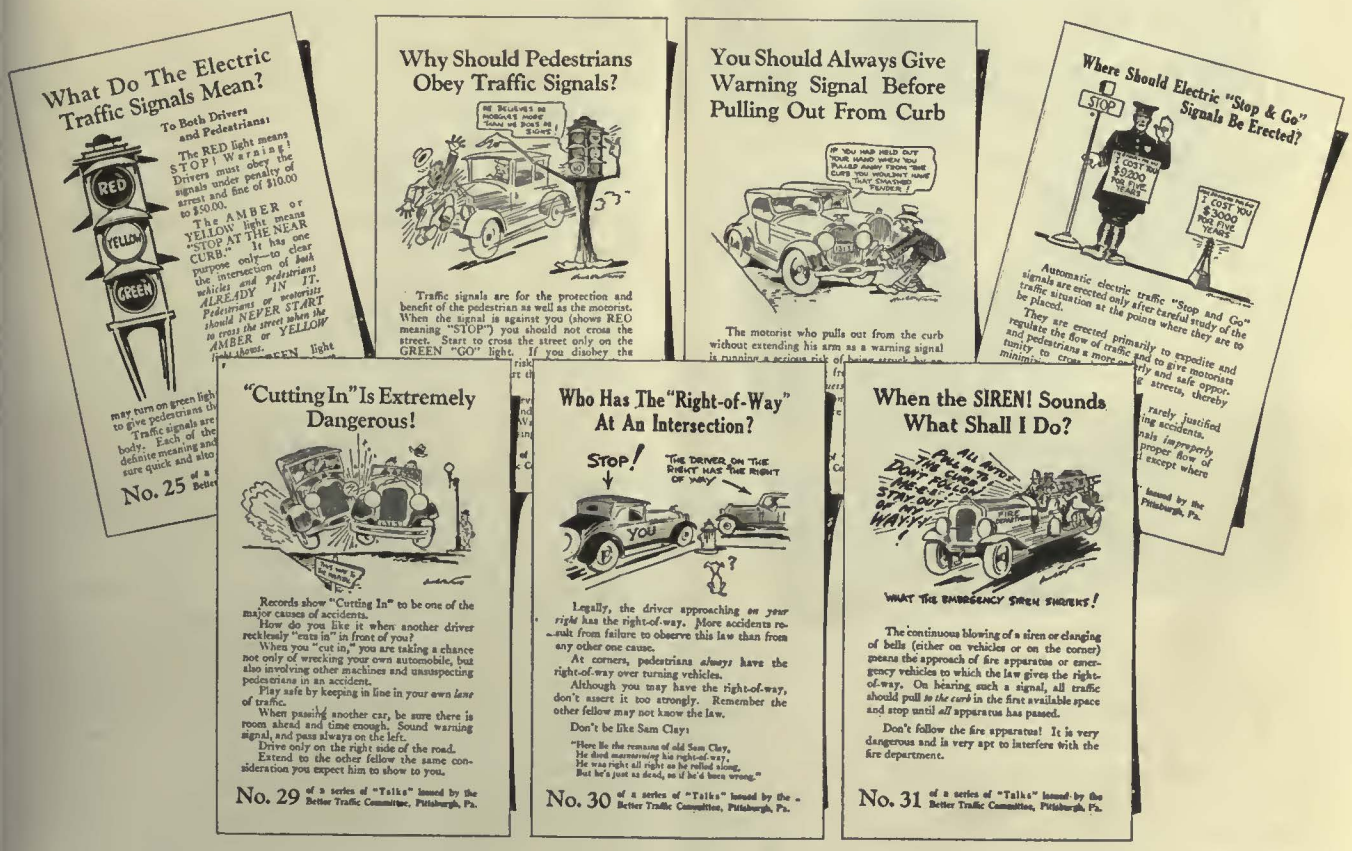
The cost of this construction without crossings or other special trackwork is approximately 300,000 fr. per kilometer ($19,200 per mile) of single track.

Novel Color Advertising Featured

MUCH of the advertising literature of the Pittsburgh Railways, Pittsburgh, Pa., is unusual, particularly with respect to the use of color and also the advantages derived from seasonal subjects. The text matter of one campaign was confined mainly to accident prevention, the weekly pass sale and a series of sixteen traffic talks as issued by the Better Traffic Committee. The first talk, which was released coincident with the opening of the public schools, warned Pittsburgh citizens of the no-parking rules, at the same time reminding them of the city's narrow streets and that there are about 120,000 automobiles in the community, with parking space for only about 5,000 cars. This talk was followed by a humorously illustrated reminder of how business is retarded by too much parking. Some of the other talks, which were issued weekly, are reproduced on this page.

The colored autumn leaf poster used in previous years was also presented, with an element of timeliness by calling attention to an accident on Sept. 8 which resulted from the street and track having become dangerous due to their leafy coating. Another effective use of multi-

IT'S THE CAREFUL DRIVER WHO IS WRECK–LESS



Some examples of publicity with which the Pittsburgh Railways is striving to put across the message of safety and service

color may be seen in the accompanying illustration where a comical bird is employed to put across the economy resulting from the use of the weekly pass. Perhaps the most interesting of the color ads is one which is a reproduction of the old-time school slate, which not only

Types of posters in color used by the Pittsburgh Railways

stresses the Sunday pass selling argument but maintains humor and brings back memories to the older residents of the city.

A very effective poster in black and white gives a list of the number of accidents per carhouse in terms of car-miles operated, settlement and verdict, cost per hundred car-miles and accidents per 10,000 miles operated. The poster shows an auto caught by a street car and a telegraph pole on a dangerous curve. Referring again to the use of color, there was an interesting poster done in orange and red illustrated by a grotesque figure in black standing before a microphone. This was used to put over the radio show held at Duquesne Garden from Oct. 3 to 8. Another very effective poster showed a green cab and car drawn up side by side, the motorman and chauffeur grinning at each other. Underneath the text is as follows:

To Our Friends—the Motormen and Conductors: The traffic problem is our mutual one. The public safety on our streets and avenues is of constant and immediate concern to us all. By co-operation much can be done to solve this vital and important question. Green Cab is ready and willing to consider any way to help. We want to know how Green Cab men and the railway's men can work together for the public welfare. Suggestions from motormen and conductors on this matter will be welcomed by us.

This poster is signed, "Green Cab," below which is the slogan, "Let's all help the taxicab boys."

Although concerned with the distribution of larger posters, the Pittsburgh Railways has not neglected the little window pasters, some of which put over various problems in a few words; for instance:

Our present streets should be used for moving vehicles only. The parked car congests.

School opens this week. Please be careful of kiddies in the streets.

If every one would obey signals streets will be safer and all of us happier.

In addition to these forms of advertising the company still continues its policy of exhaustive publicity through the medium of the *Transit Guest,* the make-up of which is familiar to most of the readers of ELECTRIC RAILWAY JOURNAL.

Use of Maps Improves Service

STREET railway and interurban lines can add to their service to the public and increase the number of car riders, by a display of system maps in all cars and in terminals, according to an article in the Public Utilities Advertising Association *Bulletin* for February. Nearly all cities carry a transient population daily and house a portion of inhabitants who are familiar with not more than a fraction of the routes of their railway system. A better knowledge of the entire system, localities reached, points of general interest and educational institutions easy of access by trolley will increase car riders.

Wide adoption of one-man car operation has made it less convenient and desirable to interrupt the car operator. A complete map attached to the car window for ready reference will help patrons to answer many of their own questions by referring to the map. Such maps naturally should be designed to display street names clearly, designate car routes by number and bring out interesting points, of a nature to attract the public, in a graphic manner.

The use of car window maps is not altogether new. The Hudson Tunnel trains, joining New York City and New Jersey, carried maps for many years, attached to the center door of each car. Today each of the thousands of cars in the New York subways carries a map of the entire system. They have proved of widespread reference use.

In addition to car window maps, some companies distribute system maps in folded form and spread them widely in the thought that familiarity with the system is the first step in attracting traffic.

Manufacture Transportation That Will Sell

By E. G. Buckland
Vice-President and General Counsel
New York, New Haven & Hartford Railroad

Nations rise and fall as their transportation is good or bad. The only thing to do is to produce transportation of a kind that the people will buy at a price that will pay, said the author, speaking before the New England Street Railway Club at its Springfield meeting March 22

MANUFACTURING of transportation is no different than manufacturing of any other commodity necessary to the prosperity of a community. It may be that transportation is in a measure more essential to the prosperity of a community than any other one article which industry may make in that community. But the economics which govern it are identical. In the case of a street railway, it is the manufacture of passenger-miles that will sell. You cannot manufacture any commodity economically with obsolete, worn-out, extravagant machinery. Therefore, the only thing to do, where you find that more power is being used in moving a car than should be used, is to look to the bonding of your tracks, to look to the character of the construction of your tracks, to look to the weight of your cars, to see that your transmission lines are right, to see that your generating station is right. That is common sense, applied to any other industry, and it is common sense when applied to railroading.

Now, the New Haven Railroad happened to be very largely interested in street railways. And the job which was up to us to work out was to see if we could produce a kind of transportation that people would buy at a price at which we could sell it. There was nothing more complicated than that. There is, however, one thing which enters into that question of transportation which perhaps does not occur to the layman, but certainly is in the minds of most of you as representatives of street railways. And that is, the kind of transportation that people will buy.

Four Principal Means of Transportation

I think we can say without fear of successful contradiction, that of the four principal kinds of transportation, that by water has its place as perhaps the cheapest kind of transportation to perform. The cheapest method of transporting masses of property overland is by the standard steam railroad. Now we have motor trucks and we have all sorts of other kinds of vehicles operating on the highways. All told they do not carry 5 per cent of the traffic. I wish sometimes that they would be required to carry the same degree of low-class traffic that we have to, but they apparently can pick and choose, and therefore take only the best. But in the matter of tonnage they do not carry more than 5 per cent of the traffic. I think, therefore, we can say safely that water transportation between ports is the cheapest, but that overland transportation by rail is most economical and will prevail.

What is the place of the street railway? At the inception of our negotiations with the cities of Worcester and Springfield, Mayor O'Hara and Mayor Parker were good enough to appoint in each of their cities experts to study, along with our representatives, the characteristics of the street railway transportation carried on in these two communities. And it is curious how closely together those reports were in their recommendations. And it is also interesting that the reports were unanimous in both cities and in both places. They came to the conclusion that in cities of the character and size of Springfield and of Worcester, where large numbers of people had to be handled in peak hours in the densely traveled portions of the cities, there was no other means of transportation so economical of space and so satisfactory, as to speed and facility, as the street railway. When we come to operation between cities we get into a twilight zone. As the density of the traffic decreases the profitable or economic character of the street railway car likewise decreases. When, added to that, by reason of the magnificent highways which the state of Massachusetts has constructed, a means of speedy communication is afforded, we have found that we can do better by substituting passenger motor buses from the perimeter of the densely-settled portions of the community, operating express from the center of the city to that perimeter and locally beyond that.

Now, that is simply a common sense co-ordination of traffic, which we believe will work and which has the advantage, I believe, of giving to people the kind of transportation which they wish to use. And it is difficult to sell to a man a thing which he does not want.

While I am on that subject, the question has been frequently asked: If you agree that the street railway has its place, as you have stated, that the passenger motor bus has its place, that the railroad and the steamboat have their places as stated, why not the motor truck? Why should you stop arbitrarily and not carry property over the highway, just as you do carry passengers over the highway?

The answer is that we are stopped by artificial statutory enactment in the interstate commerce act. Sections 2 and 3 of this act forbid unjust or unreasonable discrimination between persons or places, and the Interstate

Commerce Commission has several times decided that a carrier subject to that act has no right to make a different rate in a locality, or to two persons in that locality engaged in the same kind of business. I am measuring my language here pretty carefully. The railroad has no right to make a different rate to one man than to another located in the same community, and doing the same kind of business.

If the railroad were to engage in the motor truck business, it would speedily find itself in this position, of continuing to give free delivery on a siding to an industry which had for a long time been established on that railroad siding, and charging an industry located a mile or so off the railroad for that transportation. And so long as it was engaged in motor trucking, there is nothing that the railroad could do to escape the imputation and the prohibition of unjust and unreasonable prejudice in charging the man located off its line for the motor truck haul.

Now, gentlemen, a few years ago we made an intensive study of the cost of trucking to and from our stations, and yards along our line, and we found that the amount which was paid was equal to the entire revenue which the company received for the carrying of the freight. If we were compelled to absorb motor truck charges we would probably go broke in 60 days. And that is the whole reason why you do not find the degree of willingness on the part of common carriers to engage in motor trucking that you find to engage in the carriage of passengers.

I am tempted at this point, because my subject is a pretty broad one—"The Co-ordination of Transportation in New England"—to say a few words to you who represent the producers of transportation, with respect to the character of the business in which you are engaged. I do not know whether you have ever really realized the importance of transportation in civilization. The great Francis Bacon once wrote this sentence: "There be but three things which make a country great and prosperous; a fertile soil, busy workshops, and easy conveyances for men and things from one place to another."

Whether he wrote Shakespeare or not, he uttered a great truth in that statement. There has never been a nation in the history of civilization that has risen to power that did not carry with it adequate means of transportation. I think we are entitled to accept the origin of transportation in Mesopotamia and in Egypt, which was the caravan route between the Red Sea, the Arabian Sea, and the Mediterranean. It is characteristic that this transportation followed the lines of transportation to Phoenicia, which controlled the Mediterranean. It was the envy of Israelites by reason of the magnificence of its commerce, that had spread to Carthage, which was a Phoenician outlying point, and remained in control of Carthage until Rome, in the three Punic Wars, wrested the control, and of the million population of Carthage only a few thousand were left. It was the outstanding characteristic of the Roman Empire, stretching from Jerusalem to the walls of Antioch, with a great stream of transportation which made it possible for the Roman citizen to go the entire length of the Roman Empire with the products of the Roman territory. Later, Venice came to the fore, when she controlled the transportation of the seas, and traded with Constantinople, Greece, Syria and Egypt. Her prosperity increased and far surpassed that of the first Venice. Until she lost her transportation power the Roman Empire had prospered. Spain succeeded, and if she had been as willing to colonize as she was to conquer might have maintained her prestige today. But she ran against England, who was destined to colonize in conquering, and the Armada destroyed Spain's power because it took from her the means of transportation and gave it to the British Empire, which has maintained it ever since.

Here in the United States we have grown up with transportation. The thirteen original states, the real fringe along the Atlantic seaboard, measured the extent to which the sailing ship, and the rowboat, and the ox wagon went, and it so happened that almost at the beginning of these United States of ours occurred the beginning of new methods of transportation. We became a nation in 1787. Within twenty years the steamboat was invented; within twenty more years the steam locomotive was invented; within 25 more years the telegraph was invented; in twenty more years the telephone was invented; all means of conveying persons and property in commerce, and the transmission of intelligence in commerce.

We, here in the United States, have grown hand in hand with the development in our transportation; in the intermingling of people, in the exchange of ideas, in the exchange of property, all of which are essentials to the progress of a nation. If you do not believe it in modern times, just compare two countries, the United States and Russia. They are not very different in area; Russia is somewhat larger. They are not very different in the breadth of latitude which they occupy. We have 262,000 miles of railroad; Russia has 25,000 miles of railroad. Can anyone doubt that if 100 years ago, when Peter the Great was teaching the greatness to which Russia was destined, he had educated his people and built 260,000 miles of railroads, ramifying through that great empire, that Russia today would have a great asset for national prosperity, instead of being a blot upon the nations of the world?

So you who are engaged in this great industry of transportation need never apologize for it. It is one on which I believe the prosperity of the world depends, and I am in good company when I predict that the peace of the world may depend on it; for it was only the day before yesterday when that splendid Lone Eagle, who winged his way alone from New York to Paris, and afterward as the Ambassador of Good Will to the countries about the Caribbean, said that the differences which existed between those countries existed because it took days and weeks to go through the jungles and over the mountains, but that by air that distance could be traversed in two or three or four hours, and these people be brought into contact, each with the other, so that these

jungles of doubt and mountains of ignorance might be levelled, and be brought to a common understanding.

It is that which gives us as transportation men the vision which Tennyson gave us so many years ago in Locksley Hall, when he spoke of the time when "the war drum throbb'd no longer, and the battle flags were furl'd in the Parliament of Man, and the Federation of the World."

Winnipeg Company Uses Gas-Electric Car

The interior of the gas-electric car is roomy and comfortable

RAPIDLY increasing traffic on the Winnipeg River Railway due to pulp, wood and mining activity in central Manitoba made necessary recently the installation of a Mack model AS gas-electric car by the Winnipeg Electric Company.

The car is 52 ft. long, 10 ft. wide and over 12 ft. high. It weighs 30 tons and carries 59 passengers. The car is of aluminum construction throughout, contains a parlor car section, smoking compartment, express room and the usual conveniences found on standard main-line trains. It has a rating of 120 hp. From the viewpoints of comfort and utility, the car has proved highly satisfactory. Well-cushioned spring seats absorb all road shocks.

Witness Blank Tells of Bonus

ACCIDENT PREVENTION BONUS

The conductor and motorman of this car are paid a bonus for safe operation, which they lose if involved in a preventable accident.

The management and employees take pride in an exceptional record for safe operation—and solicit your co-operation.

Your name and address on this card will assist the company in giving fair treatment to all concerned.

Name .....

Residence .....

Telephone Number .....

City .....

Business Address .....

Telephone Number .....

City .....

DATE ..... THANK YOU

Brooklyn witness card tells of bonus plan

SINCE the introduction of the bonus system for excellence of accident records, conductors and motormen of the Brooklyn City Railroad, Brooklyn, N. Y., have been turning in the names of more witnesses than they did previously. In order to assist them still more, a new form of witness card has been made out which tells the witness of the participation of motormen and conductors in the bonus for safe operation. It is believed that with the use of this card, the accident records will continue to improve.

More Light for Chicago Readers

ELECTRIC lamps with clear glass which have been standard in the cars of the Chicago Surface Lines, Chicago, Ill., rated at 23 watts, are being replaced by 36-watt lamps, with inside frosting. This change was determined upon after an extensive investigation. These new lights will provide 40 per cent more illumination, making it much easier for passengers to read newspapers. Additional energy required for these lights will amount to about $25,000 a year.

This gas-electric car is handling passenger traffic on an outlying line of the Winnipeg Electric Company's system

Maintenance Methods *and* Devices

Emergency Trolley Tension Rod

This trolley base tension rod is a time saver when the regular rod breaks

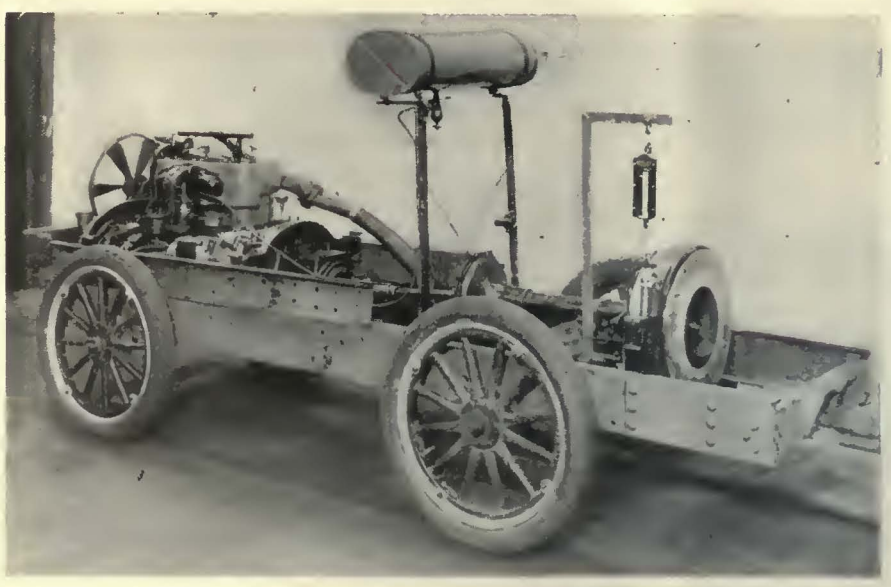
PROPER trolley pole pressure is easily obtained in the event of a broken rod with the trolley base tension rod shown in the illustration. It was developed by one of the trouble men of the Cincinnati Street Railway, Cincinnati, Ohio. This rod may be attached to the trolley base without driving out the pin that holds the end of the broken rod in place. As a result this tension rod has been found a very effective time saver for emergency jobs of the nature described.

Portable Dynamometer Set for "Running-In" Motors

IT IS BELIEVED by the bus maintenance department of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., that the bearings of automotive engines which have had their periodic or emergency overhauling completed, are best run in with a portable prony brake dynamometer.

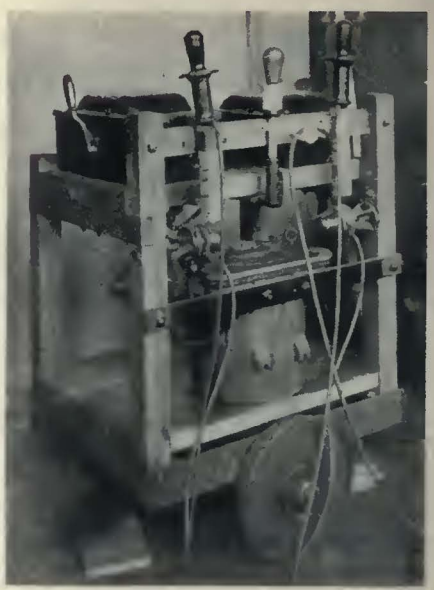
The truck assembly of dynamometer equipment shown in the accompanying illustration was made in the company's shop to answer this purpose. It consists essentially of a deep channel side frame bolted together with end pieces of almost equal depth to form a rigid chassis. This is mounted on ordinary light-weight automotive type axles, with wheels proportionately of light construction and taking 30x3½-in. tires. An additional steel frame is mounted at one end of the chassis with cross members so spaced as to permit the mounting of either four or six-cylinder motors as used with the bus equipment.

It has been found that proper "running-in" of motor bearings is not insured simply by operating such a motor at an idling speed over a period of twelve to eighteen hours. The prony brake is used, therefore, to load the engine progressively over a period of twelve hours until during the last one to one and one-half hours or so, it is carrying as nearly normal full load as can be approximated. The first two hours of the "running-in" process is at no load, the next eight hours a load of about 33 per cent of normal full load is held, and the finish is with the engine operating at its rated horsepower.



This portable prony brake dynamometer was made in the Milwaukee Electric Railway & Light Company's own shops to solve the problem of properly "running-in" bus motors

High Tension Test Outfit



SINCE publication of the article by R. S. Beers on a simple high-potential testing outfit in the JOURNAL for March 24, page 505, a photograph of the actual device has been received. This is reproduced herewith. The basis of the outfit is a standard 110/2,200-volt lighting transformer. The auxiliary equipment and the testing leads are also shown.

Wood Commutator Cover with Added Features

FAILURE to latch properly often caused the malleable iron commutator covers furnished originally with the GE-80 motors to be lost in service. This necessitated a continual replacement with a resultant high maintenance expense. The New York & Harlem Railroad, New York City, has developed a wood cover with a locking screw to prevent this. It is made of oak, oval in shape and is 19½ in. long, 9 in. wide and 1 in. thick. One-half of the thickness of the wood is cut away for a distance of $1\frac{5}{16}$ in. from the edge. This leaves an oval boss $16\frac{7}{8}$ in. long by $6\frac{3}{8}$ in. wide. The boss fits into the commutator hole of the motor frame and prevents shifting of the cover. A ⅛x4-in. steel plate installed across the entire width of the cover at the middle acts as a reinforcement as well as a footing for the holding screw. The holding

Wooden commutator cover takes place of lost ones

screw support is a malleable casting and is bolted to the top half of the motor shell. This casting projects over the plate for about 3 in., and the end is drilled and tapped with ½-in. machine threads.

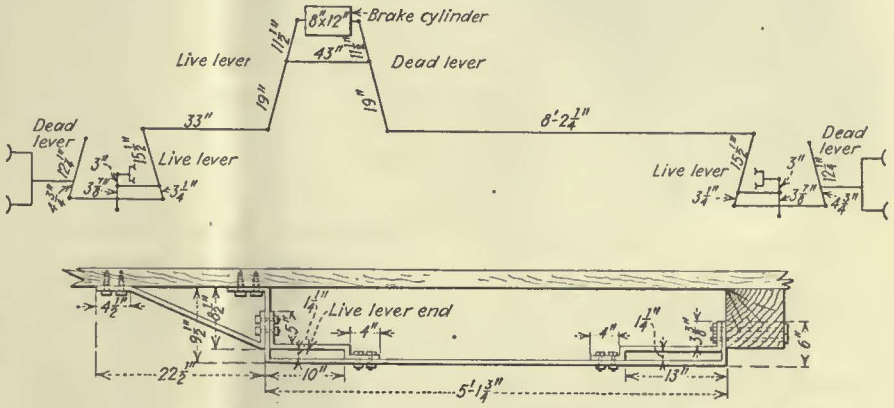
The holding screw is made from ½-in. round bar. It is bent at a right angle with a short end of 2½ in. and a long side of 4½ in. The short end is threaded for installation in the support and the long side is used as the handle. This cover is light, and since the locking handle is within easy reach of the workman no difficulty has been experienced in keeping it on at all times.

Portable Vacuum Cleaner for Car Seats

PLUSH and cane seats in the cars of the Atlantic City & Shore Railroad, Atlantic City, N. J., are cleaned at regular intervals by means of an Electro-Lux vacuum cleaner. This is a small portable equipment operating on 110 volts alternating current. Convenient outlets at this voltage are located at intervals through the car shops. The process takes about 4½ hours per car, including removal of dust and dirt from the floor around the seat supports, and from the arm rests and window sills, as well as from the seats themselves. A thorough cleaning is given to each car once every two weeks.

Safety Stop for Brake Cylinder Levers

SAFETY and continuity of service being considered of importance on the New York & Queens County Railway, Woodside, N. Y., nothing is overlooked that will tend to improve these factors. To guard against a total loss of the braking power if one of the pull rods breaks led to the design of a stop which would assure one-half of the braking effort. This was accomplished in the following manner: A flat bar ½ in. x 3 in. x 66¾ in. is installed in such a position that it supports the ends of the brake cylinder live and dead lever in a horizontal position. One end of this carrier is fastened to a cross sill by ½-in. through bolts and the other end is secured to the center sill by ½-in. lagscrews. A piece of ½-in. x 3-in. iron is bolted to the carrier over each lever so that it forms a slot 10 in. long for the live lever and 13 in. long for the dead lever. These slots allow free movement of the levers under normal operating conditions, and with a broken pull rod act as a stop for the loose lever. This permits the proper functioning of the complete braking equipment fastened to the other lever.



Arrangement of safety stops for brake levers

Twenty Things to Avoid in Maintaining Cable Leads

1. *Cutting of wire strands when removing cable insulation.*
2. *Making a terminal connection with ends of strands twisted.*
3. *Removal of too little insulation so that only one setscrew takes hold of the cable.*
4. *Terminal and connector setscrews not locked with jam nuts and lock washers.*
5. *Soldering of cable ends by inexperienced men.*
6. *Poor cleaning of conductors preparatory to soldering.*
7. *Solder that is too cold.*
8. *Soldering acid that is too weak.*
9. *Rough soldered joints with poor insulation.*
10. *Solder spattered over face of commutator and necks at armature connections.*
11. *Acid flux spilled on armature windings.*
12. *Poor insulation of field coil terminals after making cable connections.*
13. *Iron setscrews dropped in motor frame and left there.*
14. *Poorly supported leads anchored inside motor frame.*
15. *Cable for motor leads and wiring around frame that is too stiff.*
16. *Reversed field coils from wrong cable connections.*
17. *Motor leads brought out of frame by non-uniform methods.*
18. *Insecure cleating to hold leads to motor frame and car body.*
19. *Leads arranged so they will rub on motor or car parts.*
20. *Knuckle joint connectors placed in the swinging loop.*

New Equipment Available

Light-Weight Calculator

LESS than 7 lb. is the weight of a calculating machine announced by the Burroughs Adding Machine Company, Detroit, Mich. While small and compact it is equipped with full-size keys, a standard keyboard, visible adding dials and operates the same as the larger models. The machine is but 6½ in. wide and 11¼ in. long. It has an accumulating capacity

Small compact computing machine

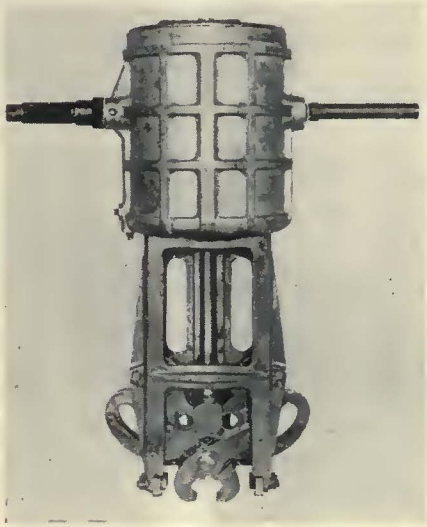
of 9,999.99 for addition and multiplication. Subtraction and division are facilitated by the proper complementary figures on all keytops.

The mechanism of the new calculator is adjusted to high-speed work. It was brought out primarily to meet the requirements of railways and public utilities for a low-priced machine for revenue accounting work, and for checking invoices and computing payrolls.

Air-Operated Spike Puller

SPIKE pulling is facilitated by a tool developed for the purpose by Ingersoll-Rand, New York, N. Y. It is claimed that with it one man can pull eight to ten spikes per minute. The machine is light, so that it can be moved quickly by hand from tie to tie. It is said to consume on the average only 3 cu.ft. of air per spike.

To pull a spike the throttle is turned to admit air on top of the plunger. As the plunger moves down a link arrangement opens the jaws on the lower end. The machine is then set with the jaws around the spike and the foot-rest on the lower flange of the rail. Air is admitted by rotating the throttle and the plunger rises. The pull from the



Air-operated spike puller

plunger moves the links to close the jaws under the head of the spike and clamp it firmly. As soon as the jaws clamp a strong upward pull draws out the spike.

Hydraulic Jack Used for Pressing In Bushings

HEREWITH is shown a Blackhawk hydraulic jack of 7-ton capacity installed so as to act as a horizontal press. All hydraulic jacks of the Blackhawk Manufacturing Company, Milwaukee, Wis., operate horizontally providing the pump side is down. To help speed up production a spring is fastened to the base of the jack and to the side of the ram. When the release valve is

Method of using hydraulic jack as a horizontal press

opened this spring pulls the head of the jack off the finished job, and allows removal of the piece and the placing of a new shaft and collar.

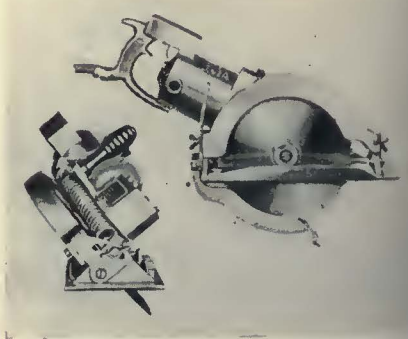
Manganese Steel Drilled Successfully

IT HAS always been considered impracticable to drill or machine high manganese steel. With the advent of a new cobalt steel, however, the Morse Twist Drill & Machine Company, New Bedford, Mass., announces that it has been able successfully to drill railroad frogs with a chemical content of 1.08 carbon, 10.04 manganese, and with a Brinell hardness of 207-217, using a drill of special structure to withstand extreme torque and point pressure.

On one grind nine holes each 1½ in. deep were drilled through the railroad frog. The company announces that it is now prepared to make drills for this work upon specification.

Portable Electric Hand Saw

BEVEL sawing, at any angle up to 60 deg., in addition to vertical sawing is announced as a feature of a new hand saw produced by the Wodack Electric Tool Corporation, Chicago, Ill. The new type B portable electric hand saw has a tilting



New type portable electric hand saw

base which can be set and locked at any angle within the 60 deg. range, by means of a slide and locknut.

Another new feature is that of the width gage for vertical sawing, which can be set for any dimension up to 6 in. With it various widths of strips can be sawed without the necessity of marking.

Like other Wodack saws the type B has a built-in General Electric universal motor which operates on both alternating and direct current. Each saw is furnished complete with a one 11 in. and one 9 in. blade.

Association Activities

Utilities Problems Discussed at Baltimore Meeting

Beneficial results to be accomplished formed the theme of the principal speakers at the sixth annual convention of the Maryland Utilities Association held in Baltimore, Md., last week

WITH ADDRESSES by nationally known experts in their particular fields, the Maryland Utilities Association held its sixth annual convention at the Emerson Hotel, Baltimore, Md., Friday, March 23, 1928. In order to promote liberal discussion of the various problems, the morning session was divided into four groups, electric, transportation, gas and water. In the transportation group Dean J. Locke, staff engineer United Railways & Electric Company of Baltimore, told of traffic conditions and various schemes of traffic control used in Chicago, Cleveland, Detroit, Pittsburgh and Baltimore. An abstract of his paper is published elsewhere in this issue.

In the discussion following Mr. Locke's paper, C. D. Gaither, police commissioner of Baltimore, told of some of the problems that were confronting the police department and of various remedies that were being tried to solve them. Carl W. Stocks, editor *Bus Transportation*, spoke briefly of the desirability for uniformity in traffic regulation, and Clarence W. Squier, associate editor ELECTRIC RAILWAY JOURNAL, spoke of the reduction in accidents that could be expected from improved traffic control and the advantages of safety zones and wide left turns in speeding up the movement of traffic in city streets.

The electric group discussed various committee reports and listened to a paper by Earl Whitehorne, commercial editor of *Electrical World*, on developing domestic loads. The gas group heard about care and maintenance of the gas meter by A. M. Wolfe, assistant manager Maryland Meter Works, and the water group had a general discussion on their problems.

The afternoon joint session was taken up largely by three addresses by prominent officials of the American Electric Railway Association, the American Gas Association and the National Electric Light Association. In comparing electric railways with other public utilities, L. S. Storrs, managing director American Electric Railway Association, commented on the size of the electric railway industry and by various comparisons showed its real importance and that, in fact, it must be considered as one of the greatest factors affecting the growth and prosperity of any community. Without transportation, he said, development would lag badly. An abstract of Mr. Storrs' address is given below.

Major Alexander Forward, managing director American Gas Association, prophesied the ultimate elimination of smoke and spoke of some of the things that he believes could be expected in the future for gas producers. He gave some statistics to show the trend toward consolidation of industry. Interstate power was discussed by Major H. S. Bennion, director of engineering National Electric Light Association.

In the business session of the association, the following officers were elected: President, H. T. Connolly, general manager Washington, Baltimore & Annapolis Railroad, Baltimore, Md.; vice-president, H. A. Brooks, Potomac Electric Power Company, Washington, D. C.; treasurer, R. E. Town, Potomac Edison Company, Hagerstown, Md.; secretary, David Kinnear, United Railways & Electric Company of Baltimore. The directors chosen were Adrian Hughes, Jr., L. G. Smith, C. H. Leatham, Frank Meyers, Frank Mitchell, and G. W. Woolford.

The evening session included a banquet and addresses by Albert C. Ritchie, Governor of Maryland, and William F. Broening, Mayor of Baltimore.

Electric Railways Are Not Looking for Charity*

BY LUCIUS S. STORRS
Managing Director American Electric Railway Association

IN RECENT years the electric railway branch of the public utility business has been regarded almost as a "poor relation." With $5,500,000,000 invested in it, with 300,000 men on its payrolls, and with its service to nearly 16,000,000,000 of passengers per annum, it still is a great enterprise. But lately the growth of the power and light business has been so spectacular, and the troubles of the electric railways due to the competition of the private automobile and the unregulated bus have been so prominently before the public, that the vitally necessary service which the electric railways are rendering to the public, and which they will continue to render, has been somewhat obscured.

But the electric railways are not "poor relations." They are by no means clamoring for charity. They *are* asking for better understanding, for better appreciation of the fact that they are rendering a service that cannot, by any stretch of imagination, be dispensed with; they *are* seeking the full co-operation of the public in the rendering of that service.

Electric railways *do* render an essential, absolutely necessary service. The reason why electric railway service is irreplaceable is that it is the most economical means of transporting the masses of the people. Nothing yet has been devised that is so efficient and inexpensive in carrying large numbers of people from their homes to the factories, to the shopping centers, to the theaters and other places where people must gather in large bodies.

The principal field for the electric railway is in the medium and large-size cities. It is inconceivable that a city like Baltimore could continue to be an attractive, prosperous metropolitan city without such excellent service as the local street railway gives the public.

Too often the question of rate of fare occupies the public mind, when the real problem is quality of service. Where can you buy for 5 cents anything that you could have bought for that sum ten or fifteen years ago, except possibly a postage stamp? Yet the 5-cent fare has been a political fetish in some of our large cities, notably in New York, where the inadequate revenues of the electric railways have prevented the development of the kind of service which the people really want, but which their political overseers have prevented them from getting.

It is gradually sinking into the public mind that something cannot be gotten from a street railway company for nothing any more than something can be taken from a grocery store without payment. You may force your public utility to continue to give you service at less than a fair rate of return, but

**Abstract of an address delivered before the Maryland Utilities Association, Baltimore, Md., March 23, 1928.*

rest assured that that company cannot continue forever to give service under such a handicap and remain a sound business organization. Sooner or later the day of reckoning comes, and then you have receiverships, with the lopping off of non-paying lines, destruction of values, disruption of the business of the community and greater expense and inconvenience to the public.

Fares Should Give a Reasonable Rate of Return

If I had any plea to make, more than another, it would be for recognition of the right of the electric railways to earn a rate of return that would permit them to render the public the high quality of service which the public wants. The granting of that plea would insure the continuance of this necessary service with ever-increasing improvement. It would insure as ready a flow of capital into the electric railway industry—publicly regulated and controlled—as flows into private business enterprises, many of them by no means essential and all of them free from public regulation.

Granting of that plea would put quality and adequacy of service over everything else. It would make the rate of fare a matter of secondary importance, which it rightfully should be.

The first essential of any public service is *adequacy*, and as the service is publicly controlled it is within the power of the regulatory authorities to insist that it shall be adequate. But a company not earning its operating expenses, or at best a mere pittance above them, is in no position to give the public the kind of service it most earnestly wants to give and which the public desires and ought to have.

In some parts of the country, notably in Ohio, the service-at-cost franchise has solved the problem of adequacy of service and reasonable rate of return. This kind of franchise provides that a specified rate of return on the value of the property shall be counted as part of the cost of providing the service. The rate of fare fluctuates according to the condition of the operating surplus of the company. You probably are familiar with the franchises in Cincinnati and Cleveland, in which those large cities recognize a fair return on the value of the properties as a proper element of the cost of service.

I am not here advocating any particular kind of franchise, I cite these instances merely in support of my statement that the public is coming to recognize more fully the importance of permitting its street railway companies to charge rates of fare that will assure the investors a reasonable return on their money invested in the public service. The same result may be obtained under any franchise, provided the regulatory bodies, the public and the companies have mutual understanding of their obligations to each other, mutual confidence and respect and a common ideal—the provision and support of a truly adequate public transportation service.

Traffic and Traffic Control in Various Large Cities*

By Dean J. Locke,
Staff Engineer United Railways & Electric Company of Baltimore

OUR highway systems, designed for the most part many years ago to meet the then existing traffic conditions, are inadequate today. It is the purpose of this paper to describe briefly the traffic in a number of cities visited and make a comparison with Baltimore.

The visitor to Chicago is quickly impressed with the absence of congestion in street and pedestrian traffic within the downtown Loop district. Most of the streets are either 38 or 48 ft. between the curbs. Blocks are laid out in a rectangular pattern, and average 400 ft. north and south, and 320 ft. east and west.

The co-ordinated traffic light system now in use in the Loop district of Chicago has three objects in view: (1) to release traffic officers for better use in the promotion of safety and reduction of ordinance violations; (2) to speed up traffic, and (3) to increase the capacity of the streets. The system was a success from the start. It nearly doubled the speed of street cars and motor vehicles through the controlled district and increased the street capacity by from 25 to 50 per cent. Regulations on parking that became effective two years later, further materially increased street capacities. Records of the Police Department indicate a reduction of 23 per cent in the number of personal injuries from automobile accidents as a result of the signal control.

At the entrance of the controlled area the signals are set to admit traffic part of the time, and part of the time to permit traffic on the cross streets. This breaks the lines of vehicles into groups or platoons separated by an interval of time. As each group moves along the street toward the succeeding street intersection, the signals at that intersection are made to give an indication in their favor just as they arrive. The interval between the changes in lights at successive intersections is timed to permit steady movement under average conditions. The travel on cross streets flows in the interval between these groups and in a similar manner.

When the system was planned the data indicated that a 90-second cycle would be necessary. In practice traffic movements have been so facilitated that for normal weekdays six different lengths of cycle are now employed during the different periods of the day, ranging between 50 and 70 seconds. On Saturdays seven different cycle lengths are employed, as the traffic at times is materially different from that on other weekdays.

Shortly after the signals were placed in operation, parking within 50 ft. of the downtown signal lights was prohibited to promote better vision at the street intersection, to facilitate the loading of street cars and to minimize delays at congested street corners. At each stopping place at the near side of each intersection a car safety zone has been established. Free wheel vehicles are required to use the lane between the curb and the loading zone.

All left turns are prohibited at all intersections within the Loop except at the boundaries of the section.

On Jan. 10, 1928, parking in the Chicago Loop section was prohibited by ordinance during business hours. This "No Parking" ordinance affects an area of approximately 1 mile square. Within the past few days opponents of the plan have succeeded in securing an amendment to the ordinance permitting ten-minute parking of passenger automobiles within the Loop district.

With the parking ban as first instituted vehicles move with a saving in time of more than 20 per cent during the evening rush hours and of more than 30 per cent during the middle of the day. Pedestrians move more freely with a greater sense of security. Street car schedules are much more regular and save 15 per cent of passenger time. Cabs, buses, private and commercial cars operate as before, and passenger vehicles can stop to receive and discharge passengers as they always have done. All of these benefits have been obtained without limiting the use of the street to traffic in any way. It simply means that vehicles cannot block the streets by using them for storage.

Cleveland's Natural Advantages

Cleveland has about 225 traffic lights installed at the present time. The great majority of these are at isolated corners in outlying sections and work independently although controlled by the master timers of the groups to be described. There are, however, three groups of signals, working on the co-ordinated control plan, which handle traffic on heavy arteries in a most efficient manner.

The first group is that on Euclid Avenue between Public Square and Eighteenth Street, where, in the shopping district for a distance of about 4,000 ft. nine signals have been installed with control centered in a tower at Ninth Street, the busiest intersection.

The second group is that on Carnegie Avenue between 30th Street and Sterns Road, where 21 signals provide co-ordinated control of free-wheel vehicles for a distance of more than 3 miles. Carnegie Avenue is a main artery of travel. Traffic consists almost entirely of passenger cars and buses; slow-moving trucks are diverted to parallel streets. Cross traffic at the different in-

**Abstract of a paper presented before the Maryland Utilities Association, Baltimore, Md., March 23, 1928.*

Essential Features to Successful Solution of Traffic Problems

1. Without genuine co-operation and unselfish contributions by the various interests involved, including the city administrators, the police, business organizations, transportation companies and the general public, the present-day traffic problems cannot be solved as they should be.

2. The immediate problem, apart from that of city planning, is concerned with means of securing the maximum efficiency in the use of existing streets and other traffic facilities.

3. Traffic control devices have passed the experimental stage, but they should be installed only after very careful engineering investigation and study into all the facts and conditions surrounding their use and when a definite need for them has been established. There is real danger that the widespread installation of signals at isolated intersections will result in great delay to traffic which will not be compensated for by added safety.

4. Automatic traffic control devices, when installed under proper conditions and operated properly, increase materially the capacity of streets, the speeds of vehicle operation and the safety of individuals using the streets.

5. Parking is the principal and least justifiable cause of street congestion. It is the crux of the traffic problem in most cities, including Baltimore. Parked cars cut our street widths in two, strangle business and delay all who use the streets, while only a few car owners are benefited.

6. Materially greater provision should be made for off-street storage of motor cars in the business district.

7. Where free wheel vehicles and street cars are in conflict, separate lanes of travel should be provided to permit the fluid movement of traffic. To this end, car stops generally throughout the business district should be provided with clearly defined safety or loading zones. Where street widths are too narrow to permit of clear free-wheel vehicle lanes opposite such zones, curbs should be recessed, where physically possible.

8. Boulevard stops, when carefully located, are a material aid to the relief of traffic congestion and to the promotion of safety.

tersections varies from a volume approximately equal to that on Carnegie Avenue, to a very small amount. The width of Carnegie Avenue permits four lanes of traffic. In the morning rush hour three lanes are occupied by inbound traffic and one by outbound, while in the evening rush hour three lanes are occupied by outbound traffic and one by inbound. The system is so adjusted with a cycle of 84 seconds that traffic at a speed of 25 m.p.h. can move in both directions without interruption. Motorists may now cover the controlled section in an average time of ten minutes, where formerly with manually operated semaphore control, 21 minutes were required.

The third installation is on Euclid Avenue in East Cleveland, where for a distance of more than 3 miles, sixteen intersections are co-ordinate-controlled from City Hall. There the roadway is 68 ft. in width. The 61-second cycle permits of an average vehicle speed through the section of about 24 m.p.h. and an average car speed of about 12 m.p.h., including stops. Elevated car loading platforms are used at each car stop.

The streets adjacent to the boundaries of the Loop district in Detroit are rectangular in pattern with widths of about 60 ft. between building lines. In the center, however, streets are in radial and circular pattern, with Grand Circus Park as a center. Some of the radial streets, including Woodward Avenue, are as much as 120 ft. wide. The street plan makes the control of traffic difficult.

Traffic on the principal streets is controlled by some 125 automatic signals, mounted in a variety of ways, hence somewhat confusing to users of the streets.

Practical Benefits in Doubt

The signals operate on a fixed 56-second cycle split equally between green and red. They are controlled from one timing mechanism. The light aspects are staggered to provide progressive movement of vehicles at about 20 m.p.h. With this arrangement the aspects down any one street at any given time are individually or in groups alternately green and red. While this plan when installed penalized traffic on the main thoroughfares while giving an unduly long interval to minor cross streets, it was supposed to speed up both motor and street car traffic some 60 per cent and to reduce the accidents very materially. There has, however, been some controversy as to its practical benefits and I understand that it is proposed to rearrange the signal timing mechanism to provide for co-ordinated control, as in Chicago and Cleveland. A trial installation of this type has been in successful operation for some time on Cass Avenue between Temple and Antoinette Streets.

Pittsburgh's Tough Problem

Undoubtedly Pittsburgh has one of the toughest traffic problems to solve of any large city in the United States. The business center, termed "the Triangle," lies in the fork of two rivers, and is surrounded by hills and precipices. The blocks are irregular and narrow. Practically two-thirds of the blocks are under 300 ft. in length. About half of them accommodate but two lanes of traffic. Most of the three-lane streets, comprising 40 per cent of the blocks, are one-way streets and have been such for a number of years.

At the present time traffic control in the Triangle is by officers using semaphore signals. Congestion is so great that vehicular speeds are very low and street capacities are decidedly limited. That these conditions are not worse is due in considerable measure to a no-parking ordinance which prohibits parking on a vast majority of the downtown streets either for 24 hours a day or between 8 a.m. and 6 p.m.

A solution of Pittsburgh's traffic problem is in sight, however, as the result of the untiring efforts of the Mayor's better traffic committee, which, appointed early in 1925, has made a comprehensive study of the problem and recently has submitted a report recommending: (1) The immediate installation of a "flexible co-ordinated" electric traffic control system in the central business district; (2) that steps be taken to bring about obedience to signals by pedestrian traffic as well as by the vehicular traffic; (3) that immediate consideration be given to the elimination of many of the left-hand turns; (4) that immediate consideration be given to the prohibition of horse-drawn traffic from certain major streets during the peak hours, with the setting up of certain suitable by-pass streets for this type of traffic.

It is proposed to install electric signals at some 100 downtown intersections at a cost of several hundred thousand dollars. These signals would be master-controlled at some convenient centralized point and would provide a means of increasing street capacities and the safety of movement. The studies made indicate a possible time saving for both motor vehicles and street cars in traversing the proposed signalized area of from 30 to 40 per cent.

Here in Baltimore we have a serious traffic problem. Within the central business district 66 per cent of the roadways are less than 40 ft. in width and 50 per cent of the blocks are less than 300 ft. long.

At all but a few intersections downtown traffic control is by officers using semaphores or lights. No parking is permitted between 7:30 and 9:30 a.m. and between 4:30 and 6 p.m. on a limited number of streets, while two-hour parking is permitted generally between 9:30 a.m. and 4:30 p.m.

Outside the business district traffic is controlled at some 135 intersections by automatic lights, most of which are controlled individually. The exceptions are small groups on North Avenue, Mount Royal Avenue, the Fallsway and St. Paul Street, which are synchronously operated, and a group of twelve lights on Cathedral Street, which recently have been connected with a more modern co-ordinated type of control. The Cathedral Street group permits continuous flow of automobile traffic for a distance of 4,200 ft. at 22 m.p.h. The length of cycle is 63 seconds. Plans have been made for the use of co-ordinated control on North Avenue, a heavy crosstown street on Lincoln Highway, and on St. Paul Street, a heavy radial artery. Co-ordinated electric signal traffic control is also planned for some sixteen intersections on Baltimore and Howard Streets in the central business district. Boulevard stops are little used. Street car stopping places on the railway system as a whole average ten per mile during rush hours with the rush-hour stop plan, and twelve per mile during non-rush hours.

The features most essential to the successful solution of our traffic problems are given on page 549.

Modern Equipment Interests New Englanders

IMPROVING electric railway service through the use of up-to-date equipment was the principal subject of discussion at a meeting of the New England Street Railway Club held at Springfield, Mass., March 12. At the afternoon session W. L. Harwood, engineer of power and equipment of the Springfield Street Railway and the Worcester Consolidated Street Railway, told about the results achieved with the Springfield experimental car. An abstract of Mr. Harwood's paper appears elsewhere in this issue. He illustrated his talk with lantern slides showing details of the equipment. The advantages of the treadle door over the older type of door operating mechanism were outlined by J. H. Vander Veer, sales engineer National Pneumatic Company. His talk was accompanied by motion pictures showing operations of treadle doors on electric railway cars in many cities.

Commenting on the necessity for giving up-to-date service, Lucius S. Storrs, managing director, American Electric Railway Association, pointed out that the number of people who ride on the electric railways during the course of a year is greater than the number of postage stamps sold in the United States. Improvements being made to the local transportation systems in many cities, he said, are indisputable evidence that the public transportation industry is on the road to recovery. Charles Gordon, editor of ELECTRIC RAILWAY JOURNAL, mentioned the recent developments in car design as one of the most significant things in the field of local transportation today. W. C. Slade, vice-president, United Electric Railways of Providence, said that electric railways have been marking time during recent years because they have been undecided whether to buy more cars or to buy buses. Developments in car design fostered by the Springfield and Worcester companies will mean much, he said, to the future of the industry.

Improvements to the Springfield and Worcester Street Railway system were not made for idealist reasons, according to E. G. Buckland, vice-president New York, New Haven & Hartford Railroad. Mr. Buckland's remarks are given elsewhere in this issue.

More than 500 men, a record-breaking number for the New England Street Railway Club, attended the banquet in the evening. Howard F. Fitch, vice-president of the club, presided at the banquet and made brief remarks welcoming the men to the dinner and convention. He deviated from the regular program to introduce Clark V. Wood, president of the Springfield and Worcester railways, and the man in charge of arrangements for the record-breaking meeting. Mr. Wood welcomed the huge crowd and thanked everyone, from the officials to the track repair crews, for their presence and their interest.

Mayor Fordis C. Parker, of Springfield, welcomed the members of the club to the city. He spoke with gratitude of the efforts of the Springfield Street Railway to maintain the highest grade of service. He said that the expenditure of more than $800,000 by the company last year was evidence of the attempts being made to render the best possible service. He thanked Mr. Wood for his endeavors and experiments that had given the city a type of street car that is being copied in other communities.

The city of Worcester was represented by Mayor M. S. O'Hara, who congratulated the officials of the New York, New Haven & Hartford Railroad for their courage in buying a railway that was on its "last legs" and putting it on a sound basis again. He told how the old cars had been painted and repaired, and the service improved more than 100 per cent. He said that it was a satisfaction to have responsible persons running the buses in the city. He was proud of the fact, he said, that powerful interests would spend money on the railway property to provide better service for the residents.

Capt. Ralph Earle, president Worcester Polytechnic Institute, gave an interesting talk on the duties and accomplishments of the United States navy during peace times. Robert Burlen, of Boston, concluded with what he termed "A Message" to the effect that humor is necessary to play the game of life.

Energy Consumption Low on Springfield Experimental Car*

By W. L. HARWOOD

Engineer of Power and Equipment Springfield Street Railway, Springfield, Mass.

SEVERAL years of thought and experimenting by the Springfield Street Railway have resulted in the Springfield experimental car.

It would be too long a story to tell of the development of the various pieces of equipment which finally went into the completed car, but after some delays and some interesting experiences, the car was finally completed shortly before midnight, April 13, 1927, and on Thursday, April 14, at 10:30 a.m., made a scheduled exhibition run with some 40 prominent persons. The run was successful beyond expectations. Between that time and May 13 this car made many demonstration runs for the benefit of men connected with the industry from many parts of the country. On May 13, 1927, it was put into regular service on one of the heaviest city lines and has to date made some 12,000 miles.

We have been operating the experimental car on one of our heaviest city lines, the State Street Line. This line operates on State Street with a maximum grade of 6.5 per cent, with some 1,300 ft. averaging over 5 per cent. The line loops through Dwight Street and returns via Main Street. The round trip is 7.1 miles and the actual running time varies from 48 minutes during the lighter periods of the day to 58 minutes during the rush hours, making the schedule speed from 7.3 m.p.h. to 8.9 m.p.h. Some tests taken last May showed 5.8 equivalent stops per mile at times of non-congestion and 13.5 stops per mile during congested periods. The car has made some 12,000 miles in this service, having been out of service for about a month, in order to go to Cleveland, and has carried some 75,000 revenue passengers (transfer passengers

**Abstract of a paper read at a meeting of the New England Street Railway Club, held at Springfield, Mass., March 22.*

not included). During this service, the car has performed very satisfactorily and has developed no major defects. When first put into service, the press named it "The Noiseless Car," due to its quiet operation. There are no gear or brake noises, the only noise being the trolley wheel on the wire and flange noise of the wheels on the rail. The low unsprung weight, combined with the long springs and rubber shock-insulators, allows the car to pass over special work with a rather pleasant click, quite different from the noise made by the conventional car. Tests made by the A.E.R.A. committee on noise reduction also show it to be more quiet in operation than our other cars.

The light weight and roller bearings allow the car to accelerate very smoothly and rapidly. Under test, rates as high as 2.2 m.p.h.p.s. have been noted, and in actual service rates average around 1.5 m.p.h.p.s.

Braking rates as high as 4.35 m.p.h.p.s. have been noted, and in revenue service the braking rates run around 2 m.p.h.p.s. While these are high braking rates, the effect on the passengers is not uncomfortable, as the rate is uniform without objectionable changing or jerky operation. This is partly due to the special material of which the brakeshoe is made, having a fairly constant coefficient of friction with varying loads, and there is no seizing action as the car comes to rest. In emergency, full brake chamber pressure can be obtained in less than $\frac{3}{8}$ second, and in service, in something less than $1\frac{1}{2}$ second which, combined with the rapid rate of retardation, makes possible stops in the shortest distance.

To get an accurate comparison of the power required by the experimental car as compared with a modern light-weight car, we equipped both the experimental car (No. 554) and one of our 50 new light-weight double-truck safety cars (No. 565), with watt-hour meters. Both cars are operated regularly on the State Street line. The results are as follows:

	Kilowatt-Hours per Car-Mile
For the month of December, 1927, the total amount of energy required, including heat, lights, air compressor, etc., for No. 554 was	3.19
And for No. 565 was	3.65
For the month of January, 1928, the energy used by No. 554 was	3.27
And by No. 565 was	3.88

That is, in December, 1927, the light-weight double-truck safety car No. 565 used 14.4 per cent more energy than the experimental car, and in January, 1928, 18.7 per cent more energy.

A special energy test of 8.7 miles, with one car following the other, making the same stops as traffic required, and measuring energy for motors only, showed an energy consumption as follows:

Car No. 554, kilowatt-hours per car-mile	1.61
Car No. 565, kilowatt-hours per car-mile	2.18
Car No. 554, kilowatt-hours per ton-mile	0.127
Car No. 565, kilowatt-boure per ton-mile	0.119

In this test the light-weight double-truck safety car No. 565 took 35.4 per cent more energy than the experimental car.

Another test of 9.5 miles over another route at rather higher speed, with fewer stops, showed the following:

Car No. 554, kilowatt-hours per car-mile	1.58
Car No. 565, kilowatt-hours per car-mile	2.11
Car No. 554, kilowatt-hours per ton-mile	0.125
Car No. 565, kilowatt-hours per ton-mile	0.116

In this case the light-weight double-truck safety car used 33.5 per cent more energy than the experimental car.

The weight of car No. 565 is 36,500 lb. against 25,300 lb. for experimental car No. 554—car No. 565 is 44 per cent heavier.

There have been no worn-out parts or replacements in the 12,000 miles of service. A thorough inspection made recently showed no wear in the bearings and the worm gear and work shaft were in perfect condition. It is too early to predict what the life of bearings and drive will be, but there is every indication of long life. Brakelinings show wear of only $\frac{1}{8}$ in. for 10,000 miles of service, which would indicate that we will obtain about 20,000 miles per set in our heavy city service. Based on 12,000 miles of operation, there is every indication of low maintenance.

New Business Can Be Developed With Advertising and Publicity*

By E. E. Soules

Manager Department of Publicity Illinois Traction System, Peoria, Ill.

FROM an industry that was largely non-advertising ten years ago there is today being spent better than $6,000,000 each year for city and interurban transportation advertising. How and why the industry has brought advertising into its operating program is of interest; what have been the results and what results may be expected is the present-day concern.

The modern railway manager uses advertising continually to keep his public informed about the affairs of his company. He has learned that it does not pay to wait until there is trouble and then rush into print and expect the public to join in the mourning. He knows that the public is not interested in the troubles of the advertiser, and that they would rather hear of success than failure; but he also believes that the public is notably fair, and that if it can be made to see that the community is directly affected by the failure or success of the transportation system it may be depended upon for support.

Ask a progressive city railway operator for concrete figures on the result of his advertising. If reports for comparative periods show increased riding he will state that in his judgment advertising, plus good service, and perhaps plus changed conditions, have all had a part in the improved reports. If reports do not show increased riding or earnings he will tell you that without advertising the story would have been worse.

Recent years have produced but few examples of increased riding on city properties. An outstanding exception with which we are all more or less familiar is the city of Chicago, where the surface and elevated lines have shown consistent increases. It is significant that both of the operating companies in Chicago have within recent years established advertising departments that have effectively used the display columns of the newspapers. It is not contended, even by the advertising man, that advertising alone has been responsible for the upward turn in Chicago. Increasing difficulties for the motorist who now finds street congestion almost unsolvable has also tended to put passengers back on the rail cars; while speeding up of schedules and rerouting of basic lines is keeping passengers on the cars. But advertising and publicity have played an important part by first telling the story of things to be done and things accomplished, then selling the public on the advisibility of doing the things planned, and finally selling them again on the use of new and improved services.

Newspaper the Basic Medium

There is such a variety of operating conditions that no standardization of advertising methods has been developed by city railways. Following well-proved advertising practises the newspaper is the basic advertising medium. On the average about 65 per cent of transportation advertising appropriations is expended in the columns of the daily and weekly newspaper. The street railway and bus operator has a decided advantage in having a medium of advertising without cost in the car card space in his own cars and buses, and dashboard space on the outside of his cars, but its real value is not appreciated by many operators. In recent years city transportation advertisers have come to more generous use of outdoor advertising, principally in the form of painted bulletins. The radio, the motion picture and other novelty forms of advertising are included in the plans of a few companies.

High-pressure sales methods are not entirely lacking in city transportation advertising. In recent months we find a representative company in the mid-west city offering reduced bus fares on certain "express" lines during off-peak hours of the day. In another instance we find free rides advertised for the day on which a new bus route is opened. We find other companies co-operating with retail stores on special shopping days by offering free rides during certain hours.

The advertising activities of electric interurban railways, which at first were secondary to the publicity work, have

**Abstract of a paper presented before the Illinois Electric Railways Association, Springfield, Ill., March 14-15, 1928.*

steadily grown. Companies were to a great extent impelled to adopt active selling and advertising policies by the keen competition offered in the transportation field, by the growth in popularity of the private automobile, the interurban type of motor bus and the increased hard road mileage. Because the interurban railways have been employing strenuous merchandise and advertising tactics over a longer period of time, there are available more examples of developing new business in this field than in that of the city operating company.

There are sufficient examples of developing new business with advertising in the interurban field to convince the doubtful operator that advertising, when coupled with sound merchandising principles and a saleable service, does produce results. Here again the first attribute to success in terms of increased business is a service that permits the electric carrier to compete on a service basis with other carriers. In every instance where the company has been able to secure and hold new customers it will be found that the quality of the service has warranted the merchandising and advertising that is used to sell it.

Selling Improved Service

In the passenger field many improvements designed for the special comfort of passengers, such as standard parlor, sleeping and dining cars, luxurious modernized coaches, faster schedules and smoother roadway, have been made by the electric railways. In the freight field there has been intensive solicitation for local freight and express, and many of the larger companies have redesigned and rebuilt motive power and equipment to place them in position to handle through freight in car lots with interchange of equipment and rates with other carriers. Advertising and publicity has had much to do with acquainting the traveling and shipping public with these developments.

Today we find electric railways not only using the pages of local publications for their freight traffic advertising story, but also the columns of traffic magazines with national circulation. In these pages the shipper of freight in San Francisco, in New York, in New Orleans is told that certain electric railways solicit freight shipments in carload lots to and from any point in the United States. The Illinois Traction System was the first electric railway to place its advertising regularly in a traffic magazine of national circulation. It began to tell this story only after it was capable of giving a valuable freight service to the national shipper, and now finds it profitable to maintain representatives in most of the larger cities for the solicitation of through freight business.

Taking an illustration from the remarkable story of the Chicago, South Shore & South Bend Railroad, we find an electric railway which through rehabilitation of its physical properties and reorganization and modernizing of its traffic and sales policies, almost doubled its gross revenues in less than two years. Advertising played an important part in this noteworthy transportation achievement, as it has also done in the rejuvenation of the Chicago, Aurora & Elgin Railroad.

There was a time when "doorbell ringing" was considered an undignified type of solicitation, but the advertiser of today appreciates the value of personal solicitation and the modern electric railway is making good use of this form of approach. The employee sales campaigns of some of the most progressive railway organizations have proved their worth as business producers for both the passenger and freight departments. The Chicago, North Shore & Milwaukee Railroad was a pioneer in this method, and it has also been used to good advantage by the East St. Louis & Suburban Railway in introducing new motor bus routes.

Many electric railways are acting as ticket agents for athletic events and theatrical attractions, reserving seats and selling combination tickets that include transportation and seat accommodations.

The direct mail medium of advertising is given an important place in the advertising plan of the modern electric railway. Lists of memberships of lodges, civic clubs, social organizations, school classes and various kinds of societies are usually available and the personalized letter announcing a special service or innovation is an effective and dignified method of approach, providing it is not repeated too frequently.

Outdoor advertising is a valuable medium in territories where population is dense and circulation is heavy. This has been demonstrated to the satisfaction of companies like the Chicago, North Shore & Milwaukee Railroad, the Chicago Rapid Transit Company, the Chicago, South Shore and South Bend Railroad and the Chicago, Aurora & Elgin, which have the advantage of telling their story to a tremendous outdoor circulation through the use of painted bulletins and lithographed posters.

Exhibits at expositions, public speaking activities, use of the radio, motion picture and other novelty advertising will be found in the advertising plans of many companies and are used with various degrees of success. Results from this form of media, however, are not easily checked and they are of value principally for general publicity purposes.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 6 — Metropolitan Section, A.E.R.A., 33 W. 39th Street, New York, N. Y.

April 25-27 — American Welding Society, annual meeting, 33 West 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5 — Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

May 9-10—Central Electric Railway Master Mechanics' Association, Erie, Pa.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27 — American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22 — American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17 — Wisconsin Utilities Ass'n, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

American Association News

Entertainment

PLAN early and well, was the motive of C. S. MacCalla, chairman of the entertainment committee, in calling the meeting held on March 26 at association headquarters in New York. Last year's results were discussed and plans were developed for the coming convention to be held during September in Cleveland.

With the addition of a theater seating 5,000 and a smaller ballroom now being completed on the auditorium property it was planned to have all social events on the "pier," as the verbiage goes after so many years at Atlantic City.

The meeting was headed by C. S. MacCalla, chairman, and attended by J. C. McQuiston of East Pittsburgh, vice-chairman; Ralph Emerson, Cleveland; Joe Stewart, Jr., Cincinnati; S. J. Cotsworth, Philadelphia, and John A. Dewhurst, L. S. Storrs, J. W. Welsh and A. A. Hale, all of New York.

News of the Industry

Short Railroad in Michigan Does Trick

An interurban railway line boasting of only 8 miles has reversed the usual order of things by threatening to run a bus line out of business. It is the United Suburban Railway "the shortest railroad with the longest list of stockholders in the United States" that has turned the trick. Started in July, 1927, with 700 stockholders, the line runs from Grand Rapids, Mich., southwest to the village of Jenison, Mich. A bus line has covered the same route for the past few years but offered its equipment and franchise to the railroad this month for $57,000. The stockholders see little value in purchasing the line.

In 1926 the Grand Rapids, Holland & Chicago Railroad succumbed to the competition of the bus lines. With the passing of this road the residents of the territory between Grand Rapids and Jenison had no means of transportation. The bus line service did not satisfy and finally the commuters decided to own their own service.

Five cars were ordered from New York City and on July 17, 1927, using the defunct road, the first trips were made. Later it was found necessary to lease an additional car from the Grand Rapids Railroad, and early this year two more new cars were ordered from the East.

At the first annual meeting of the stockholders the books showed a profit of $2,950 for seven months of operation. Each succeeding month has shown an improvement. December, with its heavy holiday traffic, was expected to top the list, but its high mark was exceeded by January, which in turn was surpassed by February.

Hope is held out that the initial cash dividend would be paid next year. However, the 700 stockholders who reside along the right-of-way feel that they are receiving substantial dividends through increased property values since the resumption of operations.

Toronto Men Want New Agreement

Features of a new agreement shortly to be submitted by the employees of the Toronto Transportation Commission, Toronto, Ont., are a clause to give all employees two weeks' annual vacation with pay, and an increased schedule of wages for the maintenance department. With the exception of a proposed increase to maintenance men and the request for two weeks' vacation with pay, the new agreement differs little from the present, which expires March 31. The employees take the position that since they are in the employ of the city they are as much entitled to a vacation without any penalty as are other city employees.

The agreement will be for two years. It will probably not be dealt with before General Manager Harvey's return from England.

Talk of Lackawanna Electrification Revived

Representatives of 23 North Jersey civic organizations on March 27 told J. M. Davis, president of the Delaware, Lackawanna & Western Railroad, that they would use their influence to increase commutation fares if his company would electrify its lines to commuting communities. The project of electrifying these lines has been talked of for twenty years, but this was the first time that spokesmen for the public involved have come forward to aid the project. Mr. Davis said he would give the suggestions that have been made serious consideration.

It is proposed to operate trains electrically on 75 miles of road. These would include the lines from Hoboken to Montclair, Dover and Bernardsville. The cost would be about $13,000,000 if the railroad bought power from outside interests or $17,000,000 if it constructed its own generating plant.

Mr. Mitten and Amalgamated Negotiate

Conditions in Philadelphia and Buffalo to remain as at present so far as organization activities are concerned. Two-thirds secret vote will fix policy on any new lines

ANNOUNCEMENT was made on March 28 that Mitten Management, Inc., had reached an agreement with the Amalgamated Association for union labor co-operation where Mitten Management in the future may acquire or operate any transportation system, providing two-thirds of the employees of the system by secret vote agree.

Mitten Management, Inc., of which Thomas E. Mitten is the head, manages the operation of the Philadelphia Rapid Transit Company system and the operation of the International Railway system at Buffalo, but these companies are not affected by the agreement.

The agreement was reached after a series of conferences in Atlantic City among Thomas E. Mitten and his son, Dr. A. A. Mitten, chairman of the boards of the Philadelphia Rapid Transit Company and the International Railway, and W. D. Mahon, president of the Amalgamated Association; his son, O. L. Mahon; L. D. Bland, treasurer, and P. J. Shea, vice-president of the Amalgamated. The conference was arranged by W. Jett Lauck, a labor economist and former secretary of the War Labor Board.

The full memorandum of the union-management agreement, dated March 25, follows:

Mitten Management reiterates its desire to deal with organized labor whenever and wherever any union organization will undertake to co-operate for increased economic efficiency and where two-thirds of the employees, by secret ballot, may so elect.

Mahon and associates, speaking for the Amalgamated Association of Street and Electric Railway Employees of America, being also desirous of co-operating in economic accomplishment and of aiding their membership to a 50-50 participation in the rewards rightfully paid to men and management, in addition to the present wages paid, have now come to an understanding with Mitten Management, Inc., by which the following procedure will hereafter govern both parties:

The P. R. T. Co-operative Plan of 1926 shall be made effective with the union covering such system, or departments of a system, as the union may designate, after two-thirds of such employees shall have so determined by secret ballot, it being fully understood that the right to organize is a fundamental right of labor which should not and cannot be permanently abridged or denied, but it is now understood and agreed that the activities of the Amalgamated in this respect shall be restricted to properties that are to be acquired or operated by Mitten Management in the future.

So far as Philadelphia and Buffalo are concerned, conditions there are to remain as at present in so far as organization activities are concerned, it being desirable that the situation on these properties shall remain as at present in order that the standard of economic excellence of these companies now being operated by Mitten Management be the standard by which union performance in co-operating with Mitten Management on other properties shall be measured. When co-operation between the Amalgamated and Mitten Management has developed to a point where the results are equal to those obtained on these properties, the matter of union-management agreements on these properties may be discussed and be made the basis of further agreement.

Working agreements including standards of work and compensation to be matter of local arrangement and ratification. Collective consideration to be upon the basis of group representation through branch, departmental and general committees, with recourse to arbitration in case of failure of agreement. Before arbitration shall be re-

sorted to, however, the matter under discussion shall be submitted to two representatives of the International Association and two representatives of Mitten Management for review and attempted settlement. Failing agreement one arbitrator for employee and one arbitrator for employer shall be chosen, these to select a third. If these two arbitrators are unable to agree upon the third arbitrator then the Public Service Commission shall act as the third arbitrator.

Contract shall run during delivery of co-operative effectiveness, which is understood to mean that degree of assistance in securing the result on the property in question as secured by Mitten Management on the properties operated by them at this date. Non-performance by either party to be settled through arbitration. Contract may be terminated by vote—secret ballot—of two-thirds of the employees represented by the organization. Operating company and union each to supply, at their own cost, their representatives on the 50-50 collective consideration committees, also each its own secretary. Operating company and union to share equally in the office and operating expenses as mutually decided. Operating company to, where two-thirds of the employees so vote, collect by check-off system and pay to organization such amounts as the organization may from time to time decide. All the employees of the departments involved to be so assessed. Funeral, disability, old age and all other benefits to be undertaken by the union, for which operating company will pay union $1 per month per man.

In addition to the usual results of collective consideration, it is the further object of this arrangement to secure for all interested parties the advantages of collective effort and accomplishment. To the owners this will mean a fair return on their property; to the public an adequate and efficient system of transportation; and to employees, in addition to wages sufficient for the necessities of life, comfort and savings, an opportunity to participate in increased earnings made possible by their increased effort and productive efficiencies. Mitten Management and Amalgamated Association are agreed that the same 50-50 participation shall be effective between "management and union" as now exists between "management and men," and the sense of this agreement is that both shall supply the same degree of co-operation and both similarly shall participate in the results secured therefrom.

It is explained that T. E. Mitten and W. D. Mahon have been seeking industrial peace for more than 30 years. Each has always had great respect and admiration for the other. Yet more than half the time each has been obliged to fight the other by the force of the powers to which Mr. Mahon owned his leadership as president of the Amalgamated and Mr. Mitten his position representing capital.

Twenty years ago Mr. Mitten endeavored to secure co-operation as between capital and labor, but "neither the force let by Mr. Mahon nor the capital represented by Mr. Mitten could be brought each to trust the other at Chicago, and Mr. Mitten came East in 1911 to try his 50-50 plan as between labor and capital in Philadelphia where it was fully intended by Mr. Mitten and Mr. Mahon that the union and company would co-operate."

The P. R. T. co-operative plan of 1911 was signed and all looked well, but insurgents in the forces of organized labor caused it to fail in polling the agreed two-thirds vote. Then came sniping by labor at Mr. Mitten, who for the past fifteen years "has been forced to fight off organized labor and against conservative capital to protect his 50-50 plan, which is now generally admitted to have proved beneficial alike to employees, owners and public." In conclusion an official statement said:

"All's well that ends well" and "everything happens for the best" are old and trite sayings. These have proved true here. Capital has now capitulated, and had Mr. Mitten and had Mr. Mahon worked together from 1911 forward as planned, their very association would have encouraged radical labor and reactionary capital to such opposition as would have made impossible the wonderful results secured by Mr. Mitten and the men of Philadelphia and Buffalo. These two cities, independently operated, can be now used as a measuring stick for results to be obtained wherever Mitten Management and organized labor can be combined.

This resolution, dealing with the Mitten-Mahon agreement, was adopted by the employee committee men of P. R. T., on March 27.

Whereas Mitten Management has made a formal agreement with the Amalgamated Association covering future relations; and

Whereas the basis of this agreement is the policy of men and management co-operation and fair dealing which has since 1911 guided the activities of men and management on P.R.T. system; and

Whereas this agreement in no way affects the present relationship between P.R.T. employees and Mitten Management under the co-operative plan, but on the contrary makes the men of P.R.T. system, with independent operation, the pattern of co-operative efficiency by which future Union-Management accomplishment will be measured: Therefore be it

Resolved, that the joint convention of employee and employer committees of the Philadelphia Rapid Transit Company obligate themselves jointly to maintain such a continuing degree of excellence in co-operative efficiency as will well justify the confidence thus expressed in us. And be it further

Resolved, that we indorse this agreement and extend to Mitten Management our congratulations on this accomplishment which, after many years of misunderstanding, indicates the acceptance by organized labor in the street railway industry of the fundamental principles of the Mitten plan.

Uniform Franchise Expiration Sought

An application has been filed with the City Council by the Spokane, Coeur d'Alene & Palouse Railway, Spokane, Wash., the Great Northern subsidiary owning and operating the former Inland electric railway system, asking that its franchise on Main Avenue, between Washington and Wall, be extended until 1930 in keeping with the expiration dates of other franchises held on that street. The company is not operating electric cars over this part of its line, but has leased the trackage to the Spokane United Railways. It has three franchises on Main Avenue, and wants a common date of expiration for all of them.

Progress on Merriam-Shawnee Line

Officials of the old Hocker Line, christened the Kansas City, Merriam & Shawnee Railroad, are planning to rush its opening. Work of putting back that part which was torn up after the line was sold last winter is expected to start immediately.

The new line has been granted a charter and has applied to the Public Service Commission to operate from Eighth Avenue and Southwest Boulevard in Kansas City, Kan., through Merriam and Shawnee to Rose Hill. The reorganized company may be able to resume service about Easter.

Fare Increase in Los Angeles Denied

Holding the 5-cent fare of the Los Angeles Railway, Los Angeles, Cal., to be "not unreasonable" the California State Railroad Commission in a decision made public on March 26 unanimously denied the company's application for an increase from the present 5-cent fare to a 7-cent fare or four rides for 25 cents. Application for the increase was made to the commission on Nov. 17, 1926. A valuation of the properties made by the commission was declared to amount to $42,000,000. This was used as a rate base. The figure includes undepreciated cost of properties with land at present values; also an allowance of $750,000 for materials and supplies on hand and of $250,000 for work in progress.

In its decision the commission declared the net earnings for 1927 to be $2,070,261 or 4.9 per cent on the rate base of $42,000,000. The commission held that this return had been earned in spite of the fact that the company had made no effort to take advantage of possible economies pointed out by the commission at previous hearings on the question.

Commissioner Carr in a separate but concurring opinion declared that this was the second time that the Los Angeles Railway Corporation had applied to the commission for permission to depart from the 5-cent fare and enter upon what he termed "the unchartered sea of multi-coin fares," this referring to the proposal to issue tokens at the rate of four rides for 25 cents. He pointed out that on May 31, 1921, the commission issued an order permitting the company to charge a 6-cent fare with ten tokens or tickets for 50 cents, under certain conditions which the company did not accept. He added that during the period 1921-1927 under the 5-cent fare, the company realized average net earnings of 6.6 per cent. The fluctuations, the commissioner continued, indicate the danger of attempting to arrive at a satisfactory conclusion as to rates based upon the experience of as short a period as one or two years. He said he believed there was no convincing evidence that the present cycle of low earnings was permanent.

Graveyard Fires in Worcester and Springfield

Under the plan of the New York, New Haven & Hartford Railroad for the thorough rehabilitation of the railway properties in both Worcester and Springfield, Mass., a group of 130 cars was burned recently in Worcester. This group is part of 189 cars burned during the last two weeks. The grand total of cars in Worcester sold for scrap and to be burned is 375. In addition 128 obsolete cars formerly operated in Springfield are to be fed to the flames.

As has been noted before in the ELECTRIC RAILWAY JOURNAL, the program of burning old equipment is part of the process of putting the Springfield and the Worcester properties in first-class operating condition by the purchase of new cars, reconstruction of track, building of a new carhouse and garage in Worcester and the elimination of all facilities that cannot be rehabilitated and put into efficient operating condition.

The final chapter that made possible the program now being carried out at Worcester and Springfield was written early in January, 1927, when the Public Utilities Commission of Massachusetts approved the acquisition of stock of the New England Investment & Security Company by the New York, New Haven & Hartford Railroad. The commission at that time approved the acquisition of $300,000 of first mortgage bonds of the Springfield Street Railway, authorized the issue of shares of preferred stock of the New England Investment & Security Company and authorized the acquisition of outstanding shares of the common stock of the New England Company.

Almost immediately thereafter the New Haven Railroad entered upon the program of rehabilitation calling for the expenditure of many millions of dollars on these properties that is now fast being brought to completion. Included in that program has been the realignment of the systems in both cities with the lopping off of many railway branches operated in territory sparsely settled and the substitution of bus lines for them with subsequent co-ordination of both railway and bus lines on a scale perhaps never before attempted in cities situated similarly to the two very thriving industrial communities of Massachusetts served respectively by the Worcester Consolidated Street Railway and the Springfield Street Railway.

A hook-up with the past unloosed

Would Appeal Frankfort Ordinances

An appeal from two city ordinances at Frankfort, Ind., was taken on Feb. 23 by the Terre Haute, Indianapolis & Eastern Traction Company in petitions filed with the Indiana Public Service Commission, protesting against the speed limit of 4 m.p.h., that has been fixed by the City Council in Frankfort and other regulations pertaining to track repairs. The railway was recently ordered to pave between its tracks and because of failure to do this, the Council, it is said, passed the speed regulation as a retaliatory measure.

Interborough Not to Appeal Decision in Labor Suit

James L. Quackenbush, general counsel for the Interborough Rapid Transit Company, New York, on March 23 notified Nathan D. Perlman, counsel for the Amalgamated and other labor bodies, by letter that he had decided not to appeal from the decision of Supreme Court Justice Wasservogel denying the company the restraining orders sought. The Interborough has dismissed most of its employees who joined the union and the labor organizations failed to carry out strike threats.

Terminable Permit Bills Signed by New York Governor

Governor Smith, of New York, has approved the two Thayer bills, the one amending the transportation corporations law, to provide for terminable permits for stage, omnibus and motor vehicle lines, as chapter 717 of the laws of 1928, and the other amending the railroad law, to accomplish the same purpose for street surface railroads, as chapter 733 of the laws of 1928. The bills provide that every city, town or village, in addition to other powers now conferred on them by law, shall have power to grant to street railways and to bus corporations a terminable permit to occupy and use its streets.

Every such municipality shall have power to enter into an agreement for the purchase of and to acquire by purchase all or any part of the property, plant and equipment of such a corporation actually used and useful for the convenience of the public, operating under terminable permit, and upon purchase thereof to operate, or to contract with any person, firm or corporation for the operation thereof. Power is also granted to the municipality to amend any existing license, grant, franchise or permit, or any of the conditions thereof, whether granted by municipal authority or directly or indirectly by the state or otherwise, or any consent of local authorities, or any of the terms, provisions or conditions thereof, relating to construction or operation.

Every terminable permit and every amendment to any existing license, grant, franchise, permit or consent in-

One horseman fire visits Worcester

corporating therein the terms of a terminable permit, shall contain an irrevocable option for the purchase by the city, town or village, either directly or through its nominee or nominees, of all or any part of the property of the transportation corporation.

All terminable permits and amendments thereto are to be subject to the approval of the Public Service Commission or the Transit Commission.

It has been hinted that the immediate effect of the bill will be to further a proposal to reorganize the surface transportation of Brooklyn in order to overcome the city's objection to inclusion of surface railway lines in a comprehensive unification plan.

Wage Hearing in Fort Wayne

A hearing was held in the Allen County Courthouse, Fort Wayne, Ind., on Feb. 27 before Commissioner Harvey Harmon at which operators and officials of the Indiana Service Corporation presented their arguments on the employees' petition for an increase in wages. The men, who had asked the Public Service Commission for a hearing, contended that the wage scale at present was inadequate and the company stated that business conditions and a general falling off of electric railway revenues made it impossible at the present time to grant the requested increase. Following the taking of testimony from the men and the company the commissioner said that a later date would be set for oral arguments before the full commission.

Crash on Long Island Injures More than a Score

A twelve-car train of the Long Island Railroad left the rails in the Sunnyside Yards in Long Island City on March 28 at 8:15 a.m., bringing serious injury to four, lesser hurts to 30 more, and ripped up 600 ft. of roadway, bringing commuters to their offices late and demoralizing traffic on the road throughout the day. Four investigations are under way as to the cause of the wreck. The derailed train was made up of sections coming from Speonk and from Long Beach combined at Jamaica.

New York City to Try to Recover Subways

The Board of Estimate of New York voted on March 29 to sue the Interborough Rapid Transit Company for the return of the city-owned subways as the city's answer to the Interborough's attempt to raise the fare to 7 cents. The counter suit was not started, however, because a federal court decision which former Comptroller Charles L. Craig, the city's new special counsel, is awaiting was put off until April 2, at which time a hearing before the Federal Statutory Court, scheduled for March 29, will also be held.

$75 for Best Design in St. Louis

Miss Florence Boeffer, St. Louis, Mo., a student in the Fine Arts School of Washington University, submitted the design which will be used by the St. Louis Public Service Company to mark all its street cars and insignia. She won the first prize of $75 in the contest conducted by the company among the students of Washington University. Miss Roberta Shine won the second prize of

Prize winning design

$50, while the third prize of $25 went to Fred Dreher. More than sixty students participated and some submitted as many as fifteen designs.

The design is suitable for use on cars and motor buses, on badges of conductors, motormen and chauffeurs and on caps and uniform buttons as well as for stationery and other printed matter.

Still Dallying with Boston "L" Legislation

There are no clear-cut lines yet for the form that the Boston Elevated Railway legislation may take this year, although the matter has been before the Massachusetts Legislature almost daily since its opening. Opinion sways with the wind. From present indications it seems likely there will be no Elevated legislation, though Governor Fuller has stated more than once that he will keep the Legislature in session all summer, if necessary, to straighten out the Elevated situation.

It is quite clear that no public control bill can get through the house and no public ownership bill can get through the senate. Both branches are opposed to returning the road to the stockholders. On the other hand, the Committee on Metropolitan Affairs and Street Railways has voted, fifteen to fourteen, to report a bill for public ownership, but some of the members who voted with the majority are known to have done so merely to break the deadlock and are not in favor of public ownership.

Matthew C. Brush, president of the American International Corporation, New York, and former president of the Boston Elevated Railway, was in Boston during the week ended March 24 and delivered a bristling address before the Boston Chamber of Commerce, in the course of which he rejected as useless all the propositions that have been raised before the Legislature this year. Among other things he said:

You have an impossible situation over the Elevated Railway problem. You haven't suggested a solution up to 12:30 p.m. today. I have no suggestion to make. But I do advise you not to rush into a solution until you are dead sure you are right. A hurry-up job is worse than none at all.

The statement in the interview attributed to Mr. Brush to the effect that the road could be run profitably on a 6-cent fare has since been denied.

New Franchise Sought in Wichita, Kan.

The Wichita Transportation Company, controlling both street cars and buses in Wichita, Kan., has asked the city commission for a new franchise. In return, the corporation promised the highest efficiency possible in transportation and the directors pledged themselves to fight with the commission for a return of "home rule" over buses to Wichita.

Robert C. Foulston, attorney for the carriers, explained at the start that his board of directors had decided that it was best that control over both street cars and buses be vested in the city.

The terms of the franchise were then discussed. The new franchise would run for twenty years. The carrier would have the right to supplement and extend its lines by automotive equipment as it became necessary and the commission would have the right to demand such extensions as it deemed necessary. The City Commission, by right of the ordinance, could fix the bus and car fares, but should not deny the company the right to earn 8 per cent, with any excess over that amount to be applied to the reduction of fares.

At the start, both bus and car fares would be 8 cents for one fare, 15 cents for two, 35 cents for five and $1.50 for 24 fares, with the universal transfer system in force.

There would be co-ordination between cars and buses with competitive elements eliminated. The city would retain the right to purchase the transportation system any time that it desired, providing a fair price was paid for the properties. Mr. Foulston was unable to state the value of the system, but he gave the combined property account at about $3,000,000. As to the financial condition of the company now, it was said that there are $1,490,000 in first mortgage bonds, $300,000 in 7 per cent preferred stock and $500,000 of preferred stock in the Wichita Transportation Company, recently floated to buy the independents, build a garage and add new equipment. There was a floating indebtedness which he could not describe as to amount.

Mr. Foulston stated that only one year remains for Howard Wheeler, R. C. Clevenger, R. B. Campbell and associates to finance the local transportation system which they plan to take over from the Illinois Power & Light Corporation. The franchise is considered necessary if this financing is to be consummated. He said there will be 20,000 shares in the new system. A total of 4,000 shares will be held by the Illinois Power & Light Corporation and 16,000 will be in the hands of the local cap-

italists. They must refinance the 16,000 shares by next March 1 to get the properties.

Mayor A. J. Coombs has indicated that an early answer may be expected from the city.

Valuation Figures in Madison Vary

In connection with the valuation news about the Madison Railways contained in the article in the JOURNAL for Feb. 11, page 252, it should be explained that the Railroad Commission of Wisconsin, in a late hearing, valued the property on the basis of reproduction new at $1,559,089 and less depreciation at $1,268,096 whereas the expert engineers of the company in valuation proceedings valued the property in detail with each item clearly set forth at $2,188,501 and less depreciation at $1,960,216.

It is understood that the company considers the valuation placed upon its property by the Railroad Commission engineers very much less than any court of equity would approve. In the meantime it has accepted in good faith the ruling of the commission with reference to fares in the hope that the outcome will be mutually satisfactory to the company, the city, and the commission.

Another Move in Baltimore Fare Case

The People's Corporation at Baltimore, Md., has asked the courts to set aside the Public Service Commission's decision granting the United Railways a 9-cent cash fare with three tokens for a quarter and return to the old 8-cent rate with two tokens for 15 cents.

The appeal from the commission's February ruling was filed in Circuit Court No. 2 by Linwood L. Clark, counsel for the People's Corporation. The People's Corporation, according to Mr. Clark, is composed of numerous civic organizations having a combined membership of 300,000.

Counsel for the United already has carried to the same court its appeal for a straight 10-cent fare which the company asked in its petition to the commission last August.

Need of Increased Fare for St. Louis Stressed

Unless the fare increase sought by the St. Louis Public Service Company, St. Louis, Mo., is granted by the Missouri Public Service Commission it will be impossible to maintain the railway system on the present 80 per cent efficiency basis according to a brief of the company filed with the commission on March 9. The company seeks a straight 8-cent fare for adults, this rate to be based upon a property valuation of $75,000,000. This fare would net the company approximately $2,000,000 which is only 6 per cent on the valuation claimed. Refusal of the increase requested would, the brief says, "drive the company into a pecuniary decrepitude which would result in another receivership, and the property and equipment would fall into a condition of disrepair which could only be corrected after the lapse of many years and the expenditure of many millions."

The city in its brief contends the valuation of the company's properties should not exceed $53,000,000. This is only $1,000,000 greater than the tentative valuation fixed by the commission pending the completion of the rate case. It was the contention of the company that the reproduction value of its property would be $98,573,000. The rate case has been before the commission since June, 1926.

Grand Rapids Solicits Suggestions

Employees of the Grand Rapids Railroad, Grand Rapids, Mich., are asked through the columns of *The Token*, the official paper of the company, to submit their ideas on the betterment of service and working conditions for their own benefit and the benefit of patrons. The men are asked to drop suggestions in the suggestion box in the carhouse, shop or general office and not to let an idea slip away, go undeveloped or unknown where it might do the company and others much good. In the February issue of the paper awards are announced for such suggestions as coat hooks on cars for operators' overcoats, blanks for operators' use in caring for mistakes of passengers in farebox errors, and many others.

Wages in Memphis Unchanged

Wages on the Memphis Street Railway, Memphis, Tenn., shall remain unchanged the board of arbitration decided on March 23. Declaring the present scale a satisfactory one the board denied the union's demand for a 9½-cent increase and the company's demand for a 7½-cent decrease. For one-man car operators the men sought an increase in the differential from 5 cents to 20 cents. This finding becomes effective on April 1. A. B. Galloway, representative of the union, dissented from the majority report, signed by W. A. Ransom, chairman and neutral member, and Frank N. Fisher, company member.

Back of the proceedings just ended are many months of almost continuous negotiation by both union and employers for changes in the wage scales. In the spring of 1926 an arbitration board granted the men an increase in hourly wages of 2½ cents. That scale which is continued, provides 47.5 cents an hour for men who have worked with the railway for less than two years, 52.5 cents an hour after the second year, and a top wage of 57.5 cents an hour for three-year or more men.

T. H. Tutwiler, president and general manager of the railway, says the company will make a new contract "upon a reasonable and satisfactory basis."

Hearing on Chicago "L" Increase on April 28

Consideration by the Illinois Commerce Commission of the Chicago Rapid Transit Company's application for an increase in fares, which began in Chicago on March 15 with the presentation of evidence by the company, has been postponed until April 28. The company is asking to have the $1.25 weekly pass and the three-for-a-quarter ticket rate abolished, leaving only a straight 10-cent cash fare.

H. J. Dunbaugh, attorney for the Rapid Transit Lines, explained that the company is receiving a return of about 3½ per cent on its investment, while the commission itself has held that a return of 7½ per cent would be fair. The proposed increase will bring the company's return up to only 6 per cent.

Mr. Dunbaugh recalled that in 1919 the Illinois Commerce Commission found the value of the Rapid Transit Lines properties to be $86,250,000. However, since that time, he contended the value had increased nearly $10,000,000. Harley Johnson, general manager, testified that wage increases since 1922 had totaled $1,251,339.

In deferring the hearings until after the April primaries, David H. Jackson, chairman of the commission, has allowed the city more time in which to prepare its testimony.

Right-of-Way of Chicago & Southern Becomes Highway

The Will County board of supervisors has just concluded negotiations for the purchase of the right-of-way from the Kankakee County line north to Monee, a distance of 6½ miles, formerly used by the Chicago & Southern Traction Company. Paralleling this strip must come an additional 40 ft., being purchased from land owners. This will supply the 90 ft. necessary for the construction of the new super-highway by the state of Illinois between Kankakee and Chicago, the first stretch of 4 miles, extending from Kankakee to the north, being under construction by the state. The railway suspended 2 years ago.

Dispute Ends Amicably in Winnipeg

A dispute in Winnipeg, Man., Canada, over the dismissal of a conductor of the Winnipeg Electric Company has been settled without the threatened strike. Through the efforts of two members of the Conciliation Department and Hon. Peter Heenan, minister of labor, and A. W. McLimont, president of the company, negotiations were opened and the men's committee agreed to have the conductor reinstated in some capacity other than that of conductor. The company maintained that since it was misconduct on the part of an employee it was therefore a matter of discipline and required no board of conciliation. Conciliation proceedings were set up under the industrial disputes act by the Canadian Government.

No Date Set for Public Utility Hearings

The Federal Trade Commission states that the date for beginning public hearings in connection with inquiry into public utilities has not been definitely decided. Commissioner McCulloch, who authorized the statement, said every effort was being made to speed the day when the session will be started.

Commissioner McCulloch's interpretation of the Senate resolution is that while the Senate prescribed an investigation of a public nature, "it intended that we make preliminary inquiry and collect facts upon which to base our evidence for introduction at the hearings. Thus the whole inquiry falls naturally under two headings, general investigation and public hearings."

He added that he was anxious to begin the public hearings in the utilities investigation at the earliest possible moment, but that so far the commission had not reached the stage where it was ready to proceed.

The preliminary inquiry now in process has generally to do with business and financial facts on the one side and the question of alleged propaganda and influencing of elections on the other.

A. G. Mott Defends Zone Fare for Key System

Defending his 5-cent zone fare plan, which the Key System Transit Company, Oakland, Cal., is opposing, A. G. Mott, chief engineer of the California Railroad Commission, occupied the stand the entire day at the rate hearing before Commissioner Clyde Seavey on March 21 in San Francisco. Operation of street cars under his plan, Mr. Mott declared, would increase the company's annual revenue anywhere from $134,000 to $834,000. The engineer further asserted that a rate increase would result in a decrease in patronage that would bring about curtailment in service followed by a further patronage decrease. He estimated that a rate increase from 5 to 6 cents would bring a 20 per cent patronage loss, an increase to 7 cents a 40 per cent loss, and an increase to 10 cents a 73 per cent loss.

The cross-examination of Engineer Mott was resumed on March 24. This rate hearing has been going on intermittently for three months and is now nearing the end. Key System officials contend that operation of the Mott 5-cent zone plan would force the road into bankruptcy. The company wants a 10-cent fare with $1 weekly passes.

Illmo Limited in Operation

The Illinois Traction System has added two parlor-car trains to its fleet between St. Louis and Peoria. The new trains are known as the Illmo Limited. The trains are dispatched from St. Louis and Peoria, Ill., at 10 a.m. daily, making the run in five hours.

Recent Bus Developments

Detroit Operation Raises Storm

Purchase of additional vehicles must await special report. Inquiry into results of present operation

THE Detroit Street Railway Commission has ordered a complete survey of the department's bus system under supervision of William B. Mayo, chief engineer of the Ford Motor Company and consulting engineer of the department. Until this survey, which will study the department's methods of bus cost accounting, the commission decided to defer considering purchase of additional buses.

Commissioner Barlum called the meeting to order at which this decision was made. Commissioner John J. Gorman is reported to have then said:

I hope my criticism won't be taken as a reflection on the manager, but I haven't had a good reason presented to me why these additional buses should be purchased. Likewise I have heard no description of where they are to be used. I have made an investigation and I find that the department has a lot to learn about bus operation.

We should know costs. Our statement shows that it costs 24 cents a mile to operate buses, while, as a matter of fact, the cost is nearer 34 cents a mile. There are many things, such as cost of supervision, pro rata share of overhead on shop equipment and other similar items, that are not charged against bus operation. We have no definite figures.

Isn't this going too fast? As our finances are nothing to brag about, wouldn't it be wise to hire outside aid to investigate the department's bus situation? The Woodward Avenue line lost $80,000 a year. Out of 43 lines, only fifteen show a profit under the department's own figures. Obviously we need buses, but we should postpone buying more until we investigate.

"I'm told our shop methods are lax. We don't know definite costs. We are groping in the dark about the operating costs of the eleven or twelve different type buses. I haven't talked with any one in the department who has practical experience in operating buses.

General Manager Smith, of the department is said to have replied:

The double-deck buses, purchased eighteen months ago, I had nothing to do with. They are obsolete now and we can't forecast what type of bus is to come three years hence. I don't think we can defer enlarging our system. The new buses will be used on Chalmers and Livernois Avenues, the two fastest growing lines in Detroit. Our bus traffic has grown from a few thousand to upward of 37,000,000 passengers last year. You can bring in a staff of reputable engineers and if they don't tell you that the buses are operated economically, I'll resign. There has been a lot of misinformation and not enough real information handed around.

After Mayor Lodge intervened, Mr. Smith continued to answer questions of both commissioners with the statement that "bus costs might be a shade more than is shown in the auditor's figures," and Mr. Barlum retorted: "If we don't get costs of bus operation, we had better get new auditors." Mr. Smith also stated that cost figures on each type of bus are being segregated now.

The Mayor is quoted as follows:

Shortly after election, I studied the audits of Mr. Hauser and Price-Waterhouse and came to the conclusion that, if possible, I would have an entirely neutral firm take the two audits and reconcile them. Ralph Stone, of the Detroit Trust Company, consented to do this and his report will be ready about May 1. There was no use for me to do this and I wanted some one in whom the public had confidence. Until May, we won't be in any position to talk about accounting.

As to bus operation, I don't believe the D. S. R. general manager wants to do anything unnecessary and I am glad that Mr. Gorman has raised his questions. I should like to have the survey made for me and also for Mr. Smith. And Mr. Smith, I should like to have you consider carefully the question of turning the D. S. R. purchasing department over to the city purchasing department.

Sale of Louisville Franchise Set

Mayor Harrison of Louisville, Ky., affixed his signature to the bus franchise ordinance he sponsored and which had passed the Board of Aldermen on March 20. The ordinance was passed without a dissenting vote. John Chandler, attorney for the jitney bus operators, and George C. Burton, representing labor interests, opposed the measure. On March 22 the Board of Public Works announced that the bus franchise provided for in the new ordinance would be sold at public auction on April 2. The sale is regarded as a matter of form since the ordinance was drawn with a view to the acquisition of the franchise by the Louisville Railway.

Shore Line Operating Offices Removed to Hammond, Ind.

J. C. Johnson, general manager of the Shore Line Motor Coach Company, a subsidiary of the Chicago, South Shore & South Bend Railroad, and a large mechanical and operating personnel were removed recently from Michigan City and are now housed in the company's new garage and office building in Hammond, Ind. Removal of the company's headquarters from Michigan City to the more central point on the system was effected because of the sale last December of the Shore Line routes from Chicago to Detroit and from Benton Harbor north to Muskegon, Mich., to the Motor Transit Corporation of Chicago. The service between Chicago and Benton Harbor is still maintained, however. A small staff and office is still retained in Michigan City to handle the Benton Harbor division.

Operators in Cleveland Rewarded for Safety Records

Morse W. Rew, superintendent of the motor coach department of the Cleveland Railway, Cleveland, Ohio, at a dinner at the Winton Hotel in that city on March 16 made the first awards of this kind to 98 men who had operated three months without a chargeable accident. As chairman of the evening Mr. Rew introduced Judge Skeel, president of the Cleveland Safety Council, who talked to the coach drivers on the part that safety plays in safe driving. Earl J. Harrington, superintendent of accident prevention division, also talked briefly on the relationship of accident prevention to operation of coaches.

An outstanding fact was that eight of the drivers operated during the period of three months without any accident, either chargeable or non-chargeable. Should these men continue this record for one year, they will receive a certificate symbolic of their good operating record.

As a means of promoting safe operation a committee of coach drivers recommended to the management on Nov. 1, 1927, that awards be made to the coach drivers who operate without chargeable accidents. The recommendation was approved, and awards were arranged upon the following basis:

Bronze safety pins for those drivers who operate three months without chargeable accidents.

Silver safety pins for those drivers who operate six months without chargeable accidents.

Gold safety pins for those drivers who operate one year without chargeable accidents.

It was in accordance with this plan that the first awards were made on March 16.

Buses to St. Louis Zoo

The St. Louis Public Service Company, St. Louis, Mo., has been granted permission to operate buses on Sundays and holidays along Kingshighway from Manchester to Oakland Avenue. The buses will replace the one-man street cars heretofore used on this stretch during the Summer months when the Taylor Avenue division runs direct to Forest Park Highlands amusement park and the Zoo in Forest Park.

New Move in St. Paul Following Voters' Action

Voters at St. Paul, Minn., will have submitted to them for action at the election on May 1 a proposed charter amendment authorizing the city to engage in bus transportation. The draft of the amendment was voted unanimously for submission March 22 by members of the City Council. For passage the amendment must receive a favorable vote of 60 per cent of the ballots cast at the election. This action follows refusal of the voters at the last election to adopt an amendment allowing the City Council to vote expense relief suggested by the Minnesota Railroad & Warehouse Commission to enable the St. Paul City Railway to come nearer the 7½ per cent return on its valuation authorized by the commission. This included cost of paving between tracks where the streets are already paved. The company has before the commission application for an increased rate of fare, now 8 cents or six tokens for 40 cents.

New Interstate Bus Bill Introduced

Measure now before House represents legislation regarded as not too restrictive yet sufficiently protective

CONGRESSMAN PARKER, chairman of the House committee on interstate and foreign commerce, introduced on March 24 H.R. 12380 as a substitute for his bill H.R. 5640 and, with the consent of Mr. Denison, as a substitute for H.R. 19. This bill was introduced at the request of a legislative subcommittee of the bus division of the American Automobile Association which, under the instructions of the bus board and bus division legislative committee, has since Dec. 2, 1927, been negotiating with all the interests concerned in an attempt to get a bill satisfactory to everybody which would stand a good chance of passage at this session.

In the opinion of the bus board and legislative committee, H.R. 12380 represents more perfectly the viewpoint of the bus operators in the bus division than did the Denison bill, and, at the same time, it has the approval of the American Electric Railway Association, the American Association of Railway Executives, and, informally, pending an official meeting of its legislative committee, the approval of the National Association of Railroad and Utilities Commissioners. The bill also includes several recommendations which were made by the National Automobile Chamber of Commerce at meetings between representatives of that organization and the bus board in Washington on Nov. 11 and Dec. 2.

The chief changes in H.R. 12380 over Mr. Denison's bill are as follows:

1. The two classifications have been omitted and the term "motor carrier" redrafted to take care of this change.

2. The "grandfather" clause has been changed from March 3, 1925, to one year prior to the opening day of the legislative session at which the act is passed.

3. The provision for a suspension of rates during the time when hearings are being held on a protested rate has been omitted. The regulating agencies, under the terms of the act as now written, are without authority to suspend a rate pending the outcome of a controversey.

4. The different matters which under the old bill the board or commission was required to take into consideration before granting a certificate of convenience and necessity have been cut down to a statement that, among other pertinent matters, the board or commission shall give reasonable consideration to the public convenience of and necessity for the transportation proposed and to existing available transportation agencies and service.

These represent the major changes. The only other change to be noted is that the excess phraseology in the bill has been eliminated and where the Denison bill ran to 25 pages, H.R. 12380 runs to only 20 pages. In drafting the bill every effort was made to follow to the closest degree possible the recommendations which were made to the Interstate Commerce Commission at the time of the oral argument on the examiner's tentative report in docket No. 18,300, held at the commission's office on Feb. 10.

No definite information as to hearings on interstate legislation is forthcoming as yet except that whatever hearings are held will be on H.H. 12380 and will not involve anything directly or indirectly connected with motor truck transportation. In an informal statement made to representatives of the bus division on March 28, Mr. Parker said that he would do everything he possibly could to have the committee take early action and he thought that hearings might be held the first or second week in April. At least a week's notice of the date which the committee would set for hearings has been assured. An official statement says:

> The bill as it now stands is simple in form and covers all the fundamentals of regulation. Everybody participating in the conferences at which the bill was drafted was agreed that the bus should be given every opportunity to develop along sound, healthful lines and, except for those provisions necessary for the protection of a certificate, no attempt was made by anybody to insert anything which could be construed as being at all restrictive.

Governor Signs New Jersey Bus Bill

Governor Moore of New Jersey has approved Senator Wolber's bill, senate 204, authorizing the substitution of buses for trolley cars, and extending the Public Utility Commission's control over corporations operating both railways and buses as one system. Under the terms of the bill it is announced many improvements in the transportation system of the Public Service are planned. One of the immediate changes is in West Hudson and Bergen County, where the Hackensack-Newark railway line, is to be turned into a bus line from Hackensack to Rutherford, while from Rutherford the present railway line is to be continued. There is already a de luxe bus line from Hackensack to Newark.

Consolidation Rumors in Albany

An unconfirmed rumor is afloat in Albany, N. Y., that plans are being negotiated for a consolidation of all existing bus lines radiating out of Albany. It is said that a bus corporation operating in the northern and central portion of the state and a railroad controlled corporation are both seeking to promote such a consolidation.

Financial *and* Corporate

Canadian Park Property Passes to Electric Railway

The Canadian National Electric Railways has taken over the ownership of Eldorado Park served by the Toronto-Guelph line of the railway. Its former owners were a group of business men in Brampton and vicinity. The amount involved in the transfer has not been made known. It is stated that the park will be placed under the same management as the railway company's Lakeside Park at Port Dalhousie.

Eldorado Park has an area of 128 acres, and is looked upon as the choicest picnic property in the vicinity of Toronto. It is located upon the upper reaches of the Credit River, where nature has been generous in making that part of the country a delightful beauty spot. The most direct route to the park is over the railway's own line, but it is only a short distance from the Provincial highway running through Brampton.

The railway has under way a program of improvements to the park facilities, in order to bring it up to the same standard as the park at Port Dalhousie.

Mayor of Philadelphia Would Act to Condemn "Underliers"

Mayor Mackey of Philadelphia intends to start action on the McChord plan to untangle the city's transit problems by condemning Philadelphia Rapid Transit Company "underliers." Only a short time ago General Atterbury in a letter to the Mayor explained that elimination of the subsidiary companies would remove obstacles now in the way of developing the Pennsylvania Railroad terminal west of the Schuylkill.

Mr. Mackey says that he may ask the Public Service Commission to determine the value of the "underliers" in time to submit the question of their purchase to the voters in November. The McChord plan, he explains, calls for increasing the city's indebtedness to $136,000,000, but not for any increased charge against the city borrowing capacity.

St. Joseph and Benton Harbor in Sale Proposal

A proposal is under consideration by local business men to purchase and expand the railway in the twin cities of Benton Harbor and St. Joseph, Mich., now run by the Benton Harbor-St. Joseph Railway & Light Company. A committee of six has been named by the Benton Harbor Chamber of Commerce to analyze the proposal and report its recommendations.

The question came up recently when it was revealed that the American Gas & Electric Company, which owns the outstanding capital stock of the local company, contemplated the sale of the system. The American Gas & Electric Company is interested principally in gas and electric properties.

Receivership Case in Binghamton Still in Courts

Federal Judge Frank Cooper has received briefs in Albany on the motion entered by attorneys for the Chatham-Phenix National Bank & Trust Company, New York, in which permission was requested to foreclose and sell under a mortgage held against the Binghamton Railway, Binghamton, N. Y.

The Chatham-Phenix is trustee under the first mortgage of $500,000 by the railway. That company asks for extension of the present federal receivership of William H. Riley. It wants the proceeds of the receivership to be allocated so that $100,000 in interest overdue and accruing on the mortgage may be paid.

A brief has been filed in opposition on behalf of the Traders Trust Company, Binghamton, trustee under the general consolidated mortgage of 1901, under which the receivership now stands.

Another hearing is scheduled to be held on April 5 before Special Master Roy C. McHenry, who will report to Judge Cooper.

Cincinnati Street Railway Doing Well

More passengers being carried. Surplus of $172,765 from railway operation, but loss on coaches. Interesting comment by President Draper

OPERATION of the Cincinnati Street Railway, Cincinnati, Ohio, for the year resulted in an increase in the number of passengers carried and a slight increase in the actual surplus over all expenses, taxes and charges. The surplus would have been greater had it not been that a larger amount than had been anticipated or required to be accrued into the special depreciation reserve fund, was expended to take care of track reconstruction. Part of this was charged as an operating expense. Walter A. Draper, president of the company, said:

The test of the successful operation of the Cincinnati street railway under the service-at-cost plan is the amount of money that is paid into or withdrawn from the fare control fund. In the last two months of 1925, following the date when the new franchise went into effect there was paid into the fare control fund in the way of surplus earnings $6,775. In the year 1926 the amount was $14,064, while in the year 1927 the amount was $20,339. The initial amount paid into the fare control fund when the new operations started was $400,000, provided from the sale of securities, which has been increased to $441,177 by the amount added in the 26 months of operation.

These small additions in themselves indicate, under the service-at-cost plan, that the rate of fare is almost exactly the right figure to provide for all of the requirements for the proper operation of the property. A total deficiency in an equal sum for the period mentioned would indicate the same thing. The fare control fund is provided as a reservoir into which small surpluses and out of which small deficits shall be paid so as to avoid too frequent changes in the rate of fare. It will be recalled that if the surplus should increase the fare control fund to $600,000 fares would be reduced, and, likewise, if deficits should be paid out of the fare control fund so as to reduce it to $200,000 fares would have to be raised. The rate of return to stockholders is fixed under this plan. Instead of the piling up of a large surplus as a proof of sound financial condition, the fare control fund and possible increases or decreases in the rate of fare provide the stability and protection that a corporation must have in order to have good credit and realize successful operation.

Two Full Years Under New Operation

The Cincinnati Street Railway has completed two full years of operation under the new plan and at the rate of fare that went into effect on Nov. 1, 1925, of 8½ cents for tickets and 10 cents cash. It is possible therefore to present a statement showing the results of operation for the two years that are fairly comparable, being on the basis of the same corporate and financial structure and the same conditions of operation with two exceptions; first, the property of The Cincinnati & Hamilton Traction Company was operated under lease as part of the system to April 1, 1926, at which date it was purchased and made an integral part of the property; and second, the company began the operation of motor coaches in April, 1926, having no operations of that character prior to that date.

The results of operation of Cincinnati Street Railway including cars and coaches follow:

	1927	1926
Operating revenue	$8,700,257	$8,065,296
Operating expenses	6,332,429	5,846,221
Net operating revenue	$2,367,827	$2,219,074
Taxes	771,369	708,831
Operating income	$1,596,458	$1,510,242
Non-operating income	48,021	37,220
Gross income	$1,644,480	$1,547,463
Rental, interest, sinking fund and return on capital	1,624,140	1,533,399
Balance	$20,339	$14,064
Fare control found previous balance, including initial $400,000	420,837	406,733
Total in fare control fund.	$441,177	$420,797

A separation of this statement between cars and motor coaches would

STATEMENT OF PASSENGERS CARRIED BY CINCINNATI STREET RAILWAY

	1927	1926	1925	1924	1923	1922	1921
Revenue Passengers:							
Cars	94,006,310	89,493,159	90,629,875	100,839,343	108,625,599	107,528,666	106,527,759
Coaches	6,816,139	4,104,586	.....	.....	.....	.....	.....
Total revenue passengers	100,822,449	93,597,745	90,629,875	100,839,343	108,625,599	107,528,666	106,527,759
Transfer Passengers:							
Cars	30,221,784	29,480,811	30,832,130	32,706,502	34,066,858	34,765,044	34,904,917
Coaches	1,390,784	768,711	.....	.....	.....	.....	.....
Free Passengers:							
Cars	1,553,513	1,465,801	1,309,845	1,319,318	1,292,290	1,399,018	1,527,297
Total, all passengers	133,988,530	125,313,068	122,771,850	134,865,163	143,984,747	143,692,728	142,959,973

show that the operation of the former resulted in a considerable surplus while in the case of coaches a loss was sustained. The surplus from car operation was $172,765, and the loss from coaches was $152,426, the combined statement therefore showing a surplus of $20,339. Mr. Draper explains that as long as coaches are used to serve remote and thinly populated parts of the city they may be expected to show a loss, but it is encouraging that this loss has been reduced in the latter part of the year and promises further improvement.

One of the provisions of the franchise under which the company operates is that on Dec. 1 of each year there must be filed with the city an estimate of gross receipts and budget of operating expenses, taxes, fixed charges and return on capital for the ensuing calendar year. The estimate for the year 1927, which was filed on Dec. 1, 1926, was closely realized by the actual results, as the actual operating revenue for the 12 months was $8,700,257 or $37,000 over the estimate, while the surplus after paying all requirements for the year was $20,339 or $8,712 in excess of the estimate.

Included in revenue passengers carried are those riding on the Sunday pass, which has now been in use for more than a year. The number of Sunday passes sold during the year was 556,736, which were used for a total of 3,450,344 rides. The Sunday pass is sold for 25 cents and is good for as many rides as the times it is presented by the holder on cars of the system between the hours of 5 a.m. and midnight on the same day sold. No transfers are issued on the Sunday pass, hence each time it is presented for fare it is recorded as a ride.

$1,209,453 Spent on Track

In no department was there greater activity in 1927 than in the roadway department. The program of track reconstruction, as distinguished from ordinary maintenance and repairs, included 33 major locations and involved an expenditure of $1,209,453, of which $936,753, was chargeable to operating expense as renewals and replacements and $272,700 to additions and betterments as adding to the value of the property through the installation of heavier foundation and rails and steel ties in place of the previously constructed lighter track. This was almost twice the amount expended the previous year and much in excess of the amount anticipated to be done in any one year when operations were undertaken under the new franchise. This measure required the company to charge to a special depreciation reserve fund over a period of 50 months a total sum of $1,750,000 for track reconstruction. It was early seen, however, that it would be to the advantage of the city as well as the patrons of the system if the work were speeded up sufficiently to correspond more nearly with the program for street improvements by the city.

Expenditures on Obsolete Equipment Unwise

On the subject of cars Mr. Draper said:

It has been the policy of the company to put the track in good operating condition before proceeding with the purchase and operation of new cars. The point has now been reached where new cars can fit into the rehabilitation program and the company will shortly be prepared to place a contract for the construction of from 50 to 100 new cars, delivery of which is expected to be made during the summer. The present equipment operated by the company has been improved in many ways, but the expenditure of additional money on obsolete equipment should be abandoned in favor of the purchase of entirely new rolling stock.

Employees Play Their Part Well

More and more it is being realized by all of the employees of the company that we are all part of one big family and that our interests are mutual and our welfare interdependent. Probably nothing has served to emphasize this more than the starting of a company publication called the *Cincinnati Street Railway News* devoted to the interest and the welfare of this big group of railway people.

The courtesy shown by the company employees toward the car-riding public is increasingly commented upon and many responsive echoes from individuals are received in the shape of commendatory letters. Complaints there are, naturally, where 1,500 men come in daily contact with 400,000 people, but in every such case an effort is made either to make amends, to correct or to explain, and above all, to show the complainant that the company is desirous of learning of every incident that should have attention.

The statement of additions and betterments made to the Cincinnati property during 1927 follows:

Way and structures		$272,700
Real estate for loops		40,442
Wintoo shops, real estate and buildings		792,084
Sub-station real estate and buildings		141,955
Automotive equipment		35,758
Shop equipment (tools)		8,434
Remodeling cars into prepayment type		15,158
Miscellaneous		36,083
Total cars		$1,342,617
Motor coaches	$78,185	
Coach, shop and service equipment	12,266	
Total coaches		90,452
		$1,433,070

The building up of the capitalization of the company or capital value from the date when the present plan of operation went into effect is shown by the following table:

Capital Stock		
Outstanding Nov. 1, 1925	$22,761,950	
Issued to buy Cincinnati and Hamilton property	1,000,000	
Total		$23,761,950
5½ per cent gold bonds		7,000,000
Car trust notes		512,500
Additions and betterments to Dec. 31, 1927	$2,403,369	
Funded	2,181,950	
Unfunded additions and betterments provided by company funds		221,419
Total capital value Dec. 31, 1927		$31,495,869

On the subject of the bus Mr. Draper said in part:

The officers of your company are of the opinion that the motor coach is a type of transportation which fits in logically with rail operation. It is good sense for railway systems to utilize the motor coach where it can best serve different communities, and also to use it in experimentation to determine how it may best fit in. As yet it would appear that mass transportation, particularly in large cities, can best be handled by the familiar form of street cars improved and developed to meet the special needs. The field of the motor coach has heretofore been limited by the size of the units available. There has now been developed a new motor-coach unit of greater carrying capacity which must be reckoned with and which may cause street railway operators to change their opinion as to the availability of the motor coach for use in city transportation. It is wise, therefore, to consider all the possibilities of the motor coach in connection with any future extension that the company may be called upon to make by the growing community.

On the matter of the rapid transit line and other subjects the report says, in part:

The report of the Beeler organization, employed jointly by the city and the company to make a survey of the rapid transit line situation, has been completed. An analysis and study of the Beeler report is now being made in order that the company may be in a position to undertake intelligently the discussion of what had best be done with this important enterprise. The position of the company is that if the Rapid Transit Line can be operated as a part of the local transportation system with the reasonable certainty that the operating costs and taxes, together with all of the fixed charges and return on capital of the present system can be met, it is willing to undertake its operation on a basis that will insure this result as far as possible. A committee has been authorized by Council to sit with the Rapid Transit Commission in the discussion with the company of this important matter. Mutual interest of city and company in retaining the integrity and increasing the efficiency of the existing transportation system (which will have to continue to serve by far the greater majority of the people) should leave little room

for disagreement as to the principal terms and conditions of operation.

It has been the endeavor of the officials of the company to co-operate with the city administration in every way and, in return, fair treatment and unprejudiced consideration has been accorded by the Mayor and other members of Council, the City Manager, the Director of Public Utilities and all city officials with whom the company is brought in contact.

When the franchise under which the company is operating went into effect on Nov. 1, 1925, the annual return to stockholders was reduced from the former rate of 6 per cent to 5 per cent for a period of three years. The allowance to the company for dividend payments to its stockholders will consequently continue at the rate of 5 per cent until Nov. 1, 1928, when the amount of the allowance will return to that which will allow the payment of 6 per cent. Some stockholders have felt that this temporary reduction in the return on capital has been a hardship that they should not have been called upon to suffer. However, the purpose was to help to provide funds for putting the property in a better condition than that in which it was found as the result of the four years of negotiation. It is a wise thing for directors properly to maintain the property in their charge. While a larger return on capital than 6 per cent has been allowed to public utilities in many rate cases before courts and commission, it must be kept in mind by stockholders that to offset this limited return and the control exercised by the city there is provided in our case a fair and equitable means for insuring this return, which is as far as the municipality could go toward making the return safe and secure.

In a year of rehabilitation, development, experimentation and adaptation to new conditions, the officials of the company have worked steadily and enthusiastically to accomplish the task that was so clearly set before them. Likewise, the directors of the company have been patient and interested in hearing the many problems presented to them and thoughtful and considerate in advice as to how they should be solved. To directors and officials and also to the rank and file of employees my thanks and appreciation are cordially extended.

Although this may not be a proper place in which to do so, I desire to express appreciation to the newspaper men of Cincinnati who have been so thoroughly interested in our endeavors to improve the transportation system, and also express a full measure of gratitude to all citizens generally who have helped in greater or less degree by their praise and advice and criticism, and even their complaints, and most of all to the hundreds of thousands who have shown an increasing confidence in the ability of the company to serve them by their increased patronage of cars and motor coaches.

New Chairman in Baltimore

At a meeting of the stockholders of the Washington, Baltimore & Annapolis Electric Railroad, held in Baltimore on March 26, Herbert A. Wagner was elected chairman of the board. He succeeds George T. Bishop, Cleveland, who resigned from the board some time ago. Mr. Wagner is president of the Consolidated Gas, Electric Light & Power Company, Baltimore, which controls the electric railroad and its subsidiaries through a holding company.

Economy and Efficiency Help Boston Elevated

Operation of the Boston Elevated Railway, Boston, Mass., during the last eight years has been set forth for study in parallel columns giving a few vital operating statistics for the two years 1920 and 1927.

Thirty-one million more people used the "El" in 1927 than in 1920, and the average fare per revenue passenger decreased from 9.868 to 9.266 cents. It is also disclosed that 5,500,000 more miles and 1,500,000 more round trips were operated in 1927, and as a result the number of revenue passengers carried per mile decreased from 6.548 to 6.457.

Without the economies which have been effected, the wage increases awarded during the eight-year period would have placed a burden of $4,000,000 on the car riders. Fixed charges (taxes, rent of leased roads, dividends, subway and tunnel rents, interest on bonds and notes) have increased by $1,250,000 in this period.

Notwithstanding the wage and fixed charge burdens, the actual payroll was $459,107 less in 1927 than in 1920 and operating expenses as a whole were $636,789 less than in 1920.

If operating expenses in 1927 had taken the same percentage of passenger revenue as in 1920 there would have been a deficit in 1927 of $1,293,668 instead of a surplus of $222,000.

AN EIGHT-YEAR COMPARISON OF BOSTON ELEVATED RAILWAY

	1920	1927	Increase	Decrease
Revenue passengers, 5-cent fare	8,952,577	8,534,666	.....	417,911
Revenue passengers, 6-cent and 6½-cent fare	.....	58,890,542	58,890,542	.....
Revenue passengers, 10-cent fare	326,496,184	299,340,854	.....	27,155,330
Special car and bus passengers	77,800	172,846	95,046	.....
Total	335,526,561	366,938,908	31,412,347	.....
Average fare per revenue passenger, cents	9.868	9.266	.....	0.602
Wages—Amalgamated and Craft employees	$14,040,747	*$18,045,550	*$4,004,803	.....
Actual total wage cost	$17,216,445	$16,757,338	.....	$459,107
Average employees on payroll	9,628	8,607	.....	1,021
Gross revenue	$34,031,636	$35,193,410	$1,161,774	.....
Fixed charges (taxes, rent of leased roads, dividends, subway and tunnel rents, interest on bonds and notes) and miscellaneous items	$8,609,681	$9,838,261	$1,228,580	.....
Operating expenses	$25,769,122	$25,132,333	.....	$636,789
Ratio of operating expenses to gross revenue, in per cent	75.721	71.412	.....	4.309
Revenue-mileage	51,237,527	56,827,962	5,590,435	.....
Round trips operated	5,764,347	7,295,371	1,531,024	.....
Car defects per 10,000 car-miles	13.4	3.8	.....	9.6
Revenue passengers per mile	6.548	6.457	.....	0.091
20-minute delays in service	885	500	.....	385

*Based on hours and rates of 1920.

If operating expenses in 1927 had taken the same percentage of gross revenue as in 1920, they would have been greater by $1,516,484, and there would have been a deficit for the year of $1,293,668.

Nothing in Ottawa Situation to Cause Alarm

Shareholders of Ottawa Traction Company, Ottawa, Ontario, are in receipt of a circular letter, signed by President Thomas Ahearn, setting forth the reasons for the concellation of the quarterly dividend of 1 per cent, payable ordinarily on April 2 next. The letter reads as follows:

Your directors regret very much the necessity of informing you that the reserve fund of the Ottawa Electric Railway, which has been used for the purpose of dividends for the past four years, is exhausted and that it is, therefore, necessary to suspend payment of dividends until the earnings of the company prove sufficient to warrant a resumption of payment.

You are of course aware that the application of that company for increased fares is now before the Board of Railway Commissioners for Canada, and your directors have every confidence in the merits of the application.

Your directors feel very strongly that there is nothing in the present situation to occasion any feeling of alarm in the minds of the shareholders. They themselves and other large shareholders who have made a study of the situation feel quite satisfied that the position of the company is inherently sound and that the present difficulty is that the company has for some years been selling transportation at a price too low. Ottawa will always need the street cars, and the Ottawa Electric Railway will always be able to provide transportation at a rate which will justify people in using its system.

Local Ownership the Aim in Worcester

For the first time since the New York, New Haven & Hartford Railroad resumed control of the Worcester Consolidated Street Railway, Worcester, Mass., it has been revealed that the ultimate aim of the railroad officials is to have the road become the property of Worcester investors, once it has been thoroughly rehabilitated and put on a sound basis.

Edward G. Buckland, vice-president and general counsel, says it is now the hope of the New Haven to return to the city the management of its trolleys in order that the railroad can concentrate its attention on the steam road properties. Mr. Buckland is confident the Worcester line can be made to pay. He explains that the New Haven road is getting things into shape in the hope that in the not too distant future it can entertain offers for the property.

Since reassuming control of the Worcester line in 1926 the New Haven has spent more than $1,000,000 in a rehabilitation program. This covers only part of the work to be done. Mr. Buckland says the New Haven has no prospective customer in view for the purchase of the Worcester road. When the road is placed on a paying basis it

will be ready to entertain propositions and Mr. Buckland believes that if it is earning 6 per cent on the investment there will be no dearth of purchasers. He is quoted as follows:

We would prefer to sell to Worcester interests. It is our belief that an electric railway should be locally owned just as much as an electric light company or a gas company. However, we are not idealists. If an attractive offer was received from a large utility operating company we would consider it carefully.

Preferred Dividend Passed by Tri-City Company

The Tri-City Railway & Light Company, Davenport, Ia., has passed the preferred dividend due on April 1, this year. The last payment was 1½ per cent, made on Jan. 2.

Richard Schaddelee, president of the United Light & Power Company, and a director of the Tri-City Company, said recently:

Under present conditions the operation of the railway systems in the tri-cities is producing barely enough to pay the straight operations costs, plus the taxes, without earning a cent for depreciation.

The situation is growing steadily worse and we have racked our heads for a solution, without being able to find one.

First Dividend on St. Louis Public Service Preferred

The first quarterly dividend of the St. Louis Public Service Company, St. Louis, Mo., has been declared on the preferred stock of the company. It is payable on April 1 to stockholders of record of March 20. The company has outstanding a total of 70,620 shares of preferred stock, of which 16,212 shares were allotted to the city, 53,845 shares to former St. Louis Transit Company bondholders and 553 shares to various other creditors of the United Railways, which the St. Louis Public Service succeeded after foreclosure and sale.

Financial Condition of Southern Michigan Divulged

The Southern Michigan Railway, operating from South Bend, Ind., to Benton Harbor, Mich., which went into receivership in Grand Rapids on Feb. 10, owes corporation income taxes and interest totaling $25,411 in Indiana, according to a statement received from George L. Foote, Indiana collector of internal revenue. The company owns tracks from the northern city limits of South Bend to the state line and the worth of the property is estimated at $2,000,000. The Chicago, South Bend & Northern Indiana Railway, which owns the Southern Michigan stock, operates railway service to St. Mary's over the Southern Michigan line. It is serving as receiver pending the outcome of proceedings in the Michigan Federal Court. The Northern Indiana line itself is under R. R. Smith, general manager, as receiver.

Personal Items

Changes in Buffalo

T. E. Mitten resigns from International Board. Messrs Lesswing, Sherman and Koch represent employees

AT THE annual stockholders' meeting of the International Railway, Buffalo, N. Y., held March 27, T. E. Mitten resigned from the board, on which he has served since 1920. This enables the employees to have three representatives instead of two. The following directors were selected to serve for a period of one year: A. A. Mitten, chairman; J. A. Queeney, vice-chairman; C. J. Joyce, W. K. Myers, Nelson Robinson, B. J. Yungbluth, H. P. Lesswing, M. H. Sherman and R. W. Koch.

The employee representatives on the board are: H. P. Lesswing and M. H. Sherman, president and vice-president of the employees Co-operative Association; and R. W. Koch, chairman of the general committee of employees under the Mitten plan. The board of directors thus consists of nine men, three of whom directly represent the employees, who are substantial owners of International Railway system. W. K. Myers, who is financial vice-president of Mitten Management, Inc., succeeds H. G. Tulley, former president of the International Railway and now vice-president of Mitten Management in charge of industrial relations.

Mr. Mitten To Give More Time to Banking

The meeting of the new board of directors was held immediately following the annual stockholders' meeting. A. A. Mitten was elected to succeed his father as chairman of the board, and J. A. Queeney, vice-chairman. Mr. Queeney continues as chairman of the executive committee whose membership also includes A. A. Mitten, W. K. Myers and B. J. Yungbluth. The board of directors elected the following officers of I.R.C.: B. J. Yungbluth, president and general manager; N. T. Brown, vice-president of transportation; C. A. Weber, secretary and treasurer; and C. A. Chavel, auditor.

The resignation of Mr. Mitten from the board of the International Railway follows closely his resignation from the board of the Philadelphia Rapid Transit Company, and is in line with his announced intention to relinquish active operation of the Mitten properties to the younger men whom he has trained to succeed him. In this way he can devote his entire time to Mitten Bank and the Mitten Bank Securities Corporation, through which he plans to advance still more widely the principle of democracy in industry.

Dr. A. A. Mitten is the only son of T. E. Mitten. He is well known in Buffalo, having lived for some time in Lockport and having graduated from the University of Buffalo. He has served for several years as vice-president of Mitten Management, Inc., which operates International Railway property, the Philadelphia Rapid Transit Company, the Yellow Cab Company of Philadelphia, the Yellow Cab Company of Atlantic City and associated enterprises. He is vice-president of Mitten Men and Management Bank and Trust Company and also a vice-president of the new Mitten Bank Securities Corporation. Dr. Mitten was educated as a physician and surgeon. His first connection with the electric railway industry was in 1915 when he became industrial surgeon in Milwaukee. When the United States entered the World War Dr. Mitten went to France as a captain of an ambulance company. When he returned to this country he became very much interested in the far-reaching demonstration of industrial democracy which his father was developing in Philadelphia.

Dr. Mitten's personality makes him eminently well qualified to establish and maintain the intimate contacts between men and management which are so essential to the Mitten plan for industrial democracy. He is as much at ease with a track employee as he is with one of the officials of the company and the interesting thing about it is that the track employee will be equally at ease with Dr. Mitten.

Mr. Lesswing has been continually in the employ of the International Railway since May 7, 1917. He is 28 years old and is employed as an electrician in the power department.

Mr. Sherman has spent 6 years in the service of the International Railway and is an operator working out of Broadway station.

Mr. Koch was employed on April 15, 1909 and is a substation operator in the electrical department. He is 37 years old.

Charles Fields and Otto Schultz Newly Assigned in New Jersey

Charles Fields has been appointed manager of the new Morris division of the Public Service Railway, Newark, N. J., and Otto G. Schultz has been assigned, reporting to Matthew R. Boylan vice-president in charge of operation, co-ordinated transport.

Mr. Fields started his career in the transportation business as conductor with the Brooklyn Rapid Transit Company in 1905. In 1907 he accepted a position as inspector with the New York & Queens County Railway, being subsequently promoted to chief inspector. In 1913 he became superintendent of the Binghamton Railway Company, Binghamton, N. Y. He left the employ of this company in 1917, to engage in special transportation work for Stone & Webster, and the J. G. White Management Company. In 1923 Mr. Fields was transferred to the

Morris County Traction Company as general superintendent.

Mr. Schultz has been associated with the Morris County Traction Company since December, 1909, and has held the position of manager and treasurer during that time.

Messrs. Gunn and Francis Advanced in San Francisco

Two more employees of the Market Street Railway, San Francisco, Cal., who began their railroad experience on the platforms of the cars in that city, have stepped into executive positions. They are Byron F. Gunn, who has become superintendent of the Geneva division, and A. E. Francis, who succeeds him in the post of superintendent of ferry terminals.

Mr. Gunn entered the service of the company Jan. 27, 1909, as a conductor at the Kentucky division. He was appointed starter at Third and Townsend Streets station Oct. 14, 1914. Here he distinguished himself for his handling of thousands of commuters and in dealing with emergency situations such as arise around terminals. From May 1, 1927, he has served as superintendent of ferry terminals.

Inspector A. E. Francis succeeds Mr. Gunn as superintendent of ferry terminals. Mr. Francis entered the service on Dec. 11, 1907. His appointment as inspector came on Nov. 22, 1910. He served as relief inspector, thus familiarizing himself with the entire system in San Francisco and meeting thousands of people.

H. J. MARTIN has been promoted to the position of safety inspector of the New York State Railways, covering all Rochester, N. Y., city lines, including the co-ordinated buses. Mr. Martin began his railway career twenty years ago in Manchester, England, where he operated both as a motorman and conductor. He served in Hamilton, Ont., going to Rochester as a conductor in 1921. Later he was made inspector on the Rochester lines. In addition to his other duties Inspector Martin teaches in the school of instruction, aids in the investigation of accidents and makes special investigations of safety suggestions.

W. F. BURDELL was elected assistant secretary and assistant treasurer at a recent meeting of the stockholders of the Scioto Valley Railway & Power Company, Columbus, Ohio.

F. S. SHEFFIELD, formerly chief instructor for the Eastern Texas Electric Company, Beaumont, Tex., has been appointed assistant superintendent of transportation. He will report to O. W. Gaines, who, in addition to his work of superintendent of transportation in Beaumont, has similar duties in Port Arthur. The property in the latter city was recently purchased by the Eastern Texas Electric Company as told in ELECTRIC RAILWAY JOURNAL.

FRANK MILHOLLAND, chairman of the North Dakota Railroad Commission, will resign from that position April 1 to become president and general manager of the Central West Public Service Company with headquarters in Omaha, Neb. The Central West Public Service Company properties serve 29 cities and towns in Iowa, Nebraska, Minnesota, South Dakota and North Dakota with electricity, telephones, gas and water.

Obituary

Edwin E. Downs

Edwin E. Downs, superintendent of railway revenues of the Winnipeg Electric Company, Winnipeg, Canada, died in Winnipeg on March 17. Mr. Downs was well known throughout the electric railway industry, which he had served for about 35 years.

His first business experience was in general contracting and telephone work. With the introduction of electricity for use on city and other railways he became connected with the construction department of the Thomson-Houston Company and had charge of installing electricity on the Second Avenue Passengers' Railway, Pittsburgh, Pa., the first railway in Pittsburgh to adopt electricity. Later he installed electricity on the Missouri Street Railway, St. Louis, Mo.; City Electric Railway, Little Rock, Ark.; Fort Clark Street Railway, Peoria, Ill., and the Fort Wayne & Belle Isle Railway, Detroit, Mich. In his work at Little Rock Mr. Downs was associated with Bion J. Arnold.

Subsequently Mr. Downs became manager of the railways in Kalamazoo and Battle Creek, Mich., for the General Electric Company.

Mr. Downs assisted in constructing an electric railway between Anderson and Marion, Ind., and in 1907 was engaged by George J. Kobush, St. Louis, Mo., as general manager of the Winnebago Traction Company, Oshkosh, Wis., with which company he remained for more than seven years. In October, 1904, Mr. Downs went to San Francisco in the interests of E. H. Rollins & Sons, Boston, Mass., as general manager of the Petaluma & Santa Rosa Railway. In March, 1908, he succeeded E. R. Kirk as general manager of the Sterling, Dixon & Eastern Electric Railway. Two years later he was appointed general manager of the Chicago & Milwaukee Electric Railway and later moved to Winnipeg to take the position with his old working comrade, President A. W. McLimont, as superintendent of railway revenues.

WILLIAM F. M. GOSS, formerly dean of the College of Engineering at the University of Illinois and president of the Railway Car Manufacturers' Association for ten years, died on March 23 at the Waldorf-Astoria Hotel, New York. Dr. Goss is probably best known to the electrical industry for his work as a member and later as chief engineer of the Chicago Association of Commerce committee on smoke nuisance and the electrification of railroad terminals in Chicago. In the course of his academic career he organized the department of practical mechanics at Purdue University, with which institution he was connected for seventeen years, being dean of the engineering school for a large portion of that time. In 1907 he became dean of the College of Engineering of the University of Illinois, but ten years later he severed his connection with that faculty to take up the duties of president of the Railway Car Manufacturers' Association. Dr. Goss was active in association work, having been a past-president of the American Society of Mechanical Engineers, a fellow of the American Association for the Advancement of Science, a member of the Society for the Promotion of Engineering Education and of other engineering associations. Dr. Goss was a native of Massachusetts and a graduate of the Massachusetts Institute of Technology. He was 69 years old.

T. R. BRISTOL, assistant superintendent of equipment, Georgia Power Company, Atlanta, Ga., died March 9. Mr. Bristol served his apprenticeship as a young man with the Santa Fe System. Then he served the Westinghouse Traction Brake Company for a number of years. He saw service in France with the railway engineers and after the war he resumed his duties with the Westinghouse Traction Brake Company, being stationed in Atlanta as mechanical expert. Mr. Bristol became affiliated with the Georgia Power Company in September, 1921. He was well known throughout the Southeast, which was the territory he traveled for the Westinghouse Traction Brake Company and also through his activities in the Electric Railway Association of Equipment Men, Southern Properties. Mr. Bristol was in his 32nd year.

PETER J. METZDORF, assistant to the vice-president of the Twin City Rapid Transit Company, Minneapolis, Minn., died recently. After a term of service as supplies salesman, manager of outdoor amusement enterprises and pavilions in St. Paul and county treasurer, 21 years ago he first became a member of the staff of the Twin City Rapid Transit Company, as chief clerk. Later he looked after other enterprises of the Twin City Rapid Transit Company and managed other electric railway recreational projects.

PHILIP MATTER, a director of the Indiana Union Traction Company, Anderson, Ind., and one of the principal stockholders of the company, died recently at his home in Marion, Ind., following a few days' illness resulting from a fall. He settled in Indiana in Civil War days. His judgment was sought in many business transactions and his advice aided many Marion men to build and increase their fortunes. He is survived by three sons and three daughters. Mr. Matter was 85 years old.

Manufactures and the Markets

General Electric Annual Report

The net profit of the General Electric Company for 1927 amounted to $48,799,489, after interest, depreciation and taxes. This was equal after dividends on the special stock to $6.41 a share earned on 7,211,481 no par common shares. It compared with $46,672,499, or $6.14 a share, earned in 1926.

Orders received during the year amounted to $309,784,623, against $327,400,207 in 1926, a decrease of 5 per cent. Unfilled orders at the close of 1927 were $68,916,000, against $72,297,000 at the close of 1926, also a decrease of 5 per cent. Net sales billed during the year were $312,603,772, against $326,974,104 in 1926.

Inventories, after reserves, were $67,213,705 at the end of 1927, against $65,295,154 the year before. At the close of 1920 inventories amounted to $118,109,173 and shipments were $275,758,487, the ratio of inventories to shipments being 42.8 per cent. At the close of 1927 the ratio was 21.5 per cent, or a turnover nearly double that of 1920. An increase of 13 per cent in shipments billed was accomplished, while the capital locked up in inventories was reduced to $50,895,000.

Uruguay Asks Bids For Oil-Electric Units

Bids are now being sought by the Administración de los Ferrocarriles y Tranvías del Estado covering construction of two gas-electric generating units to be installed in two of the Unicars which were bought some time ago by the Uruguayan Government. Copies of the call for bids will be lent to interested firms upon request to the Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to No. EE 1069. The closing date for bids is 11 a.m., June 1, 1928.

Business of Austin Company Very Active

Unusual building activity in the Cleveland territory is reported by the Austin Company, well known national builders, with headquarters in Cleveland. More than a dozen of the 100 building projects which this firm has under way from coast to coast are located in Greater Cleveland alone; among them is a large garage and service station, for the Cleveland Railway, costing about $200,000, with three stories and basement 100x125 ft. in size.

Austin's 1928 business is starting with a volume that bids fair to make the year even better than 1927, which was the most successful in the company's history.

The Austin Company is expanding its own facilities to meet this greatly increased demand. At its main office, corner Euclid and Noble Road, ground has been broken for a large two-story and basement addition to the office building. Greater facilities for the engineering department and general office use are being provided at a cost of more than $50,000.

At Bliss Mill, Austin's steel fabricating plant, in Euclid, Ohio, provision is being made now for the construction of an entire new woodworking shop to replace the cramped quarters at its present location on East 152nd Street, opposite the Jordan Motor Company plant. This move will result in the mobilization of all Austin service facilities at Bliss Mill, where the steel fabricating plant has been located for several years. Austin is the largest fabricator of structural building steel in the Cleveland territory.

Spanish Railway Improvements

Plans for the expenditure of 1,433,670,000 pesetas for improvements in the rail systems of Spain were approved at a recent meeting of the Supreme Railway Council. Of this amount 160,980,000 pesetas has been allotted for improvement of the electric service. A peseta is approximately 17.1 cents.

New Twin City Cars in Operation

The Twin City Rapid Transit Company, Minneapolis, Minn., has put in operation 25 new street cars. The cars are of the light-weight, noiseless type built in the Snelling shops of the company.

The car body is built on a steel and duralumin frame weighing 4,230 lb. In addition to this metal frame, the car has a complete frame of white oak. The ceiling, roof and sides of the car are plywood and the vestibule linings are plymetl. The floor is double and well insulated and the inside finish is mahogany with a white ceiling.

The trucks are each equipped with 56 coil and elliptic springs and a swinging spring plank giving a perfect graduation of the load and eliminating vibration.

With this car having a normal load, it is possible to reach a speed of 21 m.p.h. and to come to a stop within 600 ft. in 26 seconds.

The interiors of these cars are in mahogany finish with a white ceiling. They are well lighted and ventilated

One of the light-weight, noiseless type cars put in operation by the Twin City Rapid Transit Company

Name of railway	Twin City Rapid Transit Company
City and state	Minneapolis, Minn.
Number of units	25
Type of unit	one-man, two-man, double-end
Number of seats	50
Weights:	
Car body and equipment	17,983 lb.
Trucks	6,980 lb.
Total	24,963 lb.
Length over all	45 ft. 6 in.
Truck wheelbasa	4 ft. 6 in.
Width over all	9 ft. 0 in.
Body	Semi steel
Doors	End
Air brakes	G. E. Concentric Clasp
Armature bearings	Roller
Axles	Tubular
Compressors	G. E.
Control	G. E.
Door mechanism	National Pneumatic
Doors	Folding
Fare boxes	Johnson
Hand brakes	Peacock
Headlights	Ohio Brass
Interior trim	Wood-trim mahogany with aluminum metal trim
Journal bearings	Hyatt roller
Motors	G. E. No. 4
Roof material	Plywood
Seats	Rattan
Wheels, type	Steel, oil tempered, diameter 26 in.

Philadelphia Station Control Contracts to Be Let

The contract for station control and miscellaneous equipment is one of the most important awards on the Broad Street Subway yet to be let by the Department of City Transit, Philadelphia, Pa. It provides for furnishing and installing in the fourteen subway stations fencing, railings, gates, grills, handrails, baggage boards, signs, ticket booths, passimeters and turnstiles. Railings are to be constructed around the upper track levels, guard plates for emergency exit doors are to be placed in the sidewalk ventilator gratings, signs are to be placed along the tracks and in the emergency exits, and bent numbers are to be stenciled on the subway walls and columns. The specifications also provide that ticket booths shall be installed on mezzanine floors in express stations and on the platforms of local stations. There will be two types of ticket booths—the side control booth and the end control booth.

New Type Electric Locomotives for South Africa

Seventeen bids have been received in South Africa for an experimental type of electric locomotive for use on the Natal electrified system. This locomotive is to be three times as powerful as any of the units now employed on the South African Railway. Future orders for any number of locomotives up to 100 depend on the success of this experiment.

ROLLING STOCK

FITCHBURG & LEOMINSTER STREET RAILWAY, Fitchburg, Mass., has ordered five 21-passenger street car type Studebaker buses from the Studebaker Corporation of America, South Bend, Ind.

PUBLIC SERVICE CO-ORDINATED TRANSPORT, Newark, N. J., has received the first shipment of bus chasis on order of 331 gas-electric chassis recently placed with the Yellow Truck & Coach Manufacturing Company. Three chassis a day will be turned out up to April 15, and five a day thereafter, until the order is completed.

DETROIT MUNICIPAL RAILWAY, Detroit, Mich., will do nothing more about the purchase of additional buses, on which bids were recently received, until the results are made known of a survey of bus operation to be made by W. B. Mayor at the suggestion of the Street Railway Commission.

TRACK AND LINE

INTERNATIONAL RAILWAY, Buffalo, N. Y., is planning to co-operate with the city in repaving and rebuilding streets over which its local traction lines operate. One of the first major improvements planned hy the railway is the rebuilding of part of its William Street line to handle the heavy traffic which will result with the opening of the new passenger terminal of the New York Central Railway late this year. Several other lines will be included in the reconstruction and improvement program.

MONTREAL CITY COUNCIL, Montreal, Canada, has granted a contract to a local firm for the construction of the roadbed for the double tramways line across the top of Mount Royal. The project will involve an outlay of $287,415.

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

Metals—New York	Feb. 27, 1928
Copper, electrolytic, cents per lb.	13.90
Copper wire, cents per lb.	16.125
Lead, cents per lb.	6.00
Zinc, cents per lb.	6.0375
Tin, Straits, cents per lb.	52.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	4.125
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	2.025
Franklin, Ill., screenings, Chicago, net tons	1.825
Central, Ill., screenings, Chicago, net tons	1.675
Kansas screenings, Kansas City, net tons	2.375
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	15.30
Weatherproof wire base, N.Y., cents per lb.	16.5125
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots), N. Y., cents per lb.	10.2
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25
Turpentine (bbl. lots), N. Y., per gal.	$0.645

SHOPS AND BUILDINGS

WINNIPEG ELECTRIC COMPANY, Winnipeg, Manitoba, Canada, will soon erect a new terminal power station in Winnipeg, to cost approximately $750,000.

TRADE NOTES

L. W. BIRCH of the Ohio Brass Company, Mansfield, Ohio, has been made assistant manager of the railway sales division. He became a member of the staff of the Ohio Brass Company in December, 1921, and during recent years has specialized on the overhead distribution systems for electric railways. Mr. Birch was graduated from the Ohio State University in 1917 and after a brief service in the army, in which he became first lieutenant, joined the Carolina Power & Light Company and later the Pittsburgh Plate Glass Company.

WILLIAM H. WOODIN, chairman and president of American Locomotive and American Car & Foundry, has been elected a director of American Surety Company.

TRUSCON STEEL COMPANY, Youngstown, Ohio, has named C. I. Auten, vice-president in charge of sales in its standard building division. M. T. Clark is vice-president in charge of sales of the steel window division, with which he has been identified for the last nine years. C. D. Loveland, formerly manager of the Pittsburgh district of the Truscon organization, is made vice-president with headquarters at Newark, N. J. He will be in charge of Truscon distribution in that state.

FORD CHAIN HOISTS are now being distributed on the Pacific Coast by E. O. Johnstone, district sales manager for the American Chain Company, Inc., at 425 Second Street, San Francisco, Cal.

FRED A. WALES has been appointed to do sales promotion work for the bus coach work division of the Murray Corporation, according to an announcement by William Robert Wilson, chairman and president of the corporation. Mr. Wales was former sales manager of the body division of the Aluminum Company of America. He goes to the Murray Corporation equipped with an experience of twelve years in the aluminum and aluminum alloy industry. As an officer in the production division, U. S. Army Engineers, he was closely connected with the development of the Class B military truck, known as the Liberty truck.

HEYWOOD-WAKEFIELD COMPANY has appointed C. E. Preble, who has had charge of the engineering department at Wakefield, Mass., assistant to Bertram Berry in the railway sales department, New York, N. Y.

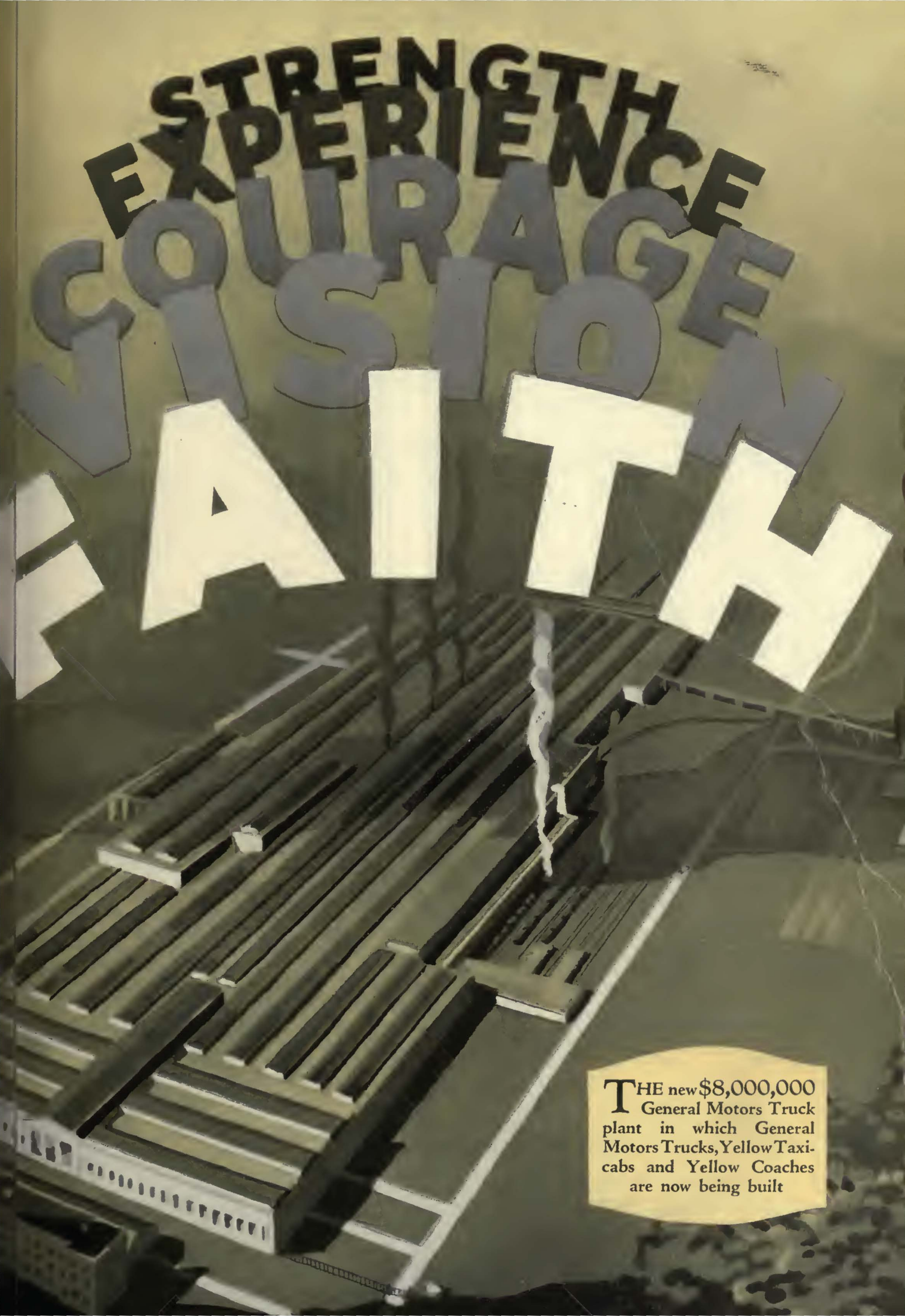
NATIONAL FLUE CLEANER COMPANY, Groveville, N. J., has recently appointed the following representatives: Chicago territory, Naylor-Hickey Corporation, 643 Washington Boulevard, Chicago, Ill.; New England territory, Furnace Improvement Company, 511 Westminster Avenue, Providence, R. I.

OXWELD ACETYLENE COMPANY, New York, N. Y., will in the future distribute exclusively the Carbic acetylene floodlight, generator and other Carbic equipment. The Carbic cake-form carbide will be distributed by the Union Carbide Sales Company, New York, N. Y.

WHITE COMPANY, Cleveland, Ohio, has appointed Jay Rathbun a vice-president of the eastern region, with headquarters at 17 Battery Place, New York. Mr. Rathbun has been a vice-president of The White Company in charge of the export department since 1926. He became associated with the company in 1911 as manager of sales for New York State, and in 1914 was appointed manager of export sales, with headquarters in New York.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has appointed Jacob F. Savela as welding service manager for the Detroit district under the direction of J. M. Robinson, district sales manager.

B. F. GOODRICH RUBBER COMPANY, New York, N. Y., accepted the resignation of Harry Hough. James D. Tew, first vice-president, was elected president to take Mr. Hough's place. Mr. Hough will retain his position as a member of the board of directors and will act in an advisory capacity. Also T. G. Graham, works manager, was elected first vice-president; and T. B. Tomkinson, comptroller, and V. I. Montenyohl, treasurer, were elected to fill existing vacancies on the board.



THE new $8,000,000 General Motors Truck plant in which General Motors Trucks, Yellow Taxicabs and Yellow Coaches are now being built

The New Plant for General Motor

Tangible evidence of the unlimited faith held by General Motors in the future of Commercial Transportation

GENERAL Motors Truck has spent $8,000,000 to erect the largest plant in the world devoted exclusively to the manufacture and assembly of commercial vehicles.

FAITH, characteristic of General Motors, built this plant.

FAITH in the future of commercial transportation.

FAITH in the superiority of the products being manufactured and assembled.

FAITH in the appreciation of commercial operators.

To build such a plant took courage.

It called for vision.

It required united strength of organization planning.

It drew upon every division of the great Genera Motors family for plant experience—

For no one man planned this plant.

Production men and engineers in the Fisher Bod plants of the corporation, backed by their years o successful experience in the production of fine bod work in tremendous quantities, contributed thei advice and recommendations.

From the metal working plants of the corporation from chassis and engine building plants and othe manufacturing centers, came other production me and engineers with their advice and recommendations born of personal and successful experience.

These men, with their cumulative and diversifie

On July 5, 1927, ground was broken. Less than six months later, January 3, 1928, finished vehicles were coming off the production line

ruck at Pontiac, Michigan

General Motors Truck, Yellow Taxicab and Yellow Coach manufacturing now combined and operated as "General Motors Truck Company"

experience, told of the latest improvements they would now incorporate in their own plants today, were they privileged to rebuild, unhandicapped by expense—

And from the civil engineering division of the corporation came fruitful ideas for plant construction, based on years of experience in the building of plants for highly efficient production.

Focused on the project were thus the best minds in the corporation, drawn from every center and made to yield their viewpoints.

The direct result of this combined effort and experience shows in the plant as it stands today—a model of efficiency, flexibility and completeness.

For every modern facility for improved production is here, multiplied many times to a point of efficiency that distinguishes this plant as the outstanding achievement in design and construction for production of commercial vehicles.

Interesting Facts About the Plant

The present huge plant is actually only an initial unit, so designed that it may easily be expanded

Building for the Future

Responsible for the building of this great plant were the many economic advantages that result from consolidating under one roof all of the manufacturing

One and a quarter million square feet of floor space—Plant site 156 acres

activities of General Motors Truck, Yellow Taxicabs and Yellow Coaches.

Moreover, General Motors believes in the future of commercial transportation—

In the basic fundamental soundness of the industry.

It believes that the use of motor trucks, taxicabs and motor coaches is sure to expand.

And General Motors Truck recognizes its responsibility to lead the way—to keep in advance of growth—to serve adequately now, and in the future.

To keep faith with the industry and with its own ideals—to leave nothing undone to further industrial progress—to give operators the best that brains and money can achieve in manufacturing facilities and finished product.

These briefly, are the real reasons why there is a new model plant at Pontiac today.

Flexibility Without Sacrificing Efficiency

If ever a plant was built around extreme flexibility of operation on a big scale, without sacrifice of efficiency, this enormous structure is an outstanding example.

In a passenger car plant the building problem is geared to an even flow of production of a few different models. Such a problem is simple as compared to the task that confronted General Motors Truck in the building of the Pontiac plant.

Here it was necessary to take into account the large range and diversity of sizes and models of General Motors Trucks, Yellow Taxicabs and Yellow Coaches that are required by commercial operators.

Interesting Facts About the Plant

Forced draft unit type heaters provide ventilation and heated fresh air to every corner of the plant

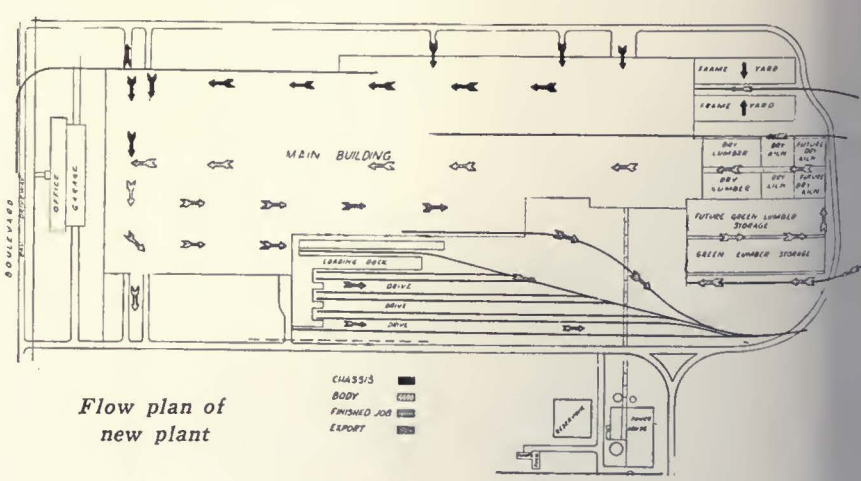
It was necessary to provide for the peaks and valleys in the production requirements of different classes of commercial vehicles; to provide an excess of capacity to meet seasonal demands for any one class of vehicle and to utilize this same excess at other times for other production purposes.

And specialization must prevail, with three distinct types of commercial vehicles being manufactured under one roof—motor trucks, taxicabs and motor coaches—each type must be kept separate and receive the exclusive attention of trained specialists.

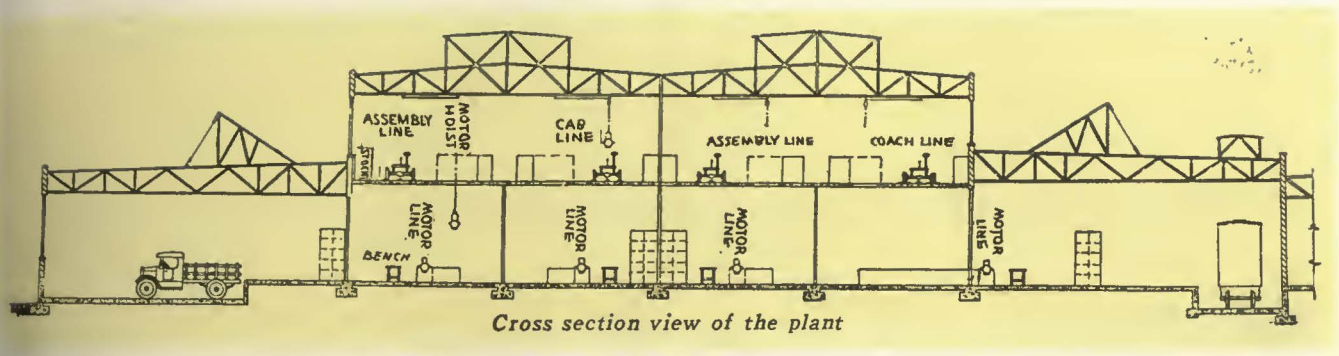
Counting the body production, there are actually four great plants working in harmony at Pontiac, each with its own production crews, production lines and sub-assembly departments.

Imagine, if you can, a plant under a single roof almost half a mile long and 620 feet wide.

A plant in the course of whose construction was poured enough cubic yards of concrete to cast five Washington Monuments solid, or lay a four-foot sidewalk 402 miles long.



Flow plan of new plant



Cross section view of the plant

The receiving platform for incoming truck freight and electric railway freight is 1500 feet long

Receiving platform for rail freight. All incoming material is delivered directly to the assembly points

A plant in which 18,000,000 pounds of structural steel were used, enough if rolled into a ten-gauge wire to encircle the earth more than two and one-half times.

A plant in which the board feet of lumber used in construction would build homes for more than 3,000 people.

A plant of this size is necessary to house the manufacturing and assembly of the different types of commercial vehicles turned out and to give to each the specialization required.

It is worth noting, too, that even this huge manufacturing institution does not completely satisfy General Motors' faith in the future of commercial transportation.

The present plant is in fact the initial manufacturing unit, being so designed that it may be expanded readily many times its present area, without disturbing present sewer lines or equipment. Sewers, water mains, steam lines, electric supplies and all similar facilities are designed to take care of a plant of much greater area than this initial 1,250,000 square feet of floor space.

Flexibility Shown in Flow of Work

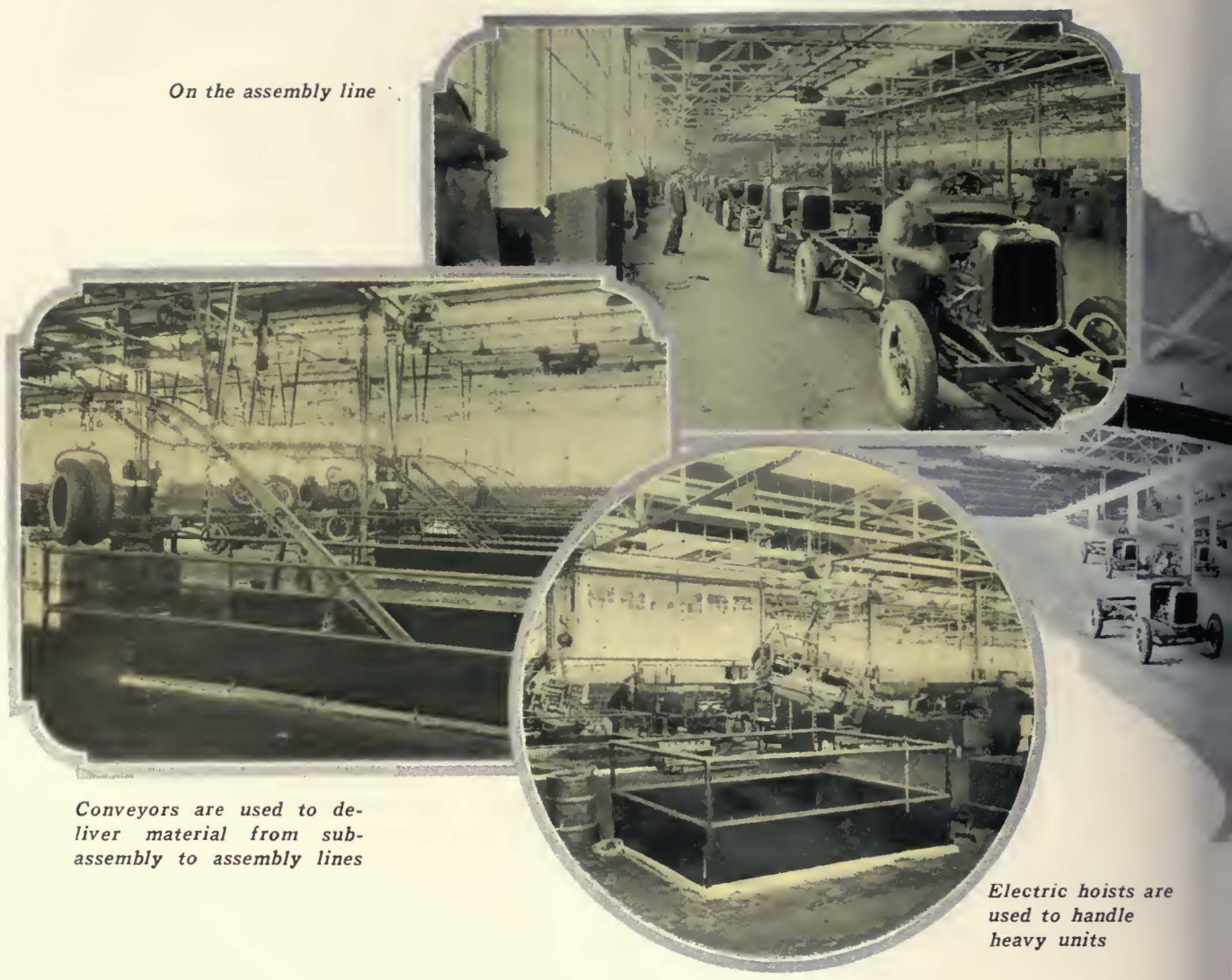
It is when one studies the flow of production that the true significance of General Motors Truck planning becomes apparent. It is then that one grasps the foresight that makes it possible for a variety of commercial vehicle units to be handled under one roof, with specialization applied to each.

Running down one side of the plant for a distance of 1,500 feet, and paralleling the left of the assembly floor, are the receiving platforms for incoming truck freight and electric railway freight. And duplicating this on the right are receiving platforms for incoming rail freight.

Standing at one end of these two long, receiving platforms, one can scarcely see to the other end.

In between the two platforms the sub-assembly chassis operations—18 in all—are carried out; these include such items as a cowl assembly, power plant final assembly, tire and wheel assembly, etc.

The material required by such assembly depart-



On the assembly line

Conveyors are used to deliver material from sub-assembly to assembly lines

Electric hoists are used to handle heavy units

ment is delivered by truck or rail car right at the assembly point. Material is lifted from truck or freight car directly onto the proper sub-assembly line. There is no duplication of handling, no waste effort and no confusion.

This plan for receiving incoming materials is entirely new in plant arrangement; a practice developed by General Motors Truck. Usual plant practice provides for one common receiving point for all incoming material; a method that invariably means re-handling, internal haulage, duplicated effort and unnecessary expense. In the new plant at Pontiac, the internal haulage problem has been reduced to a minimum.

Each sub-assembly department specializes in the production of a single complete part or unit, such as the assembly of the tire, tube, rim and wheel into one unit.

The observer who inspects this great plant will be struck by the ingenuity of the conveyor methods employed for delivering the assembled chassis units to the final chassis assembly lines on the floor above.

A system of electric escalators, conveyors and hoists speeds the completed units on their way. There is practically no trucking of material through the plant, no clogging up of aisles, no wasted footsteps—none of the scurry and confusion usually found in a big production plant. Quiet orderliness prevails, yet the various units, when completely assembled, literally take wings and fly to their point of final assembly.

Specialization Prevails Throughout

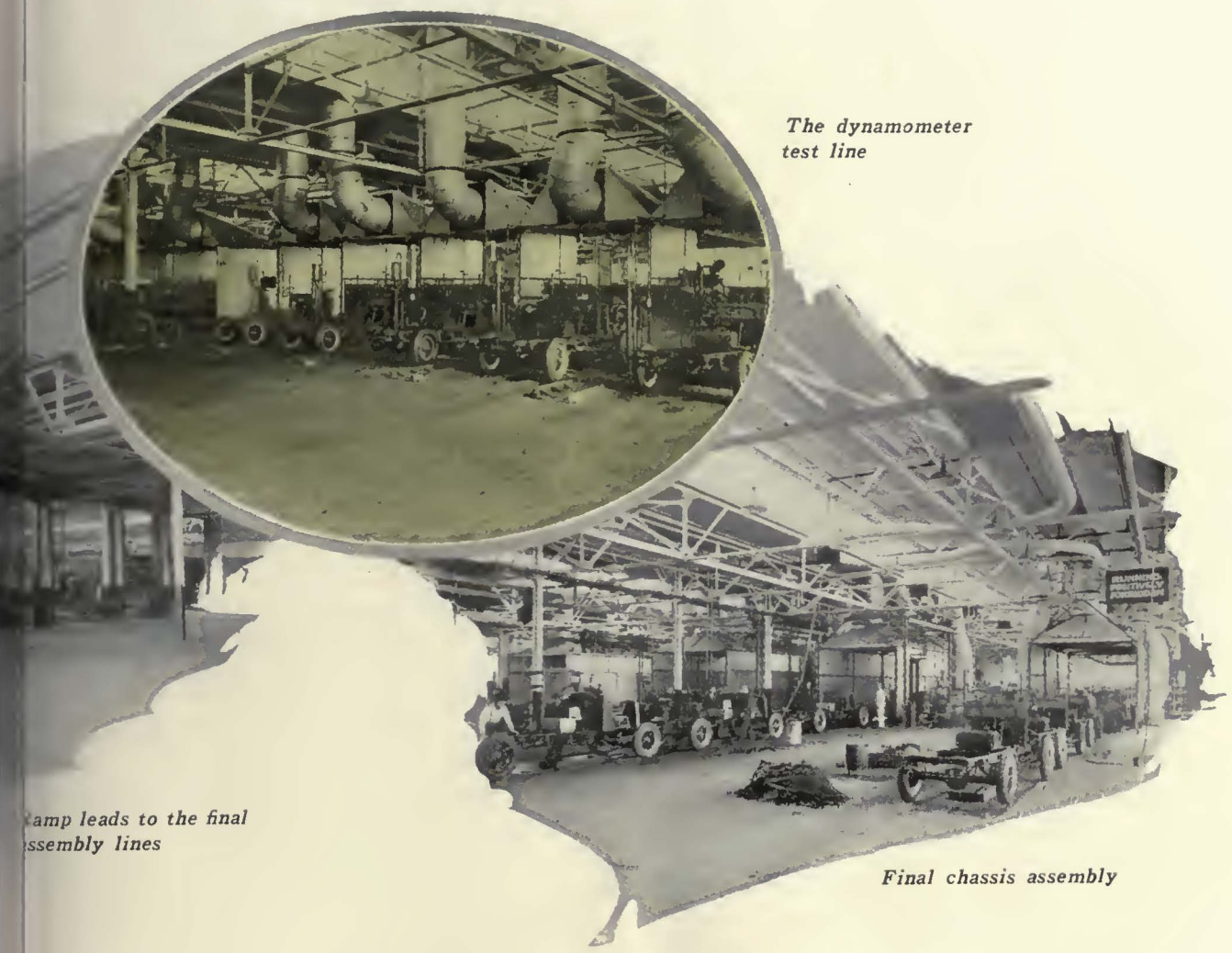
It has already been stated that each sub-assembly department is made up of specialists in the assembling of but one unit or part.

Each of these departments in turn is divided into four separate divisions, each specializing solely in the assembly of light or medium, semi-heavy or heavy duty units.

Throughout the progress of these parts

Interesting Facts About the Plant

Within six months after ground was broken, the plant was in production. July 5th to January 3rd



The dynamometer test line

Ramp leads to the final assembly lines

Final chassis assembly

through the plant, from sub-assembly to final assembly and test, these four classes of material are kept separate and distinct, each class of material flows along its own individual production lines with its own crew, highly skilled in one range of work.

Leaving the sub-assembly departments, we find that in the assembly of the complete chassis units, the system of individual production lines for each class of vehicle likewise prevails.

Here the vehicles systematically take shape as the moving assembly lines crawl slowly forward. Springs are added to frames; axles and wheels follow. Electric hoists deftly slip motors into place. There is a trained crew for each step—for each adjustment—for each test.

As you watch the vehicles take form you cannot help but sense the remarkable efficiency of the progressive assembly system employed. There is a complete elimination of labor waste. Ingenious electrical lifts, conveyors and mechanical equipment make the actual handling of parts unnecessary. Machinery, built to perform manual tasks with human skill, takes the place of common labor. The heaviest parts are slipped into their appointed places in the chassis as neatly and easily as chess pieces. It is from this point on that skilled labor steps in to make necessary attachments, adjustments and tests.

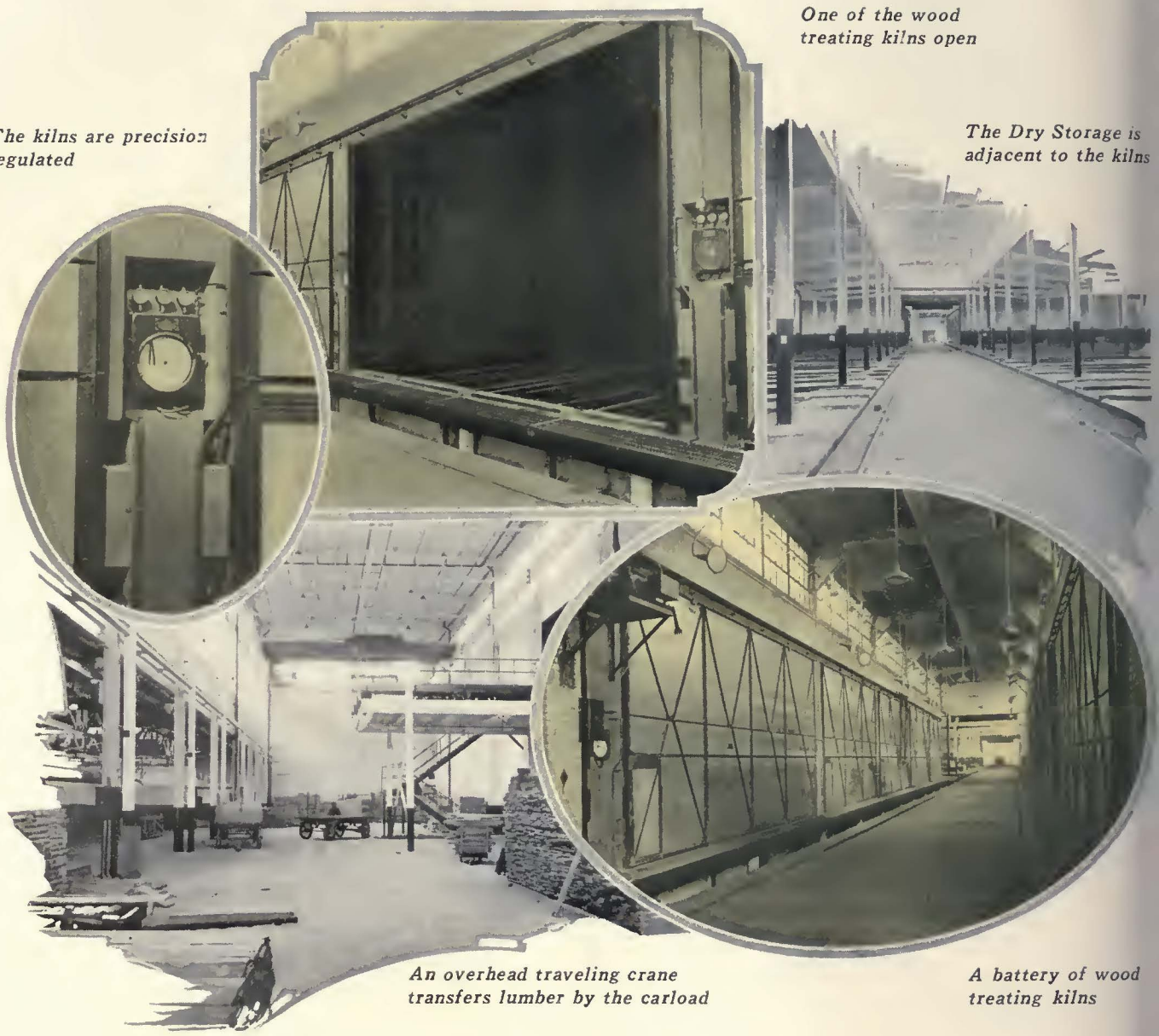
Ordinarily a factory is proud of two or three dynamometers, but here a whole battery of them, twenty in all and extending the complete width of the building, are ready to receive the finished chassis as they roll off the assembly line. On these dynamometers each finished chassis is run in under its own power, and at the same time is forced to reveal its innermost mechanical secrets to unsympathetic gauges that register its very heart throbs.

It is an inspiring sight to see this long row of vehicles "on test," recording their efficiency.

Following the running in period and

Interesting Facts About the Plant

Every window in the plant can be opened or closed from central points in five minutes



One of the wood treating kilns open

The kilns are precision regulated

The Dry Storage is adjacent to the kilns

An overhead traveling crane transfers lumber by the carload

A battery of wood treating kilns

dynamometer test, the chassis then proceeds forward to the final chassis assembly line where lamps, hood, fenders and baked enamel parts are installed prior to attaching the body.

The Body Plant— A Model of Efficiency

The body plant, while under the same roof as the chassis assembly, is an institution in itself.

Body building, at Pontiac, starts with the treatment of the selected timber.

A long battery of huge wood-treating kilns receives the lumber as it comes into the far end of the plant from the storage yards—yards in which half a million feet of lumber can be easily stored. Heat and moisture conditions are precision regulated to insure long life, strength and freedom from warping.

Following this treatment, the timber is transferred to dry storage, adjacent to the dry kilns. From here, a great time and labor saving crane, travels back and forth, delivering huge stacks of lumber as needed, to points adjacent to the saws.

In the wood working department, as in other departments, tools and equipment which minimize manual operations predominate. Duplicated handling of material is eliminated. Cutting is done over jigs to insure complete uniformity and accuracy.

In the sheet metal department, huge shears and presses cut and shape the metal into forms. Modern welding equipment joins the formed sections. Every-

Interesting Facts About the Plant

Waste wood in the body plant is converted into sawdust and operates one of the big boilers in the power plant

where, the very latest mechanical devices speed the work. Traveling cranes shift the piles of raw material about. Conveyors speed the units near completion to the various sub-assembly departments.

Here, as in the chassis assembly, the system of limiting each department to one class of body work prevails, the production lines — four in all — each specializes in the assembly of bodies for but one class of vehicle, and special provision is made to meet the widely divergent conditions pertaining to each class of work. Yellow coach bodies are built in many varieties of models, with many special features involved. Capacities range from 17-passenger parlor cars to double deck coaches for 65 passengers. Yellow taxicabs are produced in several models, with many options in body design. General Motors truck bodies must be built in many different types and sizes.

Such production means that each production line must be especially equipped and fully prepared to meet the wide range of conditions imposed.

Because of their size, extra large paint spray booths and other special equipment are required for the coaches and great overhead traveling cranes are used to facilitate handling.

The body plant division parallels the chassis division and the different production lines of the two converge at the finish where bodies are mounted on chassis. The completed vehicles are then ready for final inspection, tests and shipment.

Interesting Facts About the Plant

Parking space for 2,500 cars is provided for the employees

The Export Department

Chassis intended for export are disassembled after being completely assembled and tested.

Since nearly every vehicle shipped for export has some characteristic difference, the building of export crates is practically a custom proposition. Because of this the crates are built up on a line directly adjacent to the dis-assembly line, thus providing a quick check and eliminating much blue print handling. All parts and chassis sections are carefully packed and ready for quick re-assembly when the vehicle reaches its destination.

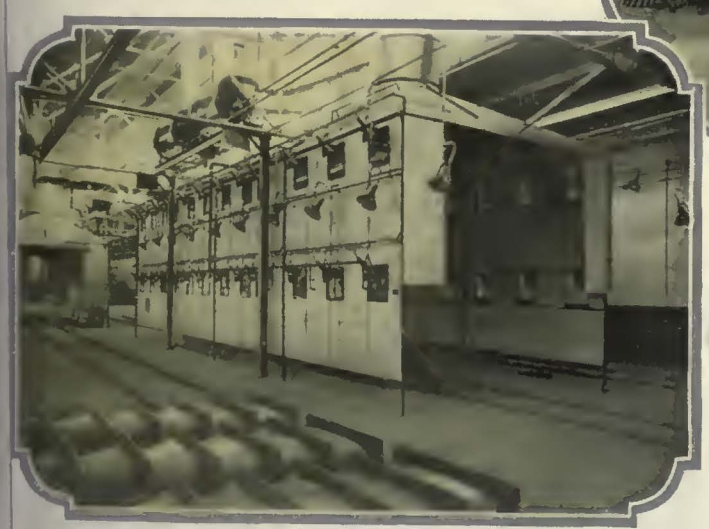
An Invitation

Word pictures and printed illustrations cannot adequately describe the extensive facilities and efficiency methods employed in this new model plant at Pontiac.

To really appreciate its size, its capacity and its flexibility of operation and the means employed to reduce labor waste and improve efficiency of production, it is necessary to visit and inspect this plant in person.

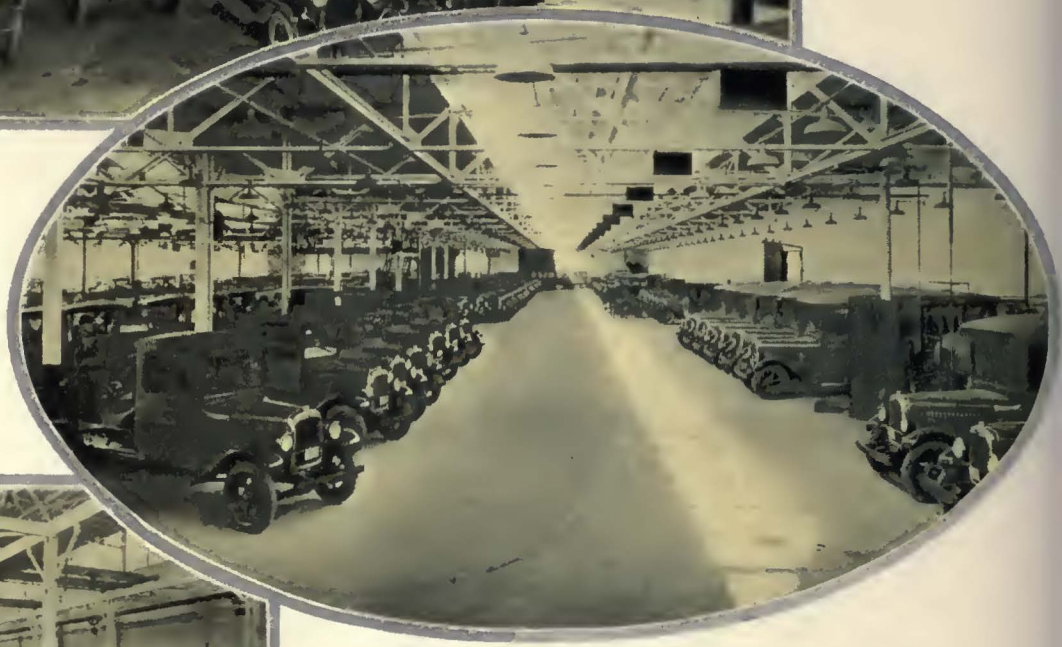
Come to Pontiac if you can.

Anyone interested in commercial transportation, whether manufacturer or operator, will always be welcome.



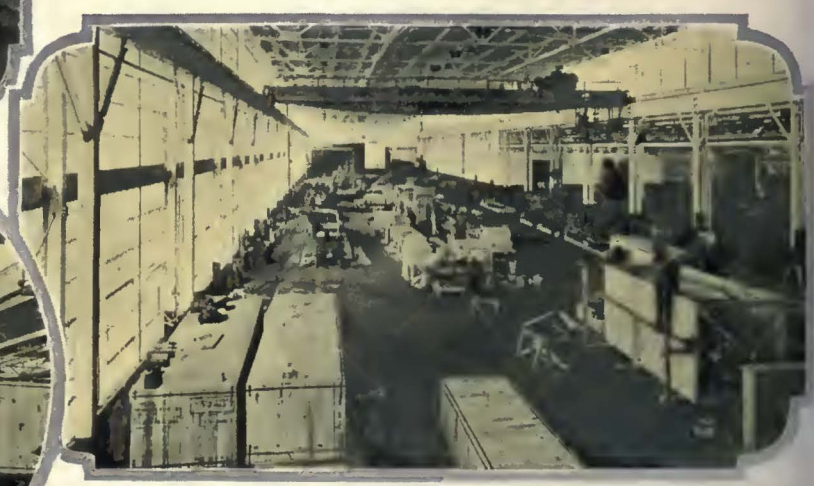
Paint spray booths are of the latest design. Note the giant booths required for the coaches

Between body mount and shipping warehouse

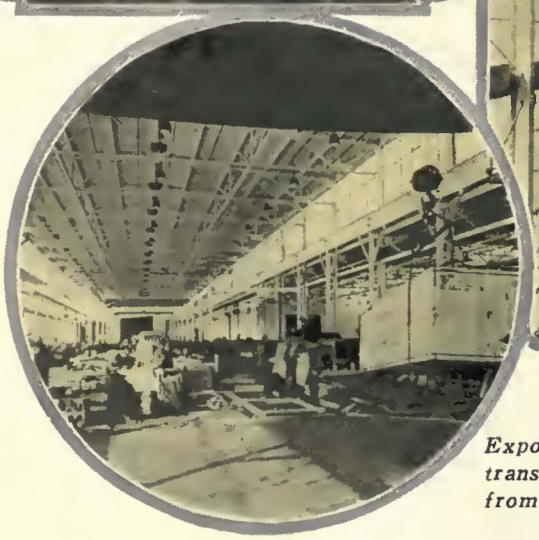


Warehouse for finished product

Left—Export shipment—Partially disassembled, the component units of the vehicle are placed upon the export case bottom. Note vehicles in background in process of disassembling



Export packing and shipping dock



Export shipment—An electric crane transfers the boxed vehicle from boxing rolls to freight car

Interesting Facts About the New Plant

THERE were 750,000 cubic yards of earth excavated or enough to clear a hole as large as an ordinary city block, 169 feet deep.

During the construction, there were 80,000 cubic yards of concrete poured or enough to cast five Washington monuments solid, or lay a four-foot sidewalk 402 miles long. In this concrete, 400,000 sacks of cement were used or enough to load a train of 570 box cars—5½ miles long. And two million pounds of reinforcing steel were used in this concrete, enough, if rolled into one-quarter inch rod, to make a rod long enough to reach more than half-way from Portland, Maine, to Portland, Oregon.

There were 4,500,000 board feet of lumber used in construction or enough to build homes for more than 3,000 people.

There were 500,000 square feet of glass used—54 solid carloads—enough to put 11½ acres of land under glass.

There were over 3,000,000 brick used, which would build a single garden wall six feet high and 13½ miles long.

The floor was covered with enough wood blocks and asphalt blocks so that if they were moulded into a shaft one foot square, they would reach a height of 50 miles or would cover a sidewalk four feet wide, long enough to reach from the City Hall in Toledo to the City Hall in Detroit.

Over 50,000 cinder blocks were used.

18,000,000 pounds of structural steel were used.

Throughout the entire plant every modern electrical device has been installed, both for human safety and for maximum production efficiency.

Electrically operated horns sound the starting and stopping signals.

All doors are electrically opened and closed. All windows can be opened or closed from central points in five minutes.

Time clocks are electrically controlled from a master clock. All machinery is individually driven by electric motors, with safety switches and controlled by start and stop buttons located in such positions as to guarantee the safety of the operator.

Electricity plays an important part in the operation of the power plant. Electrical machinery carries the coal from the car or coal pile to a crusher, feeds it into the boilers and carries away the ashes. Electric meters test the temperature inside the fire boxes, measure the flow of steam and check any possible losses of heat in the smoke stack.

The plant is completely supervised by an electric fire alarm system, a calling system and a sprinkler alarm system.

In this plant large quantities of gasoline and Duco are used daily. The storage of these inflammable liquids within the plant has been entirely eliminated. A workman desiring to use either gasoline or Duco at any point in the plant merely opens a valve and automatically the liquid is pumped from a station 3,000 feet away. The valve is self-closing and furthermore, in case of emergency, the entire system can be shut off and promptly drained by use of conveniently located stop buttons.

To provide light and power immense quantities of electrical materials were installed. All main feeders are underground in fibre duct. This duct, if laid end to end, would make a 4 in. tube, 72,000 ft. long. The lead cable used in the underground system, reduced to a size as thick as a broom handle would extend 36 miles. The wiring to all equipment is enclosed in steel conduit. The conduit used, if formed into a single pipe ½ in. in diameter would reach from the City limits of Detroit to the City limits of Cleveland, Ohio. The wire used, if reduced to the size ordinarily used in house wiring, would reach from New York City to St. Louis, Mo.

This is one of the best lighted plants in the world. There are over 12,600 reflectors for lighting in the plant. These reflectors, if stacked in their shipping cartons would make a tower over 2,500 ft. high, or more than four times as high as the Washington Monument. The lamps installed in these reflectors would furnish sufficient lighting for 1,850 homes and if placed in a single headlight would throw a beam of light strong enough to make objects plainly visible at a distance of 17 miles.

Approximately 93 miles of iron and steel pipe are used, of various sizes. 64 miles of pipe are necessary for fire protection, 10 miles for heating system, 6 miles for drinking and service water, 4 miles for carrying away rain water, 3 miles for sanitation, 3 miles for air supply and 2½ miles for oil and gasoline.

Unit type heaters employing forced air draft assure proper ventilation and even temperatures.

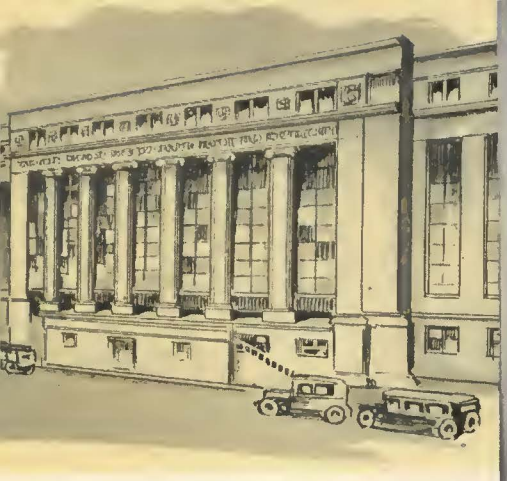
58 Frigidaire drinking fountains supply fresh cold water for the workers.

Were size alone the only consideration, this great plant would fall merely into the class of other big industrial structures. In this case, however, size of structure signifies the elaborate care taken by General Motors Truck to erect a plant large enough to render to each type of vehicle the specialization which assures the operator the greatest economy, the finest class of work and faithful performance on the road, coupled with low maintenance.

Behind such indications of progressiveness, lies an ideal. General Motors Truck has left no stone unturned to assure operators the maximum in performance and economy. The entire industry represented by operators of trucks, taxicabs and motor coaches thus shares in this new plant at Pontiac.

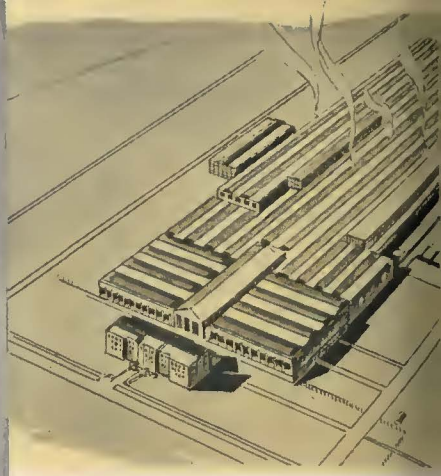
Faith, vision, experience, courage and strength built it.

"There is no substitute for experience and financial responsibility."



The research laboratories

The proving ground



The new plant at Ponti

Out of These Welded Interests–

IN the General Motors Laboratories where research engineers are continually experimenting with materials, judging the value of suggested improvements and analyzing the worth of new developments.

On the General Motors Proving Ground where the strength and stamina of General Motors Trucks, Yellow Cabs and Yellow Coaches are put to the severest test under gruelling operating conditions that reveal the truth of performance.

In the new plant at Pontiac where every modern facility for manufacture, assembly and test is engaged in turning out the finished product.

Out of these three welded interests, working in harmony, are developed General Motors Trucks, Yellow Taxicabs and Yellow Coaches. They indicate the determination on the part of General Motors to lead in the commercial vehicle transportation field with a type of truck, taxicab and motor coach for every need. Specialization at every stage of planning and building assures to the operator reliability of performance and economy of operation and maintenance.

The manufacturing and sales activities of the Yellow Truck & Coach Manufacturing Company are now consolidated in this new plant at Pontiac, where operations will be continued under the corporate name of

General Motors Truck Company

Pontiac Michigan

—*and the band played* "There'll be a hot time in

TWO years ago one night in June fifty thousand friendly voices broke into cheer after cheer as a mammoth bonfire of old Grand Rapids street cars climaxed the celebration that began a few days previously. The whole city declared holiday to witness a gala parade of new cars that replaced those consumed in the flames. The opposition of press, city officials and public had been transformed into enthusiasm, confidence and co-operation with the local railway.

Refused to Take the Count

Grand Rapids is only one of many examples of the come-back that is being staged by the electric railway industry. Atlanta, Pittsburgh, Chicago, Cincinnati, Cleveland, Richmond, Ft. Worth, Youngstown, Boston, Kansas City, Toronto, Houston and numerous other cities and localities have also made noteworthy progress. The industry hardest hit by the war and post-war turmoil is on the mend.

The come-back trail was blazed by a McGraw-Hill publication. While politicians rode into office on the 5-cent fare issue, when the automobile and the jitney ate into street railway revenue, when miracles in economies failed to stem the ebbing tide of income, but only made the car ride less attractive—in those seemingly hopeless days *Electric Railway Journal* never for a moment lost its confidence in the basic soundness of the local transportation industry. It devoted every resource at its command to inspiring local transportation companies to fight their way out of the wilderness.

Business Journalism in Action

Electric Railway Journal maintained that the solution lay in two directions: First, in modernizing equipment and improving service so as to make the car ride attractive; second, in developing the bus as a de luxe service and co-ordinating it with existing rail service. By thus satisfying the demand for comfort, speed and faster schedule, *Electric Railway Journal* contended that patronage could be won, labor and public relations improved, and fare and other franchise difficulties relieved.

To win acceptance of this program throughout the industry, every publishing resource was used—news articles, editorials and research, meetings and personal conferences with operators, associations, manufacturers and bankers. *Electric Railway Journal* showed that modern equipment would quickly pay for itself in operating economies. Later car and equipment

NEW CARS FOR OLD — Grand Rapids, June 13, 1926, when the city's populace turned out to look over new street cars that were built to "specifications by the public."

the old town tonight"

builders and other agencies took active part in the campaign. Their industrial advertising was effectively teamed with the editorial program. Finally operating companies began adopting the new methods; the rift in the clouds appeared.

This modernization campaign won for *Electric Railway Journal* the 1927 award for the most outstanding editorial service by a business paper to its industry. The award was given by Associated Business Papers, Inc., a non-profit organization of the leading business papers, whose purpose is to stimulate achievement in business journalism. .

An Every-Day Editorial Job

In the same purposeful way, each McGraw-Hill publication works in its field for better conditions, better production methods, better products, better marketing. *American Machinist* campaigns for modern machine tool equipment in the metal-working industries; *Engineering News-Record* for year-round construction work; *Coal Age* for mechanization of the mines; and so on. Receptive markets are a natural by-product of such editing. It dredges the advertising channel to those markets.

The readers of McGraw-Hill publications are the decision men of Industry, the men who must keep in touch with developments vital to their progress. Because each industry needs and reads its McGraw-Hill publication, there is created a direct avenue of approach to the responsible men of industry. Thus through industrial advertising in these publications, waste is eliminated and results increased.

How to make better use of such business papers is shown by one of McGraw-Hill's researches, "Industrial Marketing at Work." Manufacturers selling to industry, their advertising agents and their bankers are welcome to a copy by addressing the nearest office listed below.

McGRAW-HILL PUBLICATIONS

McGRAW-HILL PUBLISHING COMPANY, INC.

New York Chicago Cleveland Philadelphia St. Louis San Francisco London

Bankers and Engineers

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

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

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

Proposals, 40 cents a line an insertion.

INFORMATION:

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

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

DISPLAYED—RATE PER INCH:

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

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 8 columns—30 inches—to a page.

POSITIONS WANTED

A TRACK superintendent. Associate Member American Society Civil Engineers. Qualified by technical training and over 15 years' practical street railway track experience. Full charge as superintendent in field of over 300 men, steam shovels, concrete mixers, welding, grinding and acetylene outfits. With one of the largest street railways 15 years. Successful handling men and work. Now employed. PW-97, Electric Railway Journal, Tenth Ave. at 36th St., New York.

ENGINEER with 16 years' experience in construction of high-tension overhead construction for electric railways and power transmission lines. Five years' experience in power and sub-station design. Highest references and recommendations. PW-101, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MASTER mechanic with 17 years' experience city and interurban cars, buses, automobiles and building maintenance. Electrical engineering graduate. PW-100, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation; well known in electric railway field, with broad experience, successful record city, interurban railways and buses, available short notice, correspondence invited. Fine references. PW-94, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WANTED—Position as manager, general superintendent or M. M. of electric railways. Can qualify in every way. PW-99, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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 Traction Brake 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.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

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

Axles (Front & Rear) Motor Truck & Passenger Car
Timken Detroit Axle Co.

Axles, Trailer & Motor Buses
Timken Detroit Axle Co.

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.

Batteries, Dry
Nichols-Lintern 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.

Bells and Buzzers
Consolidated Car Heating Co.

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

Benders, Rail
Railway Trackwork Co.

Body Material, Haskelite Plymetl
Haskelite Mfg. Corp.

Bodies, Bus
Brill Co., The J. G.

Boilers
Babcock & Wilcox 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.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Bates Expanded Steel Truss Co.
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
American Brake Shoe & Foundry 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
Westinghouse E. & M. Co.

Brushholders
Columbia Machine Works
General Electric Co.

Bulkheads
Haskelite Mfg. Corp.

Buses
General Electric Co.

Buses, Motor
Yellow Truck & Coach Mfg. 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 Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

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

Car Steps, Safety
Cincinnati Car Co.

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.
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
American Brake Shoe & Foundry Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

Castings, Malleable & Brass
American Brake Shoe & Foundry Co.
Bemis Car Truck Co
Columbia Machine Works

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

Ceiling Car
Haskelite Mfg. Corp.

Ceilings Plywood Panels
Haskelite Mfg. Corp.

Chairs, Parlor Car
Heywood-Wakefield Co.

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

Change Trays
Cincinnati Car Co.

Circuit-Breakers
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
Oakite Products, Inc.

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

Clutches
Long Mfg. 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, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E & M. Co.

Coin Changers
Illinois Motive Equip. Co.
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
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 Varnish & Ins. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

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

Controllers or Parts
Columbia Machine Works
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.
American Steel & Wire Co.
Anaconda Copper 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.
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works

Coupiers, Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Traction Brake 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 Electrical & Mfg. Co.

Dealer's Machinery & Second Hand Equipment
Electric Equipment Co.
J. W. Gerke

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Works
Elec. Service Supplies Co.

Detective Service
Wieh-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.
Ohio Brass 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.

Electric Rivet Heaters
American Car & Foundry Motors 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.
H. M. Byllesby Co.
Day & Zimmermann, Inc.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Keiker & DeLeuw
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J. G.

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

Exterior Side Panels
Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co
Illinois Motive Equip. Co.
Johnson Fare Box Co.
Perey Mfg. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box 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.

Floor, Sub
Haskelite Mfg. Corp.

Floors
Haskelite Mfg. Corp.

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

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

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

Gas Electric Drive for Buses
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

(Continued on page 46)

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

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

Gear Cases
Chilllingworth 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.
R. D. Nuttall Co.

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

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grinders & Grinding Supplies
Metal & Thermit Corp.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Guard Rail Clamps
Lorain Steel Co.
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Columbia Machine Works
Elec. Service Supplies Co.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Columbia Machine Works
Haskelite Mfg. Corp.

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

Heaters, Electric Rivet
American Car & Foundry Motors Co.

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Works

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic
Westinghouse Traction Brake Co.

Instruments, Measuring, Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Irvington Varnish & Ins Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Ohio Brass Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings
Haskelite Mfg. Corp.

Jacks (See also Cranes, Hoists and Lifts)
Columbia Machine Works
Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
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.
Haskelite Mfg. Corp.

Lighting Fixtures, Interior
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.

Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Electric
Cincinnati Car Co.
General Electric Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oil and Grease
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co.

Manganese Steel Castings
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 Steel Co.
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.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Heywood-Wakefield Co.

Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.

Omnibuses (See Buses)

Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Traction Brake Co

Paints and Varnishes (Insulating)
Elec. Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints & Varnishes, Railway
National Ry. Appliance Co.

Panels, Outside, Inside
Haskelite Mfg. Corp.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Ohio Brass Co.
Westinghouse Traction 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.

Plywood Roofs, Headlinings, Floors, Interior Panels, Bulkheads, Truss Planks
Haskelite Mfg. Corp.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Poles, Metal
Union Metal Mfg. Co., The

Poles, Metal Street
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
J. F. Prettyman & Son

Poles and Ties, Treated
Bell Lumber Co.
J. F. Prettyman & Son

Poles, Trolley
Elec. Service Supplies Co.
R. D. Nuttall Co.

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 Car Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Radiators
Long Mfg. Co.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Filler
Carey Co., The Philip

Rail Grinders (See Grinders)

Rail Joints
Rail Joint Co.

Rail Joints, Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Railway Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Rattan Car Seat, Webbing
Heywood-Wakefield Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Ohmer Fare Register Co.

Reinforcement, Concrete
American Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
Westinghouse E. & M. Co.

Replacers, Car
Cincinnati Car Co.
Elec. Service Supplies Co.

Resistances
Consolidated Car Heating 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.

Rivet Heaters, Electric
American Car & Foundry Motors Co.

Roofing, Car
Haskelite Mfg. Corp.

Roofs, Car and Bus
Haskelite Mfg. Corp.

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.
Haskelite Mfg. Corp.
Heywood-Wakefield Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Second Hand Equipment
Electric Equipment Co.
J. W. Gerke

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 Heating 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.
R. D. Nuttall Co.

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.
Heywood-Wakefield Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
American Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs
National Ry. Appliance Co.

Springs, Car and Truck
American Spiral Spring Co.
American Steel Foundries
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 and Steel Products
American Steel & Wire 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)

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches
General Electric Co.

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Heating 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)

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 Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co

Ties, Mechanical
Dayton Mechanical Tie

Ties and Tie Rods, Steel
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tokens
Johnson Fare Box Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

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Tools, Track & Miscellaneous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Railway Trackwork Co.
Ramapo-Ajax Corp.

Towers and Transmission Structure
American Bridge Co.
Bates Expanded Steel Truss Co.
Westinghouse E. & M. Co

Track Grinder
Metal & Thermit Corp.
Railway Trackwork Co.
Ramapo-Ajax Corp.

Track, Special Work
Columbia Machine Works
Ramapo Ajax Corp.

Trackless Trolley Cars
Brill Co., The J. G.

Transfer Issuing Machines
Ohmer Fare Register Co.

Transformers
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
R. D. Nuttall Co.
Ohio Brass Co.

Trolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. 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.

Truss Planks
Haskelite Mfg. Corp.

Tubing, Yellow and Black Flexible Varnish
Irvington Varnish & Ins.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co

Turntables
Elec. Service Supplies Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co

Varnished Papers and Silks
Irvington Varnish & Ins. Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
Nichols-Lintern Co.
Nat'l. Ry. Appliance Co.
Railway Utility Co.

Vestibule Linings
Haskelite Mfg. Corp.

Welded Rail Joints
Metal & Thermit Corp.
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
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

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

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, Steel & Steel Tire
American Steel Foundries
Bemis Car Truck Co.
Standard Steel Works

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Bearing Metals Corp.
R. D. Nuttall Co.
Ohio Brass Co.
Star Brass Works

Whistles, Air
Ohio Brass Co.
Westinghouse E. & M. Co
Westinghouse Traction Brake Co.

Window Guards & Fittings
Cincinnati Car Co.

Wire Rope
American Steel & Wire Co
Roebling's Sons Co., J. A

Wires and Cables
American Brass Co
American Steel & Wire Co
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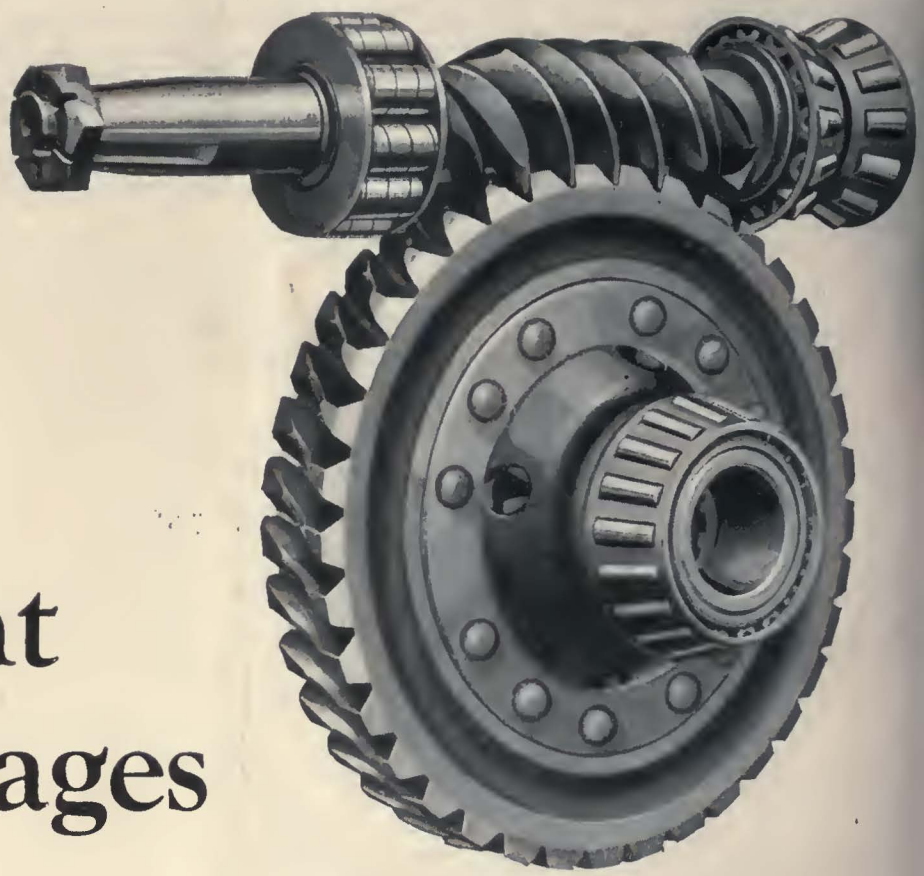

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