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ELECTRIC RAILWAY JOURNAL

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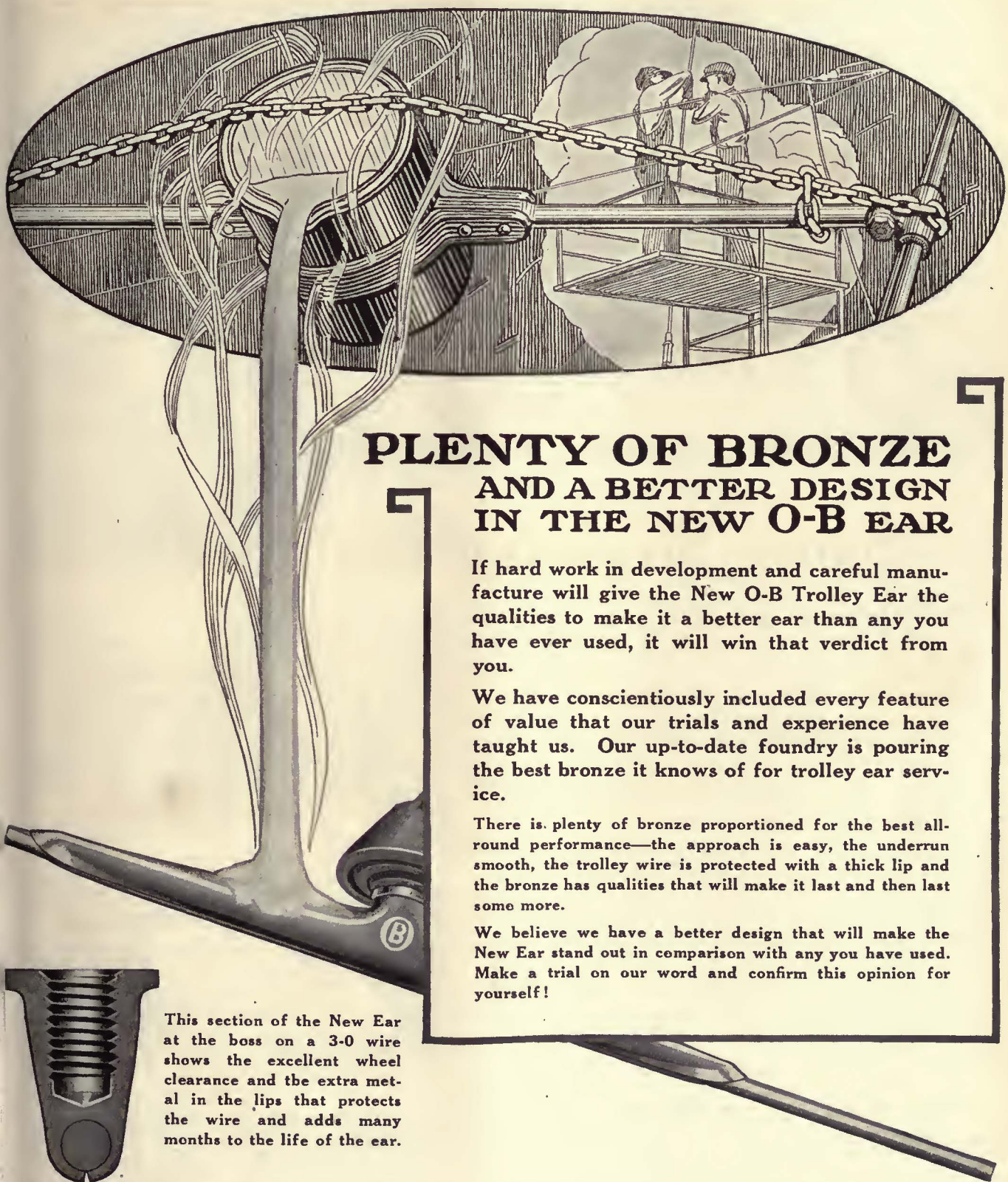

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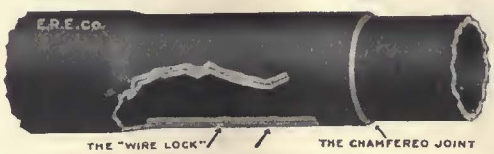

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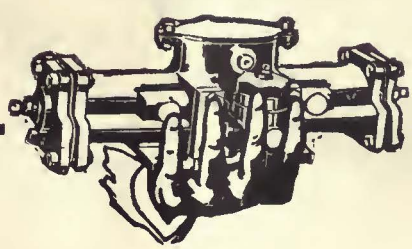

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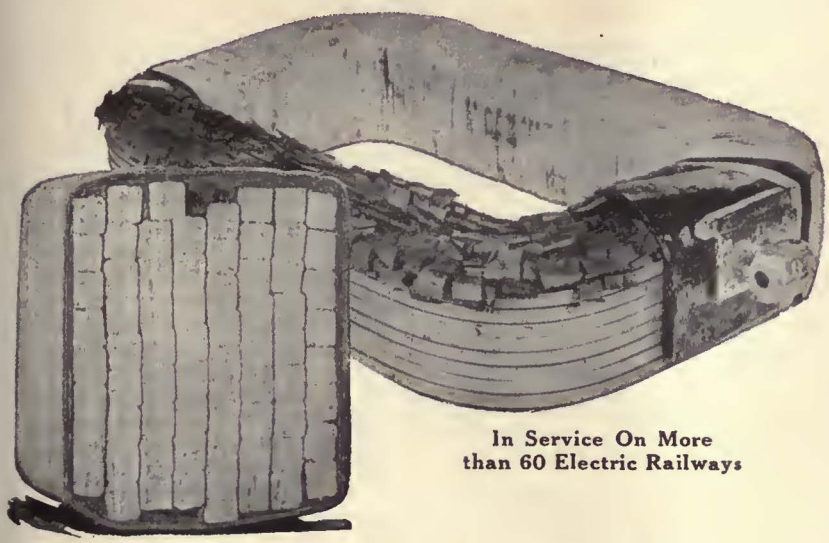

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THE CLEVELAND RAILWAY COMPANY

MAINTENANCE OF WAY
CHAS. H. CLARK, ENGINEER

HANNA BUILDING

CLEVELAND

May 11, 1923.

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(*Signed*) C. H. CLARK,

CHC:M *Engineer Maintenance of Way.*

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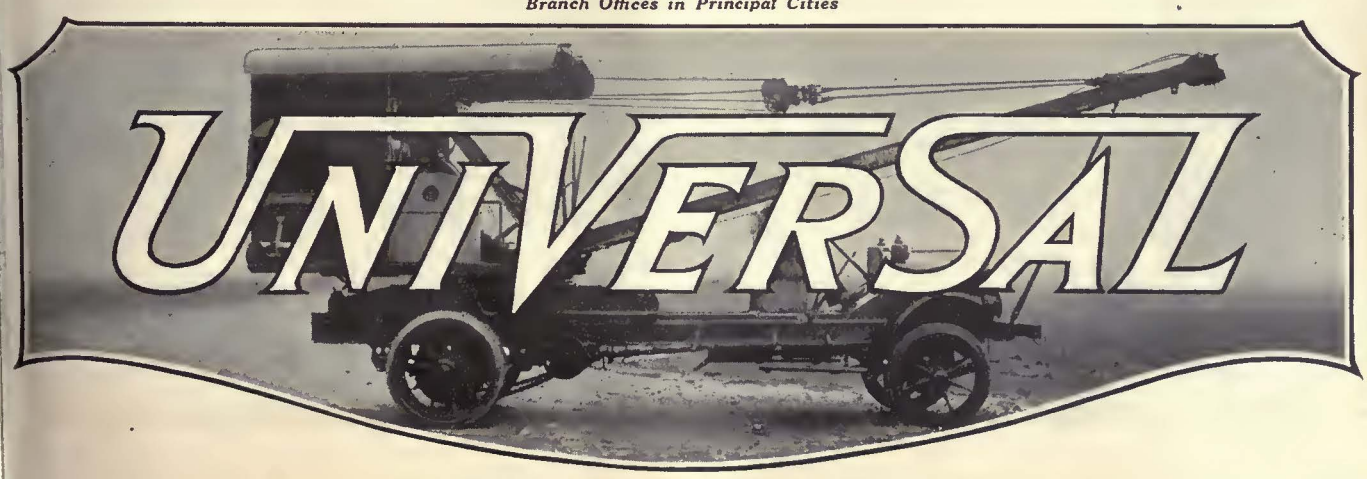

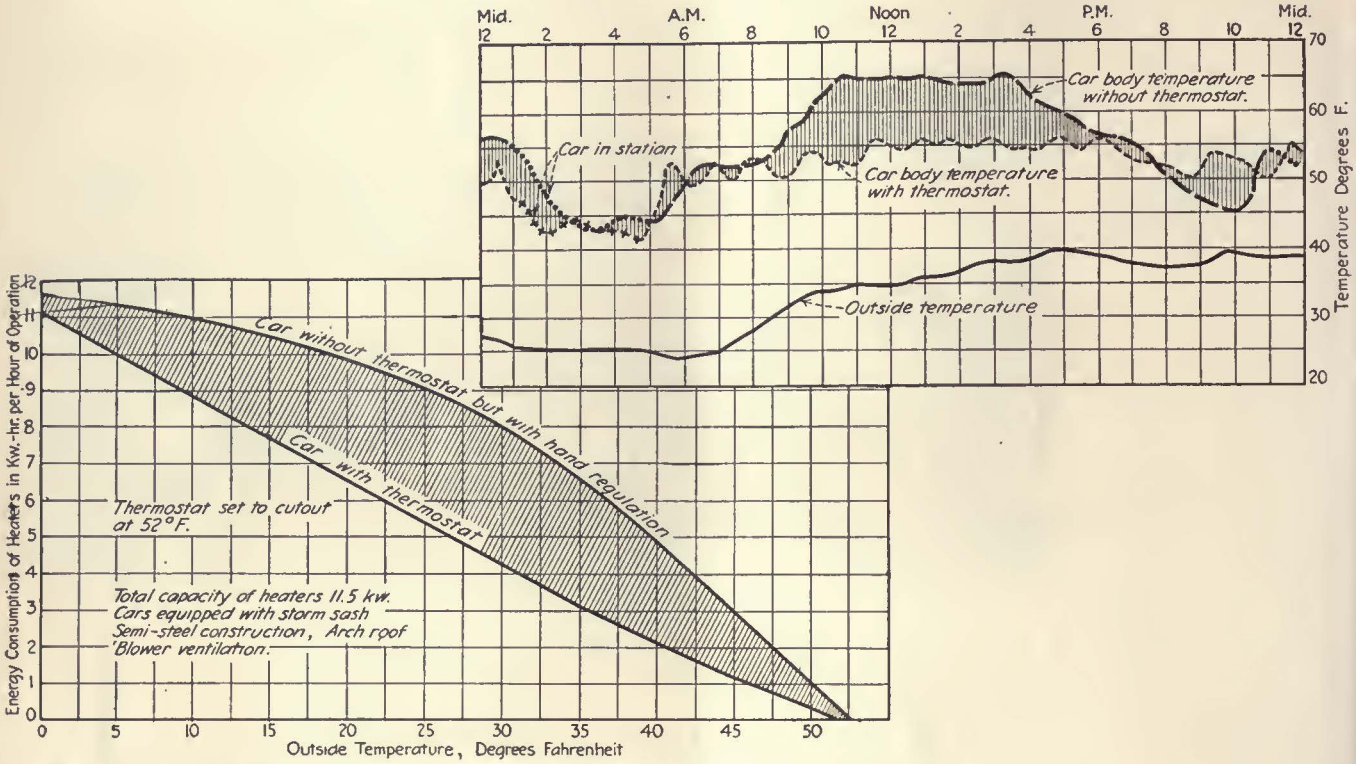

Above—Graphic Test Record Showing Effect of Thermostat in Regulating Car Temperatures
Below—Test Results Showing Effect of Thermostat on Energy Consumption.

...will not become loose. The working parts are mounte... ...mpound base ...ontacts are of the well known contactor type. The base and its ... ...anism are readily removable for inspection or repairs.

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70	100-200- 300	41- 80	MR-21	247525	22
140	200-400- 600	81-160	MR-22	247526	22
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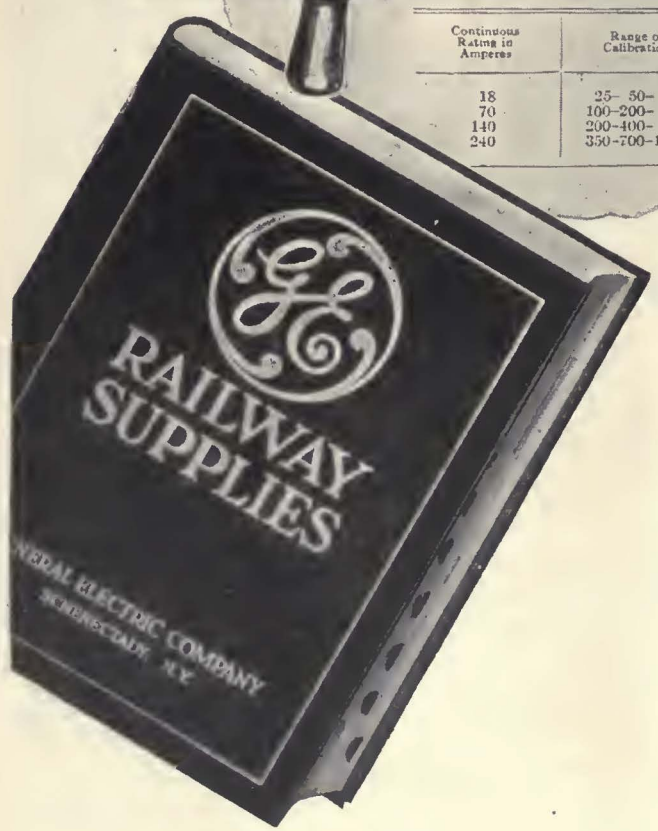
From page 176 of your G-E Catalog



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New York, Saturday, December 15, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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

Volume 62
Number 24

Cost of Repair Parts Varies with the Times

RECENTLY, in discussing with an electric railway shop superintendent the advisability of the railway manufacturing for its own use various car parts made up in small quantities, he said that a check of costs which had just been completed showed that several parts previously made in the shop at a saving could now be bought outside cheaper. So orders were to be placed for them.

Labor and raw material prices are constantly changing, and what is economical repair shop practice at one time may be found to be costly at another. The margin of saving between making repair parts in an electric railway shop and purchasing them outside is frequently quite small and railways often make parts as a matter of convenience rather than take a chance of slow delivery. A frequent check of manufacturers' prices with the shop costs will show whether it is advisable to continue to make them or place orders with a manufacturer.

As manufacturers specialize in manufacturing work, and as they usually keep their plants equipped with the most modern labor-saving machines on account of trade competition, it ought generally to be possible for them to do such work cheaper than it can be done in an electric railway shop which is organized and equipped for maintenance work, and often has old tools to work with. Abnormal conditions may make railway manufacturing desirable at times, but a watchful eye should be kept for the opportunity again to buy maintenance parts outside more cheaply.

Cleaning Done Right Contributes to Low Maintenance

IMPROVED appearance and better sanitation are desirable aspects of good car cleaning, but a more important result is the contribution this makes toward preservation of the car structure. The importance of cleanliness has increased considerably with the greater use of steel car construction. Corrosion is the greatest enemy of steel and iron and the best protective coatings have their usefulness decreased enormously by lack of attention in keeping all parts clean.

Working to meet this maintenance problem, special consideration has been given in car construction to avoid pockets and crevices which collect dirt and moisture. Sanitary corners have been provided, moldings and projections are beveled and seat pedestals are made with well-rounded bases. But these precautions merely make cleaning easy and are of little help in eliminating corrosion unless the cleaning is actually done. The dirt which collects retains moisture. This combination forms an acid which accelerates corrosive action, where steel is used, or soon rots away wooden construction. The corners are the hard parts to keep free from dirt, but they are the important points, if maintenance costs are to be held to a low figure.

Making Air Tanks Safe at Reasonable Cost

A GREAT deal of attention has been directed recently to the need for establishing definite specifications for the construction of electric railway air tanks. A committee of the American Electric Railway Engineering Association has been working on this subject and has been co-operating with a sub-committee of the American Society of Mechanical Engineers, which is engaged in the preparation of a code for the manufacture of unfired pressure vessels. This code will probably include electric railway air reservoirs.

Primarily, the object of such specifications is to insure safety. The railway companies should be, and are, in entire accord with this object, and it is to be hoped that the work under way will result in the production of a code which will not only assure safety but will also avoid saddling upon the railways an unnecessarily expensive and heavy equipment to be hauled around throughout its life.

The interest of railways goes farther than providing a construction that will be safe when first installed. In addition, the construction of air tanks for electric railway service should be such that easy, systematic and regular inspection and tests can be made. These are necessary in order to be sure that the deterioration resulting from service has not weakened the tank to a points where blowouts are likely to occur.

The present inspection and test practice of electric railways usually consists of some kind of a pressure test or a close visual inspection of the material of the tanks on the outside after all loose scale and dirt have been knocked off with a light hammer. Some roads apply pressure with a hydraulic pump, but on many roads the pressure test consists only of setting up the safety valves and pumping up the air pressure to an amount considerably in excess of that regularly obtained. Some roads have a practice of periodically rotating the reservoirs so that excessive corrosion will not take place at one particular section of the shell.

The need for an inspection of the interior of the tanks has been felt for some time, but as the usual pipe connections are seldom larger than 1 in., the opening is too small for inspection purposes. A few railways are now using tanks with a 2-in. pipe connection in one head. This makes it possible to examine them internally, as a drop light with small sized lamp can be inserted. With this better means of inspection it should be possible to utilize a lighter gage of metal for

the tank than might be considered necessary with only exterior inspection.

In addition to the better facility for inspection, the 2-in. connection can be used to advantage for providing a moisture trap in the air piping to prevent freezing of the condensed moisture at points that will interrupt the air supply.

Due to advances made in welding, a large field has been opened up for the application of this process to air reservoirs. Some engineers have felt that a welded tank increased the hazard, but with provision for careful, systematic inspection and test after installation, no doubt a satisfactory welded tank can be made at a lower cost than a riveted tank (which some members of the A.S.M.E. are inclined to feel is necessary) and perhaps with lower weight, while giving an adequate safety factor.

Having provided for adequate tests to insure safety, why not tell the public about it? It has been suggested that a very effective method of doing this would be to stencil a statement conspicuously on the outside of the tank which would read something like this: "Tested to 1½ times maximum working pressure," accompanied by the date and name of company.

While the general public is not competent to judge as to the frequency with which such tests should be made, a stenciling of this nature would at least indicate that the tank had been tested at some time and it would also serve as an incentive for the railway to make tests well within the proper interval.

Public Beginning to See that Riders Alone Cannot Support Subways

ONCE every so often some one proposes that the elevated roads, or part of them, in large cities be taken down. Scrapping is the word generally used. The obstruction which they cause to light and air on the streets below and to adjoining property is the principal argument urged against the existing structures. During the past week agitation of this kind has again come up, this time in connection with the Sixth Avenue line, New York City. Julius Miller, borough president of Manhattan, has gone somewhat further than has been done with previous proposals of a similar nature and has suggested that the cost of acquiring the structure and building a substitute subway be raised by assessments on abutting property. He believes not only that the increase in value of this property resulting from the change will amount to much more than the entire cost but that the owners of this abutting property would be willing to pay for the change by an assessment. The amount required has been estimated by him at 10 per cent of the assessed value of the property.

Now, it is undoubtedly true that in the course of the growth of a city the methods of transportation in use may have to be changed. Undoubtedly, also, property owners prefer a subway to an elevated railway on the street on which their real estate is located. The elimination of the overhead lattice work of steel girders, ties and rails on Sixth Avenue would improve the appearance of the street and make the ground-floor stores much lighter. With the railway underground there would be a pleasing reduction in noise. It is easy to see, therefore, why the property owners on that avenue favor such a step.

However, grave misgivings may well exist concerning several features of the plan. The estimated cost seems too low by a large amount. The existence of an underground railway, the Hudson & Manhattan, under Sixth Avenue from Ninth Street to Thirty-third Street would seem to impose great engineering difficulties in the design of a new subway. Apparently no detailed estimates have been made of the traffic which would be carried, nor the cost of operation, nor who will operate the line. It has simply been assumed as a matter of course that a Sixth Avenue subway would be a paying proposition.

Actually, of course, a subway is a luxury in any city. Even in Detroit, where the subsoil is ideal for subway construction because it contains no rock but can be cut like cheese, the cheapest form of subway, if supported entirely by the car rider would require a fare of 10 cents or more, according to D. L. Turner. This suggests that at least one good result may come from the campaign on Sixth Avenue, even if the subway is never built. A large number of more or less influential people will learn at first hand something about the intricacies of subway building and its tremendous cost. They will discover the thousand and one things that are required, and to which the average man never gives a thought. And if careful analyses are made of probable operating costs and passenger revenue, these property owners may learn that every railway is not *ipso facto*, a gold mine. The plan is commendable in that Mr. Miller is going about the work in the right way, namely, by placing some part of the cost of the construction on the owners of abutting property. They primarily are the ones benefited. The principle of assessment for rapid transit improvements, suggested also in Mr. Turner's report on Detroit as presented in this paper last week, is logical.

Finally, it is evident that even if the campaign for funds among Sixth Avenue property holders is successful, New York cannot dispense now with the carrying capacity of the Sixth Avenue elevated. The city is ten years at least behind in its transit program. If the building of a subway under Sixth Avenue takes five years the elevated will have to remain in place for at least that length of time because the other present north and south rapid transit lines have not the excess capacity required to accommodate the passengers who now use the Sixth Avenue elevated. After a Sixth Avenue subway is built, it may be that the elevated over the street will not be required, but if history is any guide, New York City will need for many years all of the rapid transit lines which it has now and can build to care for its constantly increasing traffic.

This condition, that the means of transportation is a step behind the demand, applies in every growing city, and is one of the safeguards of the electric railway. Thus there have been statements in the past that the surface lines in New York were obsolete and should be scrapped. Nevertheless, they carry now about 39 per cent of the local business of the city, as compared with 59 per cent on the rapid transit lines and 2 per cent by buses, and there is no other way known of taking care satisfactorily of this large proportion of the traveling public. In other words, good transportation in a city is a necessity, and a city cannot get along without electric cars in its principal streets until a better means for local transit is provided. This seems a long way off.

Use of Mold Successful in Arc Welding Copper Rail Bonds

Two Methods of Arc Welding Are Described—The First Employs a Carbon Electrode and the Second a Copper Alloy Rod—Figures of Numerous Bond Tests Are Given —Procedure Has Been Developed as a Result of Research Covering Three Years

By Chester F. Gailor
Consulting Engineer, New York City

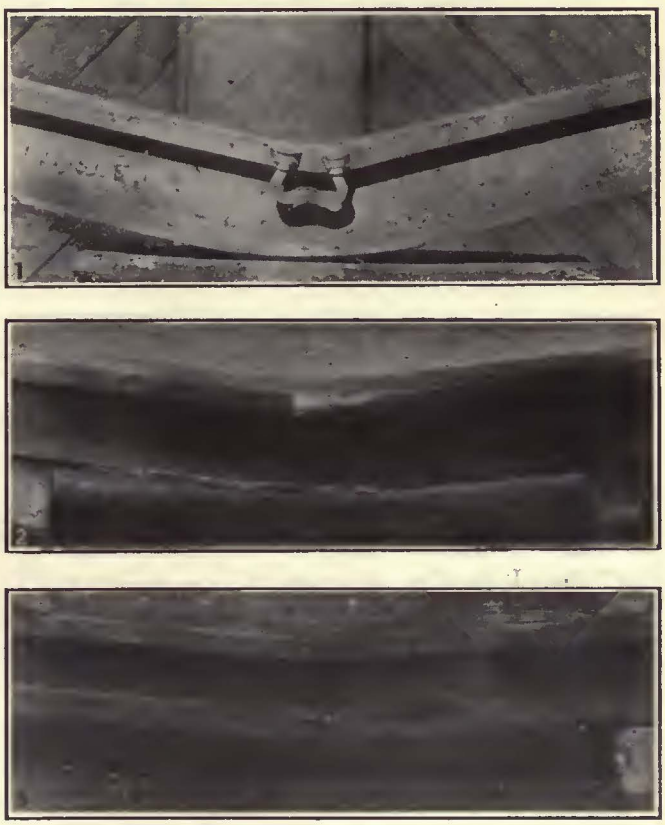
ONLY recently has the practice of arc welding bonds to rails been accomplished in a reliable and satisfactory manner. The first attempt to arc weld copper bonds to rails was made by using, both for the bonds and the filler needed, pieces of old trolley wire welded by the carbon arc method. It was considered necessary at that time to secure deep penetration into the rail steel to produce a desirable weld. This caused unnecessary gouging and burning of the steel, and usually resulted in an ugly looking weld of questionable character. A careful study of the factors involved demonstrated the fallacy of this practice and resulted in the development of a welding process which eliminates that feature.

Many attempts have been made to manufacture a rail bond with a suitable terminal which could be satisfactorily welded to the rail without the use of a mold. This has been found very difficult because the copper, in a fluid state under the influence of the arc, does not amalgamate readily with the steel. Copper in such a small mass usually will chill without producing a weld. The use of molds, however, has made it possible to use sufficient copper around the bond to produce a reliable weld and at the same time form a suitable terminal on the bond.

The problem of confining the weld metal and the necessity for producing a weld and bond terminal of a suitable character prompted the use of a mold. It was soon found that a carbon mold met the requirements better than any other material. Carbon will withstand the action of the arc and erosive action of the metal when boiling in the mold and will not chill the metal as rapidly as will most other materials. Consequently, a carbon mold in one form or another has been in use since the very beginning of this method of bonding.

It was found difficult to produce a satisfactory weld in the remote corners of the mold, especially on the smaller sizes of bonds with limited area of contact. In some cases where molds of other materials than carbon were used for experimental purposes, it was found difficult to force the copper metal into the corners of the mold, as the material had sufficient chilling and repulsive action to hold the copper back for an appreciable distance from the corners. This indicated that acute angles in the mold and thin sections of copper welding should be avoided.

The carbon molds are designed to produce a terminal and welded contact to the rail equal to at least four times the cross section of the copper metal in the bond itself. With this area it is virtually impossible for an operator to apply a bond which when finished will not test 100 per cent efficient. A larger contact terminal could not be justified.



Condition of Rails and Bonds After Being Subjected to Severe Drop Tests

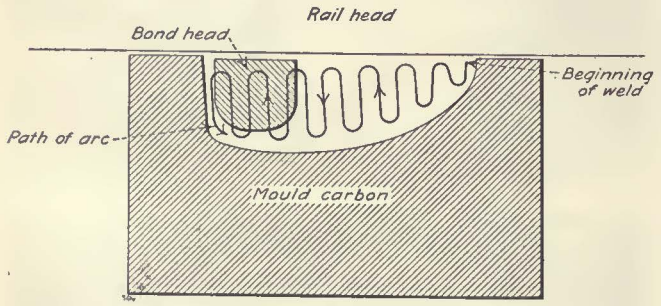
During the study it was found that a combination of copper, steel and carbon for the mold was most desirable. It developed that the mass of carbon needed around and under the head of the bond was considerably more than the space available between the finished bond terminal and the top, which many heavy-section joint plates now in use, would permit. The combination of these materials, however, enables the bond to be applied at a point on the rail head much lower than if an all carbon mold were used.

The life of such carbon molds of course depends largely on the welder. A set of carbons will, as a rule, weld forty or fifty bonds. When the speed of the operation is considered the use of molds is fully justified.

Investigation and research conducted principally in the laboratories of the Rail Welding & Bonding Company resulted in the development and perfection of two different methods. One method is by the use of the carbon arc including the use of reversed polarity, with the carbon electrode negative. Instead of using scrap copper for an electrode, a copper alloy welding rod is employed, which contains a combination of metals act-

ing as a strong deoxidizer for both steel and copper. Under the influence of the arc this will thoroughly cleanse the steel surfaces, bringing pure copper into contact with the steel in the rail under the most favorable conditions.

This action of the copper alloy rod obviates the possibility of gouging the rail steel. In fact, the best bonds are produced where the arc is drawn along the surface of the rail steel, close enough to secure the desired weld, but still far enough away to avoid any direct penetration. The action of the copper metal in the mold under the influence of the arc is very similar to that of copper when handled in a crucible. All the foreign substances and slag rise to the top, leaving the pure copper forming the bond terminal welded to the rail. This method is recommended in all cases where dynamotors and similar low voltage generating units supply the necessary electric current. The total time



Path Which Arc Should Follow in Welding Bond

for welding a bond of the ordinary standard size and type is approximately two minutes. Where conditions are sufficiently favorable bonds may be installed in half the time. It has been found very essential that sufficient current be available to keep the copper metal flowing uniformly and the metal in the mold always in a fluid state. Otherwise, the metal will chill, preventing the cleansing and boiling action, which is highly necessary. In practice at least 200 amp. are required to weld bonds successfully with this method.

Metallic Arc Welding

The second method of bond welding, which is the result of a research started about three years ago, is distinctly different. In this the welding metal must all be kept in a molten state and the length of arc changed from time to time to produce a good weld. The same molds and accessories are employed as in the first method. The current usually is supplied by a lightweight portable resistance welder, a $\frac{5}{16}$-in. diameter copper alloy rod forming the positive electrode.

The resistance should be set to permit a current of about 225 amp. The weld is commenced at the end of the mold remote from where the bond head projects into it. The arc is struck by touching the electrode to the mold. A globule of melted copper will start to form at the end of the mold and the arc should be kept at the front edge of the globule, allowing it to enlarge until the entire bottom of the mold is covered. An arc of about $\frac{1}{4}$ to $\frac{3}{8}$ in. in length is ordinarily used at the beginning of the job. As soon as the arc touches the bond head it should be shortened to $\frac{1}{8}$ in., as the short arc is necessary to melt down the copper of the bond head properly. After the bond head is melted down the arc is played back and forth and in and out from the rail over the entire head to keep all the copper in a molten state and insure that the head is well filled out in back and properly welded to the rail. This procedure is followed whether the bond is applied to the head, web or base of the rail. When applying the weld to the base a slightly longer arc, $\frac{3}{8}$ to $\frac{1}{2}$ in., is used at the beginning to fill the mold.

Mechanical Tests

During the development of the process it was found necessary to make mechanical tests in order to establish the principles involved, and also to get some idea of the comparative life of the various types of bonds. The vibrating machine used for testing bonds mechanically consists of a steel framework carrying two upright standards mounted on eccentrics in such a manner as to give a maximum movement of $\frac{13}{32}$ in. between the two members. The bonds were welded to pieces of steel and inserted between the two upright members and the machine operated continuously until failure occurred. This movement, being far in excess of that resulting from actual practice, was adopted in order to speed up the operation. A summary of several of such tests is shown in an accompanying table.

Several methods of testing the strength of the bond heads when subjected to shearing stresses such as are apt to be imposed upon bonds welded to the head of rails were tried with varying results. The most valuable of those tried was a simple shear test to show the relative strength of the weld and the copper forming the bond terminal. This test clearly indicates the merits of the weld, as the loads required to shear the bond terminals all ran over 30,000 lb.

The use of a sleeve at the junction of the bond head and bond itself was shown to be very valuable. This sleeve and the head on the bond itself hold the strands and laminations in one solid mass, preventing the welding heat from overheating any individual strand and at the same time throwing the bending action back into the flexible portion of the bond. This particular feature was found to add practically 25 per cent to the life of the bonds.

Electrical Tests

Reliable resistance tests of welded bonds were difficult to make, as it was found after a preliminary investigation that there are very few instruments available which could accurately measure the resistance in the contact between the welded copper bond head and the rail steel. The following is a brief summary of resistance tests which include 1 in. of steel at each bond head and the bond itself. No fish plates or mechanical connections were used so that these results show the actual resistance of the bonds enumerated in the accompanying table.

RESULTS OF MECHANICAL TESTS OF WELDED BONDS

Size	Type of Bond	No. Vibrations Before Failure of Bond
7-in	0000 laminated U	5,100,000
9-in.	0000 Webber U	2,403,000
8-in.	Single cable U	1,830,000
8-in.	Double cable U	1,050,000

RESULTS OF ELECTRICAL TESTS OF WELDED BONDS

Size	Type of Bond	Ohms Resistance
6-in.	0000 laminated U	.0000389
7-in.	0000 laminated U	.0000493
8-in.	Webber	.0000454
8-in.	Single cable U	.0000516
8-in.	Multiple cable U	.0000484
8-in.	400,000 circ.mil single cable U	.0000260

Careful consideration was given to the study of the rail steel at and adjacent to the point of weld. The idea of securing even the usual penetration when making a bond weld was found not only decidedly wrong from a bonding point of view, but it created a condition that proved liable to cause failure in the rail section when mechanical tests were conducted. The improvement in the process of welding, as outlined herein, quickly eliminated this feature, by making it both unnecessary and improper to penetrate the steel with the arc.

Among many other tests which were conducted to prove that the welding of copper bonds to steel rails with these processes of welding did not weaken or materially affect the structure were severe drop tests made on extra high carbon tee rails by dropping the 2,000-lb. tup so as to strike the rail at the point of weld. No failures or indications of any objectionable character were in evidence at the conclusion of these tests. The rails were removed from the testing apparatus because of the excessive vertical deflection which caused the rail to rest on the bed of the machine.

Aside from the area heated during the welding, which was in no way damaged, there was no evidence of any change in the structure of the steel or the rail section itself.

Systematic Inspection Reduces Pull-Ins

THERE has been a steady reduction in equipment failures, covering a period of several years, on the Eastern Massachusetts Street Railway, formerly the Bay State Street Railway, which operates 665 miles of city and interurban lines. This dated back to the reorganization which placed the road under state control with operation by a board of public trustees. An accompanying table shows a reduction from a maximum of 1,489 pull-ins due to equipment failures in July, 1920, to 92 in July, 1923.

This marked improvement in the record in three years is due to numerous changes in methods, but according to W. C. Bolt, superintendent of rolling stock and shops, they all can be summarized in the words "systematic maintenance and inspection."

Cars are given a general shop overhauling at between 60,000 and 75,000 car-miles, depending on the type and age of cars. Between these general overhaulings the cars are inspected every 1,000 miles at the carhouse for minor adjustment and repair. It is stated that this plan, vigorously followed, has made it possible almost to eliminate failures of equipment in service and substantially to reduce the cost of maintaining cars.

The comparative record of pull-ins by operating divisions for the month of October, 1923, shows considerable difference in the records of the various parts of the system. Two of the smaller divisions had perfect records for the month, and two of the larger stations had but one pull-in each due to maintenance, averaging 0.007 pull-ins of this character per 1,000 car-miles. From this the number of pull-ins for the various divisions ranges up to a maximum of thirty-six, or 0.184 maintenance pull-ins per 1,000 car-miles.

Publication of the monthly record is said to have created considerable competitive interest, and has been a contributing cause to the present good record. Equipment failure pull-ins are also analyzed carefully each month, as indicated in another table. The company makes this record up for each operating division, although only the total is shown in the table. This enables the department heads to determine the causes that result in car failures and to eliminate the sources of trouble.

PULL-IN REPORT, EASTERN MASSACHUSETTS STREET RAILWAY MONTHS OF SEPTEMBER AND OCTOBER, 1923

Cause of failure	Number of Pull-Ins October	September	Increase
Contactors	6	3	3
Circuit breakers	0	1	1*
Air	8	20	12*
Car body	6	5	1
Controllers	8	12	4*
Doors and steps	11	13	2*
Wheels	0	0	..
Air and hand brakes	4	8	4*
Gears and pinions	1	3	2*
Hot bearings	12	12	..
Lights	16	6	10
Sanders	0	2	2*
Armatures	8	13	5*
Fields	3	5	2*
Miscellaneous motor	2	7	5*
Wires and cables	14	5	9
Trolleys	6	4	2
Trucks	1	3	2*
Resistance	20	17	3
Grounded brush holders	2	1	1
Fenders	0	1	1*
Miscellaneous	3	5	2*
Broken axles	0	2	2*
Heaters	1	0	1
Split mercury	0	0	..
Frozen air	0	0	..
Sand boxes empty	1	6	5*
Lightning	0	1	1*
Broken windows	15	8	7
Accidents	53	62	9*
Lights (operating pull-in)	0	0	..
Inspections	4	1	3
No trouble found	20	17	3
Wet sand	1	2	1*
Total pull-ins	226	245	19*
Operating pull-ins	94	97	3*
Maintenance pull-ins	132	148	16*
Station car-miles	1,639,527		
Maintenance pull-ins per 1,000 car-miles	0.08		

* Indicates decrease.

RECORD OF EQUIPMENT FAILURES BY MONTHS, EASTERN MASSACHUSETTS STREET RAILWAY

Month	Pull-Ins Due to Equipment Failures	Pull-Ins per 1,000 Car-Miles
May, 1920	1,238	0.60
June	1,364	0.66
July	1,489	0.70
August	1,389	0.68
September	1,022	0.54
October	1,182	0.63
November	1,071	0.61
December	941	0.54
January, 1921	1,192	0.72
February	1,069	0.74
March	948	0.57
April	700	0.44
May	715	0.43
June	628	0.38
July	1,060	0.59
August	1,049	0.57
September	916	0.56
October	734	0.45
November	758	0.49
December	653	0.40
January, 1922	1,048	0.66
February	827	0.56
March	612	0.37
April	437	0.28
May	312	0.19
June	271	0.17
July	287	0.16
August	274	0.16
September	246	0.15
October	188	0.11
November	163	0.10
December	313	0.19
January, 1923	560	0.34
February	501	0 33
March	559	0.33
April	250	0.15
May	172	0.10
June	111	0.07
July	92	0 055
August	105	0.063
September	148	0.093
October	132	0.08

Reclamation Storeroom Accomplishes a Big Saving*

The System Developed by the Northern Texas Traction Company for Reclaiming Waste Material Has Improved Efficiency of Mechanical Department and Reduced Expenses

ON MANY railway properties thousands of dollars a year have undoubtedly been thrown away via the junk pile. Further losses have resulted from lack of a system whereby a single person passes on all material before it is scrapped. If so-called waste material is examined to see whether or not it can be reclaimed and restored to usefulness, large savings can often be made in material which would otherwise be drawn from stores.

This problem was the subject for discussion at a meeting of the master mechanics of the Stone & Webster companies some time ago. As a result of this discussion, it was decided that the Northern Texas Traction Company, Fort Worth, should experiment with the establishment of such a department.

A survey was made of conditions at the shop and it was found that material and spare parts were lying around everywhere. This material had been taken off the cars from time to time and left there with the idea that it would be used at some future date. Time and effort were being lost, however, in looking for what was wanted and, in a great many cases, material was requisitioned from the storeroom when a thorough search would have discovered the desired article in some corner of the shop. This was the inevitable result of having no centralized place equipped for handling second-hand material and reissuing it. Moreover, it was felt that proper examination was not being made before material went to the junk pile.

A section of the truck shop 40 ft. x 36 ft. was therefore partitioned off and some 350 shelves of various sizes were built. Scrap cupboards, waste bins, spare controller racks, glass racks, 560 small bolt bins and an armature rack were placed in this room. A work bench was installed and equipped with a vise, compressed air connections and other tools for reclaiming material needing minor repairs. Surplus material and spare parts were collected and moved into this room, assorted and put away. The room thus assumed the appearance of a storeroom, although all the material belonged to the mechanical department and not to supplies.

A man who had had previous experience in the storeroom, as well as in the shop, was placed in charge of this reclamation room under the supervision of the master mechanic. Another man was kept busy scrapping material, stripping good parts from junked material and making minor repairs. The latter man, with the assistance of the general foreman, determines whether or not worn parts that are brought in are worth reclaiming. When they are, they are taken to the department where the repairs are made, and then returned to the reclaiming room for reissue. A third man, who is an all-around mechanic, puts in a portion of his time in this department, making miscellaneous minor repairs.

A rule was made in the mechanical department that if any man in any department needs material or parts, he must first apply to the reclamation room to ascertain whether or not the material desired is to be had there. If not, the man in charge of the room has authority to write a requisition on the general storeroom. By this plan the general foreman is relieved of much detail work.

The establishment of this department has resulted in saving time in the reassembling of cars and in furnishing more accurate jobs. When cars are brought into the shop for overhauling all parts are removed, repaired and stored in this room. When the car is completed the same material is placed back on the same car, after, of course, it has had the necessary attention.

It is impossible to place a monetary value on some of the benefits derived from the establishment of this department, such as relieving the foreman of detail work and permitting him to give closer attention to other duties, relieving congested conditions in the storeroom and reducing the amount of clerical work in that department, and systematizing the use of material, both new and used. In some other respects, however, the saving in dollars and cents is quite apparent. A check made of the orders for March, 1923, showed that about 56 per cent of the calls for material were supplied by the reclamation room. But it is felt that the other benefits derived from it would be well worth while even with no saving at all in money.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association.

Repairs to Car Bodies Principal Expense Item in Railway Shops

FIGURES recently made public by the Department of Commerce show that nearly 80 per cent of the money value of work done in electric railway shops is expended in repairs to cars. In 1921 the sum of $69,131,546 was spent in this way. Repairs to motors, etc., was the next largest item, but the expenditure on this account amounted only to $7,226,905. A total of 177 cars, including passenger, freight and others, was built in electric railway repair shops, but the value of the equipment was only slightly more than $1,000,000. It appears that the railways are generally following the practice of using their shops for maintenance work and going direct to the manufacturer when they want new cars.

	1921	1919	1911	1909
Motive power and machinery departments:				
Repairs to motors, etc., value	$7,226,905	$7,081,735	$4,933,436	$4,004,396
Work for other corporations, value	$78,472	$75,182	$56,944	$88,070
All other products or work, value	$409,667	[1]$769,386	[2]$390,193	[3]$417,926
Car departments:				
Cars built — Passenger — Number	127	88	235	129
Cars built — Passenger — Value	$822,398	$635,770	$737,926	$498,709
Cars built — Freight — Number	2	46	11	63
Cars built — Freight — Value	$7,200	$95,638	$21,196	$59,102
Cars built — Other — Number	48	17	58	51
Cars built — Other — Value	$418,669	$30,885	$51,982	$68,941
Repairs to cars of all kinds, value	$69,131,546	$60,060,255	$27,628,802	$22,869,777
Work for other corporations, value	$1,249,497	$1,174,282	$441,323	$624,805
All other products or work, value	$3,900,209	$2,240,975	$2,204,814	$1,714,129
Bridge and building departments (shop work):				
Repairs and renewals, value	$420,445	$261,679	$199,751	$273,581
All other products or work, value	$96,497	$6,976	$234,676	$57,367
All other products and work not classified, value	$3,550,921	$2,777,938	$1,675,522	$1,285,818
Total value	$87,312,426	$75,210,701	$38,576,565	$31,962,561

[1] Includes value of 2 electric locomotives built.
[2] Includes values of 1 electric locomotive built.
[3] Includes value of 3 electric locomotives built.

Pouring the Concrete Track Base and Leaving Openings Under the Tie Plates

How the Concrete Is Distributed and the Under-Tie Openings Made with Shovels

Insuring a Bearing Under Steel Ties

Opening Is Left Under Ties When Pouring Concrete and After It Sets Space Is Filled in with Special Mix and Thoroughly Tamped

THE Cleveland Railway Company has worked out an improved method of placing concrete under steel ties in new track construction. There is always more or less difficulty, under the usual scheme employed, of getting the workmen to tamp the concrete under and around the steel ties to make certain of a complete bearing. Unless the operation of mixing concrete is followed very closely by continuous inspection, the workmen will make the mix too soft, in order to make it flow under the plates easily, and this reduces the strength of the concrete.

Under the new plan worked out by Charles H. Clark, engineer maintenance of way, a space about 1½ in. deep is left under the tie plate when pouring the concrete base, and this is allowed to set around the channels. After this has set for two or three days, the open space under the tie plates is filled in and tamped with power tampers, the material used being a mix of slag screenings and cement in the proportion of 1 to 3, slightly dampened.

While the concrete base is mixed in a power mixer, as shown in one of the illustrations, the slag screenings are mixed by hand as used. A Jackson electric four-tamper outfit was used for compacting the special mix under the ties.

The Concrete Base Is Permitted to Set in This Form for Two or Three Days

This new method of concreting the ties under the bearing plates increases the expense of construction slightly, but the assurance of having the ties in com-

Pouring the Concrete Track Base and Leaving Openings Under the Tie Plates

Closer View of Electric Tamping Tools Working Special Bearing Mix Under the Tie Plates

plete bearing more than justifies this added cost, Mr. Clark believes.

The new 102-lb. section 516 rail developed by the Cleveland Railway Company and laid with International steel ties is shown on page 1005 as installed on Quincy Avenue, Cleveland. The rails are given the standard tilt of 1 in 25.

Good Reports of Ciment Fondu Confirmed

Boston Elevated Railway Finds the Tensile Strength to Be Satisfactory at the End of Six Months— The Results of Tests Made in England Are Also Given

TESTS made by the Boston Elevated Railway to determine the tensile strength of Ciment Fondu at the end of six months showed a figure slightly lower than that obtained at the end of three months. The earlier experiments with this material, which is a quick setting cement, were described in the ELECTRIC RAILWAY JOURNAL for Sept. 15, 1923. It was noted at that time that the strength at the end of three months was somewhat greater than at the end of twenty-eight days, although it was not quite up to the strength shown at earlier periods. Although the reports now available show the cement at six months to be slightly weaker than at three months, nevertheless the tensile strength of Ciment Fondu appears to be holding reasonably constant. On the whole the company believes the tests so far made to be most satisfactory. Average figures for the results of these tests at each of the periods noted are given in the accompanying table.

TESTS MADE BY BOSTON ELEVATED RAILWAY

Tensile Strength 1 to 3 Mortar in Pounds per Square Inch

Fifteen hours	Twenty-four hours	Forty-eight hours	Four days	Seven days	Fourteen days	Twenty-eight days	Three months	Six months
302	360	393	457	472	500	413	469	458
280	340	386	445	507	520	455	448	429
315	372	375	482	478	490	433	460	446
Av. 299	357	385	461	486	503	434	459	444

Interesting experiments made in England with Ciment Fondu are described in the Oct. 18 issue of the *Tramway & Railway World*. The tensile strength of neat Ciment Fondu at the end of twenty-four hours was found to be 811 lb. per square inch, as compared with 91 lb. per square inch for neat portland cement of the same age. A mixture of 1:3 Ciment Fondu and sand developed a strength of 573 lb. per square inch at the end of twenty-four hours, whereas a similar mixture of portland cement and sand developed only 11 lb. per square inch. The Boston tests developed a strength of 432 lb. per square inch for neat Ciment Fondu at twenty-four hours. At the end of seven days in the English tests neat Ciment Fondu had a tensile strength of 1,003 lb. per square inch. Mortar in a proportion of 1:3 at the same age had a strength of 612 lb. per square inch. It will be seen that all of these figures are considerably higher than those obtained in the test made by the Boston Elevated Railway. This may have resulted from a variation in the methods of making the tests or in the material.

Tests were made to determine the crushing strength of 6-in. cubes of concrete in which Ciment Fondu was used. At the end of twenty-six hours a strength of 7,930 lb. per square inch was developed, and at the end of ninety days this had increased to 9,100 lb. per square inch. From records of previous tests of portland cement concrete at ninety days it has been determined that 5,000 lb. per square inch represented exceptionally good performance.

Heretofore Ciment Fondu has been used in the same proportion as portland cement, but experiments made in France indicate that it is in reality not necessary to use as much of the new material as of portland cement. The mixture used there consisted of 800 liters of gravel and 400 liters of sand mixed with 300 kg. of portland cement and with either 300 kg. or 200 kg. of Ciment Fondu. The cubes made with the portland cement at the end of three months broke under a load of 155 kg. per sq.cm., while at six months they broke at 163½ kg. per sq.cm. Similar cubes of Ciment Fondu at the end of three days had a strength of 324 kg. per sq.cm., or nearly double that of the portland cement concrete at the end of three months. At the end of three months this value had increased slightly. The weaker mixture containing 200 kg. of Ciment Fondu developed a strength at the end of three days of 242 kg. per sq.cm.; at three months 252 kg. per sq.cm., and at six months 257 kg. per sq.cm. This cement is now being used in construction work by the city of Paris, the P. L. M. Railway and the Ouest Railway.

Not only its quick setting qualities, but also the fact that a smaller quantity can be used as a substitute for portland cement, make Ciment Fondu a material of particular interest to electric railways for use in track construction.

The author of the article in the *Tramway & Railway World* says that once its practical advantages when used on a large scale are established it will have a revolutionary effect on concrete construction works of all kinds.

A Modern Electric Train in Cairo, Egypt

These Egyptian motor and trailer trains may not compare in capacity with American rolling stock standards, but they probably are superior in the speed with which they can be loaded and unloaded—judging by the number of doors rather than the characteristics of the people.

Good Results from Lettering Signs by Silk Screen Process

Details Are Given for Making Stencils and Frames, for Mounting to Save Time and Labor, for Applying the Color, Making the Squeegees and for Handling and Drying the Signs After They Are Lettered

ALL electric railways use signs in considerable quantities and must reletter them at quite frequent intervals to keep them in readable condition. In addition, the publicity campaigns which are now such an important part of the work of many railways require posters and cards in such quantities that careful attention must be given to their production.

Many methods for lettering are used by the sign departments of electric railways. A common one consists of first laying out the letters on cardboard and perforating this so that by forcing white lead through the perforation outlines of the letters are obtained on the sign surface. The letters are then filled in by hand. Where the same lettering is used in large quantities or at regular intervals stencils are frequently made with the letters cut out. Then by going over these with paint and a brush the letters are placed on the sign. With this method some lines are left on the letters which require filling in by hand as the center parts of the letters on the open stencil must be supported. This filling in by hand takes fully as much time as the stenciling.

Squeegeeing White Lead Through Silk Screen Stencil in Sign Lettering Work

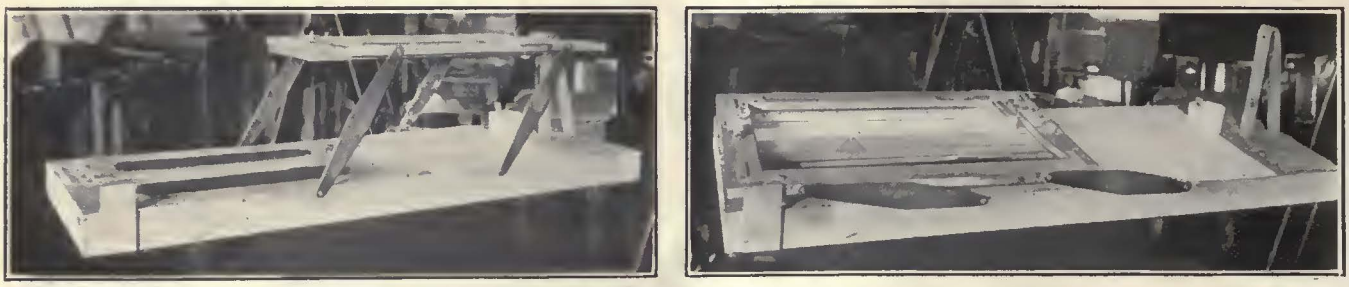
To overcome some of these difficulties and reduce the time and labor for lettering, the silk screen process has been developed. It has several advantages over the stencil and hand process. There is a marked saving in the time required to complete a job, and as the lettering produced is built up, it has a far higher visibility than ordinary brush work.

The silk screen process consists of using a stencil of silk with the letters or designs laid out on it and the outline around the design filled in with a "cut-in" solution, so that later in using this as a stencil the paint used for the lettering or design will not pass through the silk where the solution was applied. This process is now being used by a considerable number of electric railways, among which are the Los Angeles Railway Corporation, the Pacific Electric Railway, the Brooklyn-Manhattan Transit Corporation, the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis Street Railway. Most of the problems which have arisen in connection with the system have been solved.

The equipment for lettering signs by the silk-screen process consists of the silk stencil stretched on a substantial frame; a mounting to hold different stencils so that they can be quickly placed over the sign while it is being lettered, and raised again so as to insert another sign, and the squeegee for forcing the paint through the stencil and onto the sign. Practices found successful for cleaning the silk, fastening it to the frame, making the frame, filling in around the letters on the screen, and mounting for rapid handling follow. The practice used in the shops of the New York Rapid Transit Corporation for maintaining signs by this process is given as a definite procedure which has worked out satisfactorily.

Various materials have been tried as the fabric on which the design is laid out in this process, but silk bolting cloth has proved preferable to other fabrics. The mesh runs straight, retains its shape and is uniform and even. Considerable strength is also required in order to withstand the strain of squeegeeing the paint through the fabric, and silk bolting cloth holds up exceptionally well. Kress & Company, Brooklyn, N. Y., have made a special study of the desirable characteristics for a bolting cloth to be used with this process and are furnishing much of the material used at the present time.

Before laying out the design, the silk is stretched upon a wooden frame in a manner quite similar to that



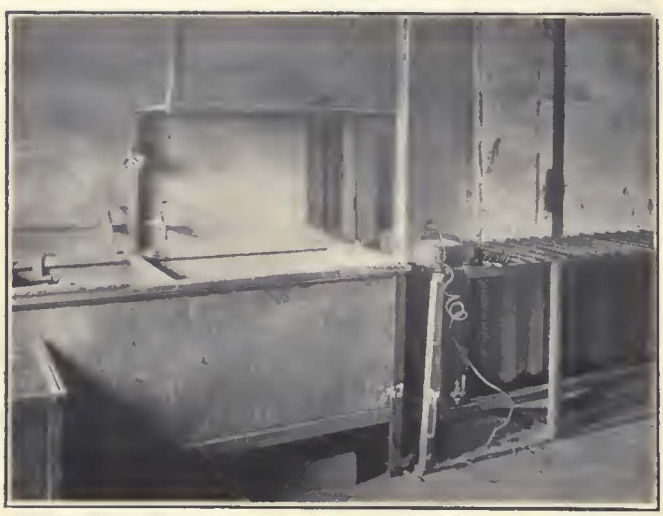
Framework for Supporting and Operating Stencil
At Left—Raised position with signs in place. At Right—Stencil lowered, ready to receive white lead.

used by artists in attaching canvas. The frame should be made a few inches wider than the size of the design to be reproduced. Some additional space is necessary to hold the paint during the operation. The frame should be made in a particularly substantial manner and well-dressed strips approximately 3 in. x 3 in. have been found quite satisfactory. The corners should be mitered and corner irons used to keep the frame in shape. It is essential that the surface of the silk screen be flat, and so of course the frame must touch on all four sides if properly made. The actual dimensions of the frame will vary with the size of the design to be lettered.

An accompanying illustration shows several signs as used by the New York Rapid Transit Corporation, which vary in size from that necessary for a single destination sign to frames about 2 ft. x 3 ft. used for lettering routing and destination signs for operation involving a large number of routings.

Preparing the Screen

After the silk is stretched tightly, it is quite essential to cleanse it and make certain that all grease or other foreign matter is removed, which may get onto the silk during the mounting operation. This can be accomplished by saturating thoroughly with either hot water, alcohol or benzol. The letters or design are then laid out on the screen. Usually, this can best be accomplished by laying out a sketch on some convenient material and then by laying the frame face down against this sketch, so that the letters can be traced upon the silk with a lead pencil. The traced design is then cut in by either leaving the silk mesh solid and the lettering open or by painting in the design or lettering solid and leaving the mesh open, it being understood that the open portions are the ones through which the paint is forced. A cut-in solution which has proved entirely satisfactory consists of ½ lb. of English drop black dry, or bone black dry, dissolved in a quart of good orange shellac, with a tablespoonful of castor oil or other essential oil added to make the shellac pliable so that it will not chip out under the squeegeeing process. The New York Rapid Transit Corporation uses a tablespoonful of powdered black and 1 oz. of glycerine to a gallon of orange shellac. The cut-in solution will thicken while using and can be thinned by the addition of ten parts of alcohol and two parts of castor oil. A pyralin or liquid celluloid solution is sometimes used, but this is not as dependable as the one just given, as it is necessary to coat both sides of the silk. This pyralin mixture, however, is of particular advantage where it is desirable to clean out the screen for other use. This latter solution is made by mixing pyralin red No. 65/5 with a very small quantity of Du Pont thinner No. 12138. A black solution is made by mixing pyralin black No. 67/2 in the same manner. Celluloid solutions are highly inflammable and it is essential to keep them away from open flames.



Equipment Used for Removing Paint and Washing, Dipping and Drying Steel Signs

The potash cleaning tank is shown at the extreme left. Signs are washed in the tank in the center and are then raised to the racks immediately overhead for drying. When thoroughly dry they are dipped in the small tank at the right end of the washing tank. This contains body color for the flat surface of the signs. After this dipping they are placed in the racks at the right for drying.

The cut-in solution is best applied by a small camel hair or sable brush. When working on a flat surface, a bridge or hand rest will be found of advantage. When the design is finished, the frame should be raised about half an inch, so that the silk will not touch the top of the table or bench. Strips tacked temporarily to the end of each frame will give the desired effect. These should be removed as soon as the screen is coated with the cut-in solution. It is almost impossible to coat in with the solution around the edges where the screen rests against the frame. A satisfactory method for protecting these places is by the use of paper glued on and then shellacked. A lining of paper 4 or 5 in. wide can be glued to the inside of the frame so as to extend down over the face of the screen. Several strips of very thin paper will be found to work more satisfactory than a single sheet of thicker paper.

Mounting of Frame Essential

When the frame with screens has been properly assembled, the next essential is an additional mechanism for holding the frame and for moving it into and out of position quickly. For the smaller sizes of frame some sort of a hinged mechanism has proved very efficient. An accompanying illustration shows the mechanism used by the New York Rapid Transit Corporation for holding the smaller sized frames which are

used for lettering the steel destination signs in its elevated cars. This framework is of 3-in. x 1-in. wood and is about 3 ft. long by 2 ft. wide. Two strap iron hinges are fitted to either side of the portions which hold the printing frame. The other end of these hinges is attached to the supporting base. The frame can thus be raised and pushed back out of the way while the sheet iron sign is being reversed or a new one placed in position.

Two small handles on either end assist in the operation. The frame which holds the silk stencil is fastened to the movable part of this framework by two hand screws, so that where it is necessary to change frames, this can be accomplished very rapidly. The entire operating mechanism is arranged so that it can be placed on a table or bench for support, which will bring it to a convenient height for rapid operation. The supporting base has a sheet iron stop at the rear end, which prevents the frame from being pushed back too far when in the raised position.

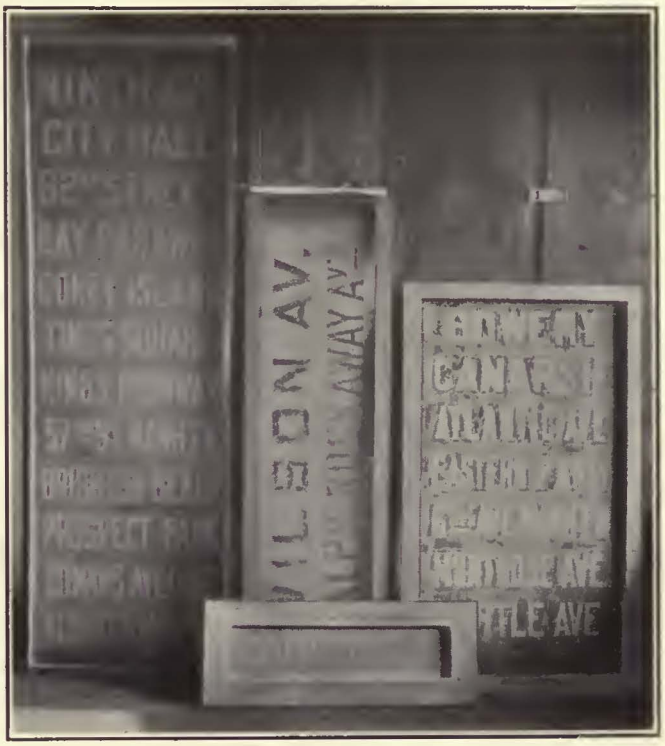
The supports for the signs to be lettered, of course, will vary with different types. For the sheet iron signs just referred to, a wooden framework is made, so that the signs are supported at the edges. This is essential as both sides of these signs are lettered, and after one side has been lettered it is placed with the lettered side down, so of course it is essential that this does not rest on anything that would smear the lettering.

How Signs Are Maintained

As this type of sign is used in large quantities, it is necessary to reletter at intervals. The facilities for handling this maintenance work and carrying it on rapidly are particularly interesting. When the sheet iron signs are received for relettering the first operation is to clean and remove the old paint. This is done by placing them in a potash solution over night. The potash tank is installed at one end of the room and the signs are hung on rods by wire hooks. These rods have small grooves so as to keep the signs spaced the required distance apart. Fourteen signs are thus handled at one operation. A large quantity are placed in the tank, and after the paint is loosened it is washed off in a washing tank, which is adjacent to the potash tank. A small overhead traveler is arranged with pulley, so that the rods with the signs attached can be lifted out of one tank and placed in the next. After washing, they are raised just above the washing tank to a wooden framework, on which they are allowed to remain while drying. Just at the end of the washing tank is a dipping tank, which contains the flat body color. When the signs are dry, they are dipped in this tank and then placed on the drying rack. This rack is made of angle iron and the round cross-rods which support the signs extend from one side to the other, while the signs hang down in between. Signs are taken from the drying rack after dipping and are placed in the frame for lettering by the silk screen process. After they are lettered they are dipped in varnish, and after drying are ready to be sent out.

The use of the silk screen process for this class of work has resulted in marked economy on this system. The lettering is now done on a piecework basis and the labor rate is 2¼ cents per sign. Previous to the installation of this system, the lettering of ten signs was considered a day's work for one man, and the average cost per sign was in the neighborhood of 65 cents.

Several other arrangements are used by different railways for holding and operating the frames with the silk stencils. Another type used has hinges placed at one end of the frame, and the frames are raised by having a pulley attachment to the wall over which a small rope operates with one end attached to the frame while the other has a small weight. The weight raises the stencil frame after the sign has been lettered and while it is being removed for the insertion of another one.



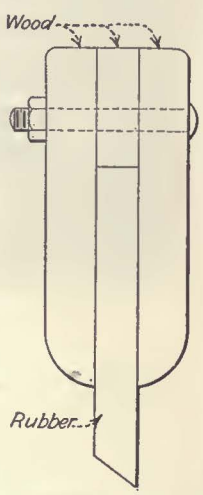
Several Sizes and Types of Silk Screen Stencils

In some cases the frames are made larger than is necessary for the signs to be lettered, and various sizes of signs are used with the same frame by tacking ½-in. strips on top of the bench to serve as guides holding the signs in position. Some sort of accurate support is quite essential in order to make the stencil register accurately with the sign to be lettered.

The paint used for lettering is forced through the silk screen by means of a squeegee, and an accompanying illustration shows the construction of such a squee-

Lettering a Long Routing and Destination Sign by the Silk Screen Process

gee which has proved satisfactory. This consists of a sheet of rubber about ⅛ in. thick clamped between two blocks, with a spacing block at the top. A medium grade of hard rubber is best. This should be cut into a strip about 4½ in. wide, and for single signs it should be a little longer than the width of the design to be lettered. For signs having a large amount of lettering, a squeegee about 12 in. long will be found to be of convenient length and about as long as can be handled readily. In placing the rubber between the boards, it should be allowed to extend about 2 in. outside. The side pieces can best be held in place by two bolts. This method of construction permits of removing the rubber when worn down or for trimming off or sharpening. The edges of the rubber should be beveled and the extended edge made sharp, as it is this edge that is drawn over the side of the frame so as to force the paint through the screen. Careful cutting is quite essential in order to provide an efficient squeegee.



Squeegee Used with Silk Screen Method of Lettering

For white letters, white lead mixed with turpentine and oil is generally used. A small quantity of this is placed along the edge of the frame farthest from the operator. By drawing the squeegee across the screen the paint is forced through onto the sign and so letters it. After drawing the squeegee across the frame in one direction, it is usually found most convenient to draw it in the opposite direction for the next operation, as this makes it unnecessary to scoop up the paint from one end and place it on the other end.

After finishing a job the stencil should be well cleaned. All surplus paint can be removed by a stiff card, and by pouring a small quantity of kerosene or gasoline into the stencil the paint in the screen can be removed by rubbing with a soft cloth. The operation should be repeated until the cleaning is satisfactory, when both sides should be dried carefully. Some roads find that a mixture of equal parts of kerosene and gasoline makes a good cleaning preparation.

Using Large Frames for Curtain Signs

The New York Rapid Transit Corporation uses the silk screen process for lettering its routing and destination signs, which have thirty-one readings on a single sheet. These sheets are lettered on both sides, using 3-in. letters with a 3-in. space on one side and 4-in. letters with a corresponding space on the opposite side. For lettering one of these complete signs, three frames with silk stencils are used. These frames are 26 in. wide by approximately 6 ft. long. Black linen is used as the material for these signs and the lettering is of white lead. The linen is laid on a long table and the lettering is done by beginning at one end and preceeding progressively. One frame is placed in position at a time and the edges of the table are marked so as to insure that the frames register properly with the sign. After the signs are lettered, they are dried by placing on drying racks, which consist of pipe extensions from the wall, so arranged that the signs can be supported on these to insure no interference while drying.

The silk screen process has proved to be very successful for special designs and illustrations, such as are used in publicity campaigns. The particular advantage in using this rather than an engraving or lithographing process lies in the low cost where small quantities are needed. For doing work of this nature it is necessary to prepare a sensitized screen. The original design or lettered copy is traced in black on a transparent surface, such as glass, celluloid, tracing cloth or tracing paper. The cloth is stretched over its supporting frame and after being cleansed the sensitized solution is poured on at one side, so as to cover the mesh entirely. By having the screen at an angle, the solution gradually flows over the surface. This photographic negative is placed with the printing side down on the screen and a heavy piece of glass is placed over this. Then by holding the screen in close contact with the negative, it can be printed the same as in regular photography, by exposing to the sunlight for about twenty minutes. The screen is then washed out by flowing water over both sides. The portion that is protected from the sun's rays will wash out completely, leaving the sun-fixed portions which are insoluble. The printing is then carried on in the same manner as already described.

Where multi-colored reproductions are desired, a separate screen for each color will be needed. The different frames should be prepared of exactly the same size, so as to insure perfect register, and the tracings are prepared by sketching in each color separately on the different screens.

Concrete Cuts Paving Costs*

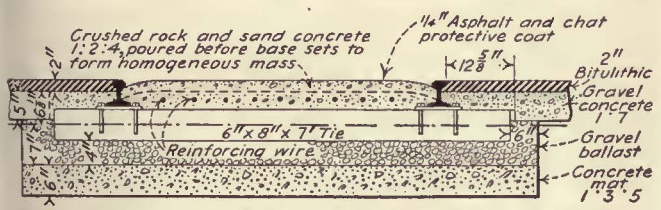
THE use of concrete for paving between the rails, regardless of the type of pavement used on the rest of the street, has saved the Northern Texas Traction Company, Fort Worth, 50 per cent of the first cost of the work and has at the same time reduced the amount of upkeep required. The franchise of this company states that the railway shall pave between its tracks with the same kind of pavement as is used elsewhere on the street. In the past this practice has resulted in a large amount of unsatisfactory paving being placed between the rails. Moreover, the maintenance of this

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.


This Concrete Paving Between the Rails in Fort Worth Cost Only Half as Much as the Paving Elsewhere on the Street

unsatisfactory paving has been very costly. In reconstructing some track recently, preparatory to paving the street, the company sought permission from the city to place concrete paving between the rails, and in spite of objections from the paving contractor permission to do so was granted.

The cost of the paving which the contractor intended to lay would have been about $2 per square yard. Experience has shown that the maintenance cost of this type of paving after it was laid was high. The company therefore told the city officials that it was tired



Cross-Section of Fort Worth Track Construction with Concrete Pavement. A Wire Net Is Used for Reinforcing

of paying out large sums for the first cost of such paving and later for its upkeep, and promised to lay a better paving of its own between the rails at a cost of only $1 per square yard, with practically no maintenance after the job was finished.

The first step in laying the railway's pavement consisted in bringing up the concrete to within ¼ in. of the top of the rail. About 2 in. below the surface the concrete was reinforced by wire net reinforcing. After the concrete had firmly set the surface was given a coating of tar and chat as a finish. It is predicted by the company that this paving will outlast by several years the bitulithic paving used on the rest of the street.

Track Relaid Amid Heaviest Vehicular Traffic

The Original Rails Laid in 1898 on Broadway, New York City, Were Replaced Under Conditions of Unusual Difficulty

A COMBINATION of circumstances made particularly difficult the job recently done by the Third Avenue Railway, New York, in renewing the rails on Broadway from Forty-fifth Street to Fifty-ninth Street. This area includes the Longacre Square theater district, which is reputed to have the heaviest vehicular traffic in the world. In spite of this fact the work had to be done during the daytime because there are a large number of hotels in this vicinity and they would not tolerate the noise of track reconstruction work at night. A headway shorter than two minutes is operated on Broadway and it was necessary to remove each rail and replace it by a new rail in the interval between cars. With the underground conduit type of construction in use there it was not feasible to switch cars onto another track while this work was in progress.

Another difficulty arose from the nature of the original construction work. The old rail was that laid in 1898, when the first electric car line on upper Broadway was electrified. The foundation was continuous between the yokes and was built with an extremely rich concrete mixture. Considerable difficulty in making even minor repairs had been caused by the solid nature of this foundation. This was one of the factors, however, which made it possible to postpone renewal work and to continue the use of the old rail until a short time ago.

The work done on the present job consisted of removal and replacement of the paving, excavation of a sufficient depth of the old concrete to permit removal of the old rails and the longitudinal timber stringers on which they are supported, in case it was necessary, and the renewal of the track rails.

Knowing the difficulty of the job it was undertaking and the necessity of getting through as speedily as possible the railway assembled an unusual amount of apparatus. A specially mounted new air compressor, built by the Chicago Pneumatic Tool Company and having a capacity of 350 cu.ft. per minute, was used for the first time. In addition to this there was also an older compressor, having a capacity of 150 cu.ft. This made possible the simultaneous operation of nine compressed air drills, six on the large machine and three on the small one.

The southbound track was relaid first and then the northbound. Only two blocks were open at one time. While the excavation of one block was in progress, new 9-in. grooved girder rail was being put down in the block behind. This in itself was no small task with the short headway on the route, but service was not interrupted for longer than a few minutes on account of the track reconstruction. As soon as the new rail was laid the excavation was concreted ready for the asphalt pavement, or else temporarily filled in so that traffic could pass.

In many cases the digging had to go down to depth of 16 in. or more. This was necessary in order to cut free from the concrete the timber supports which run lengthwise under the rails. It was found that where "dutchmen" had been put in at the joints the supporting timbers usually were cut up. The amount of timber replacement averaged about 3 ft. for each 60 ft. of rail put in. The slot rail was not renewed.

This was the first job on which the 350-cu.ft. capac-

A 350-Cu.Ft. Compressor Was Employed to Expedite Track Reconstruction Work on Upper Broadway, New York

ity air compressor was used and it proved to expedite the construction greatly. The new machine proved to be very reliable and operated continuously for many hours each day without a single shutdown. Under ordinary circumstances a machine of this capacity would hardly be needed, but where an asphalt pavement had to be taken up and a solid concrete foundation excavated the greatest possible number of pneumatic drills was necessary. By the use of the new machine, together with the older one already mentioned, and a large gang of experienced track men, it was possible to complete the job of 3,500 ft. of double track in seven weeks.

The Readers' Forum

Insurance Men Want to Help Reduce Premiums

WESTERN ACTUARIAL BUREAU

CHICAGO, ILL., Dec. 7, 1923.

To the Editors:

Your editorial on fire prevention in the issue of Dec. 1 was more than of passing interest, in that you have hit upon the key to lower insurance costs to street railway companies.

You may remember from the articles which appeared in your paper, some time since, covering the East St. Louis & Suburban Railway and the Tennessee Electric Power Company, that quite a material saving in fire insurance premiums may be enjoyed through proper attention to even ordinary fire protective precautions.

That the fire insurance companies are willing to co-operate in this work is evidenced by the fact that in many insurance jurisdictions special men or separate departments are maintained to handle just the electrical properties.

Keep up the good work. We are with you in any effort put forth to help in the fire prevention work on street railway properties. JAMES S. MAHAN.

Further Suggestion on Reducing Number of Car Parts

DEPARTMENT OF COMMERCE
OFFICE OF THE SECRETARY

WASHINGTON, D. C., Dec. 5, 1923.

To the Editors:

Your idea of approaching the storekeepers in promoting simplification of car parts is a splendid one. They ought to know what excessive diversity means in increased inventory, increased investment, increased carrying charges, greater depreciation and obsolescence, as well as extra space required, and the ever-present difficulty of always having on hand plenty of what they don't want and never enough of what they do want.

One major advantage of simplified practice is that it can be applied by purchaser as well as by manufacturer. Why should an electric railway company carry in its stores ten, or even five, different varieties of the same thing if their requirement can be amply covered with one or two? The steam roads have been doing some effective simplification of stocks recently, and in the past two and a half years forty of the large roads have reduced their total stores investment from $480,000,000 to $300,000,000, or 37½ per cent. At the same time, they have cut their stocks on hand from six months' to three months' supply, and find that they can give good service on that minumum through the better co-ordination of purchasing and delivery schedules.

In the automotive field we know of a certain large garage company which, by simplifying its equipment to one make of motor trucks and one make of passenger cars, reduced spare parts stock from 20,000 to 5,000 items, reduced varieties of tires, oils, greases, etc., decreased stockroom space, personnel and investment; also secured better prices in purchasing, and reduced costs (not including pay of drivers) 2 cents per mile in 1922 over 1921 and 5 cents per mile in 1922 over 1920.

Isn't there something in these examples for the electric railway companies? If, coincident with their efforts to induce more people to ride, they applied simplified practice, i.e., the elimination of superfluous varieties, to their purchases, etc., wouldn't the combination prove a paying one?

Simplified practice means the reduction of variety in sizes, dimensions and immaterial differences of everyday commodities as a means of eliminating waste, decreasing costs, increasing profits and values in production, distribution and consumption. It is not standardization! Instead, it is often the forerunner of standardization, for by eliminating unnecessary varieties the way is cleared for that concentration on the varieties remaining which permits the development of standards that are real standards. Simplified practice is a measure which can be applied with immediate benefit and with accruing advantage during the usual long evolutionary period required in producing a standard.

The survey you propose to make will, we believe, bear out these statements. We will be eager to hear your findings and conclusions. If we can be of further help to you, let us know. Meantime, the best of success to you. You have started a well worth while movement, and we are very confident many of the companies will warmly respond to your suggestion as to how they may apply simplified practice to advantage in their big problem of lowering operating ratios.

DIVISION OF SIMPLIFIED PRACTICE,
BY R. M. HUDSON.

[For previous discussion of this subject see ELECTRIC RAILWAY JOURNAL for Oct. 27, page 744, and Nov. 17, page 845.—EDS.]

Large Letters on Dash Sign Distinguish Routes*

CARS which operate on different lines of the El Paso Electric Railway and running in part over the same streets are equipped with special car destination signs, 16x24 in. on the dash, in addition to the regular illuminated sign carried on the hood. These signs are differently colored for the different lines, and the line is designated by a large letter such as P for Park and V for Val Verde, as shown in the illustration.

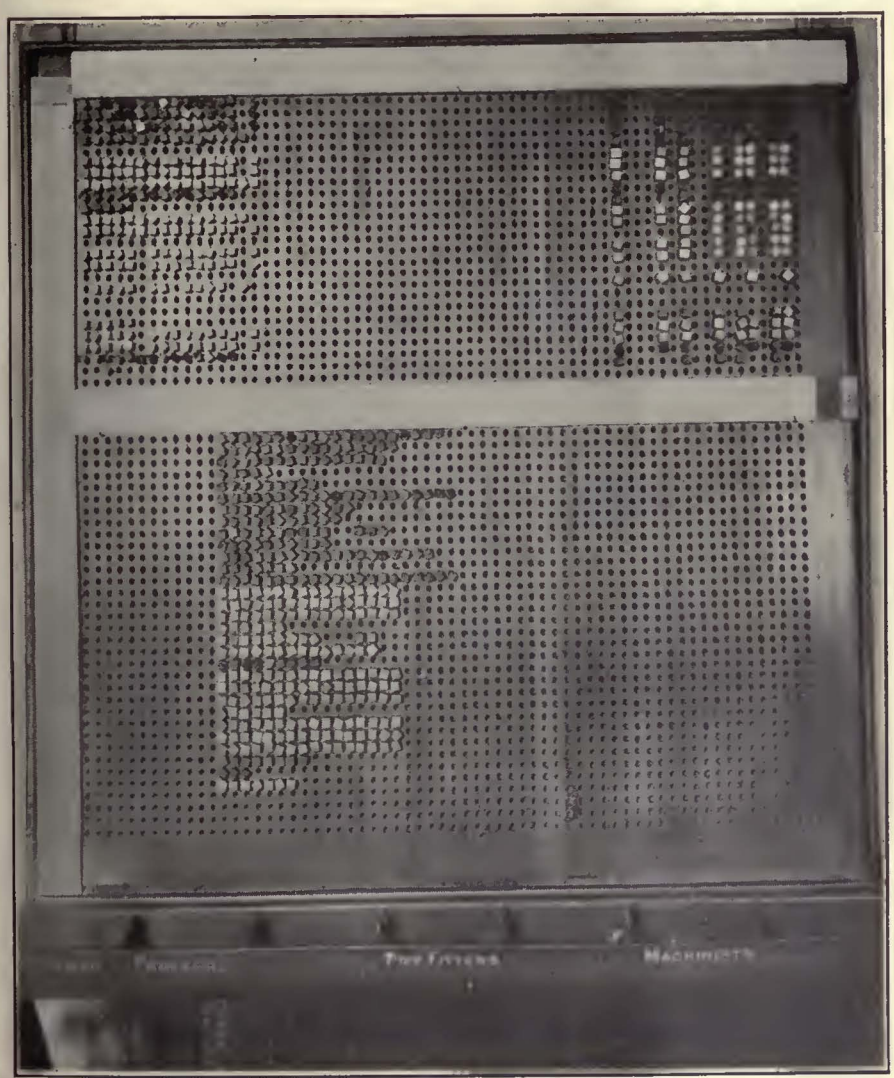
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Equipment Maintenance Notes

Board Shows Progress of Car Overhauling

THE accompanying illustration shows a progress board which is installed in the office of the superintendent of rapid transit shops of the New York Rapid Transit Corporation at Thirty-ninth Street, Brooklyn. This is arranged to show the progress made in overhauling cars by the different departments through the use of pegs which are placed in holes on the board. The board is about 4 ft. x 4 ft. in dimensions and has the various holes arranged in rows and columns. Car numbers are placed at the top of the board and opposite each row at the side is a designation of the type of work to be done, such as stripped, gates removed, seats inspected, hand straps inspected, floor repaired, doors inspected, foundation brake rigging overhauled, shields over resistance repaired, etc.

The board is divided into two parts the upper section being used for elevated cars and the lower section for subway cars. Each class of work is designated by a different colored peg—blue is used for wiremen, yellow for painters, green for the truck department, white for pipe fitters, red for riggers, light blue for machinists and black for the carpenters. Seven pockets are provided at the bottom of the board for holding the pegs. When a car is received in the overhauling shop the clerk places the car number at the top of the board, and as soon as the particular class of work is finished the foreman puts a peg in the proper location to indicate that the work is completed. The progress of the work can thus be seen at a glance not only by the superintendent of rapid transit shops and his assistants but by each individual foreman. They can thus see what class of work is behind and bring proper pressure on those responsible so that the work will be turned out promptly. The working of the board is entirely automatic, as each foreman places the pegs in position, and at the same time looks over the record of work so as to see which cars are ready for his men. The board has also proved an incentive to each foreman to keep a record of the work in a small notebook. Previous to the use of this the general superintendent had particular difficulty in having each individual foreman keep a record of the dates that work was done on various cars, but with the use of this board the foremen place a record in their notebooks so that they can peg up their work each morning, in order to show its progress. When the work on a car is completed and leaves the shop the clerk removes the pegs from the column under the car number and removes the car number.



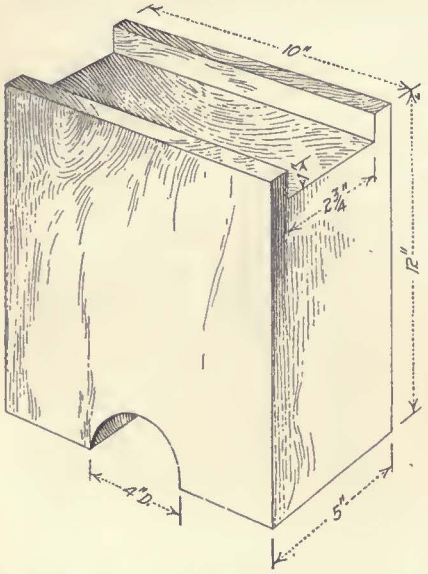
A Distinctive Colored Peg Designates Each Class of Work in Overhauling Cars

Wooden Journal Box for Skidding Truck

AFTER a truck has been dismantled it is often necessary to move the frame about the shop for repairs. This of course can be accomplished by means of an overhead crane. However, "skidding" a truck around on pairs of wheels is an easy method. As this requires the replacing of the four journal boxes and brasses it is looked upon as rather an arduous task. A device worked up in the shops of the Metropolitan West Side Elevated Railway, Chicago, facilitates this work by eliminating the placing of the journal boxes and brasses.

A pine wood block, cut to fit the pedestal jaws, of such height that the center of the axle will be in its nor-

mal position, is used. The truck is lifted, a pair of wheels rolled under and these wood blocks inserted in place of the journal boxes. With grease on the bearing end of the box, a truck may be skidded about with ease. As a safeguard against

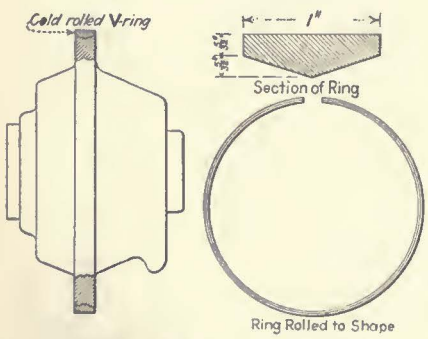


Wood Block Used in Place of Journal Box, for Mounting Truck on Axle, to Skid Truck About Shop

the block sliding out of position, a groove is cut in the upper end 3¾ in. wide and 1 in. deep to receive the truck frame member. The block itself measures 12 in. long, 10 in. wide and 5 in. thick, and besides having the groove to receive the truck frame at the one end, it has a semicylindrical groove at the other end to receive the axle bearing.

Building Up Worn Armature Housings

CONSIDERABLE wear occurs between the bearing surface of armature housings and the frames of split-frame motors. A method of renewing the wearing surface of housings is used at the West Shops of the Chicago Surface Lines which is very simple and can be carried out without much cost. An accompanying illustration shows the method. The worn head is turned up with a V-shaped groove and a ring of cold rolled bar stock is fitted into this. The section of the groove and the shape of the ring used are shown in the accompanying drawing. The ring is formed of ordinary steel plate with an opening so that it can be sprung into place on the armature housing, and, of course, it is held firmly in place by the two halves of the motor shells when these are fastened together. By this arrangement repairs are carried out at small expense. Drilling for screws is unnecessary and the adding of metal by welding also is not required. When the ring becomes worn it can be removed and readily replaced.



Method of Building Up Worn Armature Housing and Section of Cold Rolled Steel Ring Used

Weed Whipper Reduces Danger of Accidents*

ONE of the problems of the track department of the Northern Texas Traction Company, Fort Worth, is to keep the grass cut below the level of the rails on interurban lines. This is particularly important because grass on the rails makes it difficult to stop cars in an emergency. To accomplish this without a great deal of waste of time and labor, the company has built a single-truck service car with an end cab, equipped with a stationary motor on the deck. This motor drives a shaft suspended just above the rails and in front of the truck. The shaft, which is of 3-in. diameter, is bored with one-half inch staggered holes 2 in. apart, through which 24-in. sections of steel cable are thrust. The latter are held in place by seven screws. With this equipment it is possible to cut an average of twelve miles of grassy track per day. Its use has made it possible to keep a neat appearing right-of-way and at the same time to reduce the accident hazards by keeping the grass off the rails.

Steel Cable Sections Fastened to a Rotating Shaft Cut Weeds from Between the Rails

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

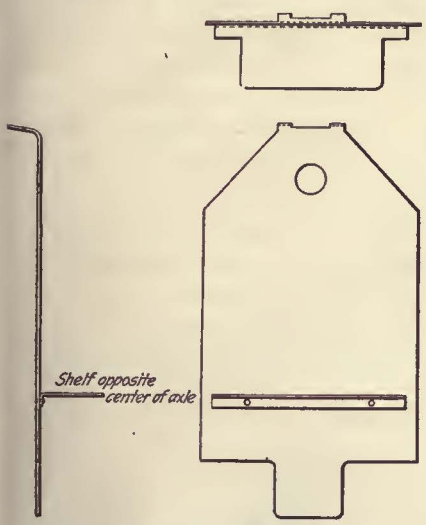
Keeping Waste Under Journals

A COMMON type of journal box cover is held in place by a single bolt at the top, about which it rotates, while a spring between the top of the cover and the bolt gives the required tension to hold the cover in position. Trouble is frequently experienced by the waste in the journal box working forward and forcing the cover out of position. This allows the waste to hang outside the lower part of the journal box and oil is thus fed out of the box leaving the rear end empty. This results in hot bearings.

The accompanying illustration shows a bent sheet-iron plate attachment to fit inside the journal box cover and hold the waste in position under the journal. This design was originated by H. C. Mason, lubricating engineer for the Texas Oil Company. A shelf or lip is provided on the bent plate attachment which projects inward toward the axle. When in place the working of the waste forward under this shelf holds the cover more firmly in position, and with the journal properly packed this shelf will press on the waste and hold it under the journal, and the

waste cannot get out or change its position. It is also impossible for the cover to change its position to any extent, as the attachment comes in contact with the housing and prevents it.

In the usual maintenance of waste in bearings it is quite common practice to force the waste in place up against the journal, at frequent intervals by a packing iron as the waste works forward. Every time that the oiler uses the packing iron it cuts some of the threads of the waste, which decreases its value as a medium for conveying oil to the surface of the journal to be lubricated. Also, if proper care is not exercised the waste may be pressed so hard that the oil will run out the back end and on to the wheel, so as to cause the housing to overflow. By using this attachment it is unnecessary to press back waste at such frequent intervals, so that there is a considerable saving in labor and a reduction in the amount of oil wasted. The device is a good insurance against hot journals.



Bent Plate Attachment to Journal Box Cover for Retaining Waste in Place Under Journal

Lighting the Fare Box on One-Man Cars*

SINCE the development of the one-man car, the necessity of some better kind of illumination near the fare box for the convenience of the operator, so that he could more readily punch transfers and make change, has been realized by railways. Also, with the ordinary lighting, it is sometimes difficult to see whether or not the proper fare has been deposited in the box. The El Paso Electric Railway has equipped one car with a lighting unit as shown in the accompanying illustration. A condulet of the VD-33 type was installed on the fare box stanchion, making a shade to cover the light globe and cutting an inverted V on the edge of the shade so that the light would reflect into the fare box. The operators were so well pleased that this device is now being used on all of the company's one-man cars.

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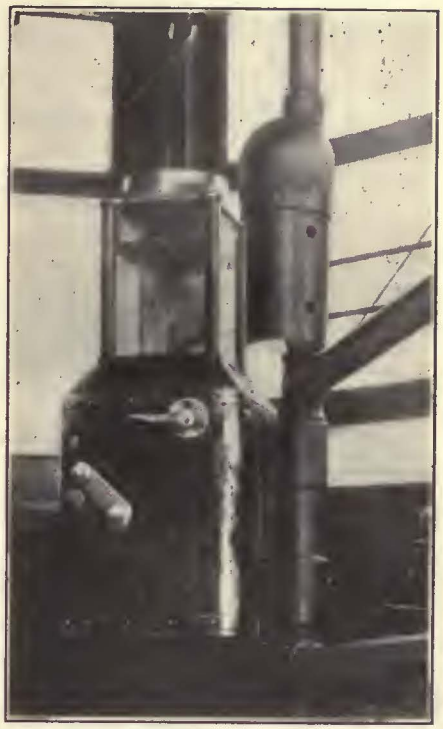


Adequate Light Is Directed to the Fare Box by Means of This Unit

A Ray of Light Strikes the G. M.

AN air of gloom pervaded the machine shop of the Jinxville Railway on this December morning. There was no sensing of the Christmas cheeriness on this day. The rain was beating down outside and Ole Olsen, Dick Singer and the rest were trying to do their work with the aid of a few dingy carbon-filament incandescent lamps, which hung by long cords from the ceiling. It was enough to give anybody the blues. Even Singer, usually referred to as "Whistlin' Dick," was glum.

Into this depressing atmosphere William Redfield, the general manager, brought a visitor, a lawyer from West Virginia.

"Hello, what's this dark hole?" asked the visitor, as they stepped in.

"Machine shop, Sam," replied Redfield; "it is a bit forbidding, but it's a dark, wet December day outside; you can't expect much brilliance on a day like this."

"I suppose not, William; not being a railroad man I don't feel like criticising. I'm a lawyer, though, and handle a lot of accident cases. I'll bet it would cost you a pile of money if one of your men got hurt from not being able to see clearly.

William Redfield, general manager of the Jinxville Railway, gets a tip from a lawyer friend from the South. Decides a few things can be done to brighten up his machine shop with a view to the comfort and safety of the men and improvement in the work.

"Our men don't complain, Sam; but now that you've called my attention to it the place does look mighty dark."

"I'll say it does, Bill. I don't see how you expect to turn out good repair work in a shop like this. Seeing your shop reminds me, by contrast, of one down where I live, in Huntington. Say, old man, that's one of the most cheerful places you can imagine. Our little railway is a crackerjack, anyway; but the shop is one of the best parts of the outfit. You ought to have a look at it. The walls are all coated—some kind of a shiny paint—and the windows are big enough to let in some light. Then for dark days they've got some worthwhile lamps. Of course, you'll say I'm always boostin' Huntington. Well, it's worth it. If I didn't know you so well and what you've done in a little over a year to rejuvenate this run-down property I wouldn't say anything. I know you won't take this amiss. No charge for the advice either. I usually collect about $25 for a suggestion like that."

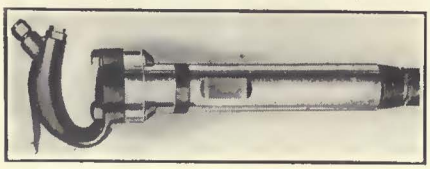
"No harm done, Sam, and maybe some good. You've opened my eyes a bit. I see several things we could do here for a little money. We could get some good paint on the walls; we could hang some decent fixtures and lamps; we could put in two or three skylights, and we could clean our windows. Bill Jones, our foreman here, is a good fellow but kind of slack. I'll put him wise to this matter and I think the men will appreciate it. Let's go over to the paint shop. It's more cheerful over there."

New Equipment Available

New Type Riveting Hammer

THE Ingersoll-Rand Company, New York, N. Y., has developed a new type of pneumatic riveting hammer with many added improvements. The outstanding features of this new riveter include bolted construction for holding the handle to the barrel, heavy section valve with liberal bearing surfaces, combination poppet and piston type throttle valve, power in excess of ordinary requirements, low air consumption and easy operation.

The new hammers are manufactured in three styles, A, B and C,



Rivet Hammer with Features for Easy Handling

and are available in a complete range of sizes from a 5-in. to a 9-in. stroke. Each size of this riveter can be purchased with any one of three types of barrels and with either outside or inside trigger handles.

The standard "A" type has a barrel machined to accommodate a rivet set clip only; three alloy steel bolts, fitted with lock washers, hold the handle to the barrel. This enables the hammer to be taken apart anywhere for inspection or cleaning with the aid of only a wrench; no vise, crowbar or other tools are necessary.

The throttle valve, except on inside trigger handles, is a combination of the piston and poppet types, having the control of the piston valve and the freedom from leakage of the poppet type. The beveled seat will remain tight and prevent leakage. The throttle lever or trigger is made in one piece from special heat-treated spring steel and has a long bearing in the handle, making it capable of withstanding abuse. The control is sensitive, ranging from a light tap to a heavy blow, entirely at the will of the operator.

The valve is a sleeve made from special alloy steel. It has liberal bearing surfaces and its walls are free from holes or ports which so often are the starting points for checks or cracks. It operates in a valve box of strong construction, located in the head of the barrel. The valve box is constructed with a solid end which enables it to be easily taken apart by the use of a piston for the removal of the valve, without recourse to the use of a screwdriver or similar instrument. This construction also insures a compression chamber in the valve box which cushions the piston on the return stroke and prevents the piston from striking the handle.

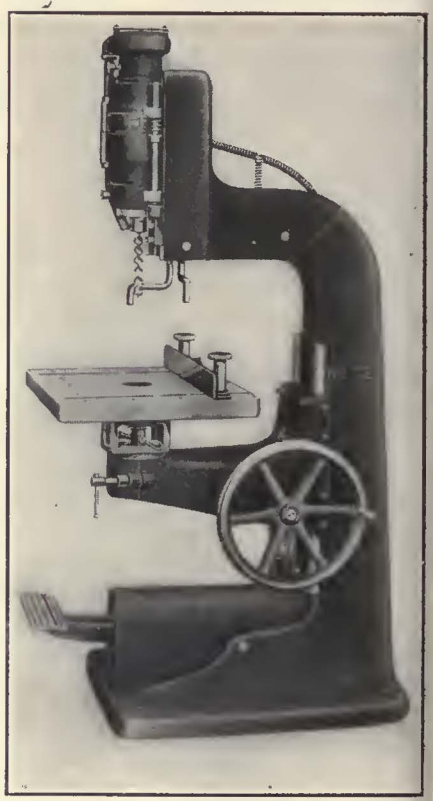
The handles are of high quality steel, drop-forged to a shape that fits the hand and are sand blast finished to give an excellent grip. Either outside or inside trigger handles can be furnished, although the outside type is standard. The exhaust is through the side of the barrel near the handle and can be deflected in any direction desired by the operator, by merely turning the deflector.

Due primarily to the bolted handle construction, the hammers are lighter in the handle end and are better balanced and easier holding, especially when used in a horizontal or inverted position.

Boring Machine with Motor Armature on Spindle

A SINGLE-SPINDLE borer with several new features is being placed on the market by the Oliver Machinery Company, Grand Rapids, Mich. This machine has been given the name of "Motor-in-Head Vertical Borer" because the rotor of the motor is mounted directly on the spindle of the boring machine. This eliminates all belting, countershafts, pulleys and a number of bearings. It also saves floor space and makes a simpler machine. Another interesting feature of this machine is the blower, which is also mounted directly on the spindle at the top of the machine. This blows the dust or borings away from the work.

This machine has a capacity for boring holes up to 2 in. diameter and up to 6 in. depth with one stroke. The distance from the center of the spindle to the column is 18 in. and the vertical movement of the table 14 in. The maximum stroke of the motor head is 6½ in. The table swivels completely around and tilts up to an angle of 45 deg. in any direction. The column is a one piece casting, with a wide flange base, measuring 24 in. by 31 in. A counterbalancing weight is provided inside the main vertical portion of the column, which also forms the connecting link between the foot lever and the head lever. A hood cast integral with the column deflects chips away from the foot lever. The motor is fully inclosed and the housing consists of two halves clamped together by large bolts. The motor's stator is clamped concentrically inside of these two halves with an air passage for ventilation. The rotor, together with the spindle, is provided with ball bearings at the outer ends. The lower half of the motor head has a lug at the back through which a connecting link and a counterbalance



Single-Spindle Boring Machine

lever system reaching to the foot lever supplies the downward motion of the head. A coil compression spring provides the necessary return movement.

A funnel type pressure blast fan is mounted at the upper end of the motor head. The blades are one-piece aluminum castings pinned to the upper end of the boring spindle. The air blast is directed downward toward the boring point, so as to blow the chips away and cool the boring bits.

Association News & Discussions

Way Problems Occupy New England Club

Progress in Methods of Snow Removal, Systematized Methods of Track Repair and Electric Freight Opportunities Discussed at Boston Meeting—Machinery Playing Larger Part in Way Maintenance

THE advance of machine methods into the field of way maintenance featured a well-attended meeting of the New England Street Railway Club at the Copley Plaza Hotel, Boston, Dec. 6, President Ralph D. Hood occupying the chair. A number of addresses were given on the subjects of snow removal, trackwork and interurban freight. Following the usual dinner, Chief Photographer Jones of the Boston & Maine Railroad gave an illustrated lecture on the "Scenic Attractions of Maine."

In an early issue an extended account of the Eastern Massachusetts Street Railway Company's planning and control of way maintenance will be published by courtesy of R. B. Stearns, vice-president, and F. B. Walker, enlarging upon the material presented at this meeting in a paper by Mr. Walker on the subject "Track Machinery."

Snow Removal by Machine Methods

C. F. Reuter, engineer Eastern Tractor Company, Cambridge, Mass., pointed out in his talk on "Snow Removal" that the demand for snow removal has attained such proportions that this year an effort will be made by the Massachusetts Department of Public Works to keep open a number of the major trunk line highways, although not as much work will be done as though the proposed tax on gasoline had passed the last Legislature. Monopolization of street railway tracks by highway traffic is to be done away with on these trunk lines. It is proposed to try out the use of buses equipped with a form of plowing apparatus on some branch highways, but this, in the speaker's opinion, will be chiefly experimental.

The tractor, with its concentrated large power, appears to offer the best solution of the snow-removal problem, declared the speaker. It has been successful in Dakota, Montana, Michigan, New York, New Hampshire and other states. Despite the high power present in the modern tractor, a representative unit described by Mr. Reuter has a bearing weight of only 4 lb. per square inch upon the highway and does no damage to the road. Drifts 8 to 10 ft. deep can be handled with ease. A plow with a 10-ft. blade run by a 5-ton truck will remove 40,000 sq.ft. per hour as compared with 70,000 sq.ft. by tractor. The tractor costs less to operate than the truck and the average expense of "bucking" snow with a tractor of from 5 to 10 tons rating is about 92.4 cents per mile of route cleared.

The latest development in snow-handling equipment, the speaker stated, is the rotary plow-tractor combination. A 5-ton tractor unit is equipped with a 60-hp. gasoline engine, driving a rotor plow at 1,000 r.p.m. Two inverted V-blades lead to an opening with an area of 4¼ sq.ft. at the throat of the plow, the scooped in snow being drawn through the rotary blades and thrown to one side for disposal. The machine adjustments permit throwing the snow 100 ft. off-side, or the outfit can be designed to deposit the snow in a gondola car behind the tractor. If desired, the snow can be thrown off at intermediate distances. Loading into another vehicle continues while the plow and tractor are moving with traffic at a speed of from 1 to 6 m.p.h. The snow is pulverized finely so that a 5-ton truck will carry away about 4 tons of dry snow instead of 1 tons of loose, lumpy snow.

A new plow to be used by the Boston Elevated Railway will carry rotor blades of 2-in. x 18-in. x 36-in. chrome-nickel steel. The rotary end costs about $6,000. A 5-ton Holt tractor with auxiliary equipment costs about $4,750, or a Best tractor, including cab, heating coil, radiator and complete lighting outfit, $4,250.

In clearing the Champs de Mars, Montreal, Canada, of snow the job was done by tractor for $25, whereas an appropriation of several thousand dollars had been thought necessary for hand shoveling. This field was 1,000 ft. long, 125 ft. wide and had snow on it 18 in. thick. The rotor runs in ball bearings and will turn four minutes after receiving an impulse by hand. The latest rotor has four blades, which means 4,000 cuttings per minute. The cutter can be dropped from 8 in. above the rail to the rail top. The intake blades are lined with §-in. metal reinforcement and can be reversed after wear. The minimum width of the machine is about 6 ft. 9 in. to 7 ft. The overhang over curves covers about 5 ft. of street width. Estimated yearly depreciation of the tractor is 12½ per cent, and repairs 6¼ per cent, of the first cost. The engine is the only part which is likely to give trouble.

Experience with Rotary Snow Brooms in Greater New York

W. B. Kelley, head of the division of operation and maintenance, Department of Plant and Structures, city of New York, described the failures of old-style sweepers and plows on Staten Island, N. Y., during heavy storms three years ago. Grades on this system run from 6.5 to 10 per cent maximum, curvature reaches 28 to 33 deg. and there are many hills and valleys, with great exposure. In 1921 the trackless trolley system was installed and in the fall of that year a Fox rotary snow broom was tried out by the city. Twenty-six snowstorms with a minimum of 6½ in. of snow were overcome without tying up traffic, and in one case 56 miles of track were cleared in 3¼ hours, when all other sweepers had failed. "I tried every known mechanical stunt to make the outfit fail," said Mr. Kelley, "but the machine merely laughed at me and came up for more punishment!" The Staten Island lines were operated when all other surface lines in New York were tied up. The Fox outfit is run in summer as an emergency truck and tower. The broom will remove more snow from a paved street than any two sweepers. A nine-track terminal with two automobile thoroughfares was cleared in 43 minutes compared with hours' work by 200 to 300 men in older days.

Mr. Kelley said that the broom can be removed in 25 minutes. Rattan is used instead of steel for the brushes. Only three sets of brooms had to be purchased in the twenty-six storms. The railway has gone through 7 ft. of snow with this broom and the Public Service Commission of New York highly praised the road's efforts to keep open during the past winter. The outfit can be mounted on a chassis and removed in about an hour. The New York Street Cleaning Department now has fifty-six of these brooms; the trackless trolley system has two and four more on order. There is a 24-ft. roadway on the trackless trolley system and the trolley runs from side to side like a bus. About 26 miles comprise the trackless trolley system. The broom operates when going up grades, as it has a separate engine drive, and this is not the case with an electric sweeper. Four or five of these outfits went a long way toward keeping the International Railway lines in Buffalo open during severe winter weather. The Department of Plant and Structures of New York proposes to purchase ten

more rotary brooms for use on the trackless trolley lines. All the Staten Island sweepers were to be sold last week.

INTERURBANS MAKING PROGRESS IN FREIGHT HAULAGE

That remarkable progress has been made in the business of handling freight on interurban lines was the conclusion of T. H. Stoffel, Westinghouse Electric & Manufacturing Company. This has taken place particularly in the Central West and even there only the surface of possibilities has been scratched. Data have been gathered, he said, which indicate that approximately $50,000,000 will be received by electric lines for handling freight and express for the years 1923, and that a total of more than 1,000,000,000 ton-miles will have been handled before the end of the year; that electric lines now have in regular freight service more than 13,000 freight and express cars, and more than 475 electric locomotives are employed.

The fourteen or fifteen electric lines, operating over 4,000 miles of track in the Central States, are not confining their efforts to the handling of merchandise or less than carload freight, but in the past two years have consistently broadened their field and are gradually adding facilities permitting them to move all classes of tonnage, including carload consignments of live stock, cement, stone, building material, coal, lumber, logs, canned goods, etc., at rates which are competitive with those in effect on steam lines.

As a result, these lines are finding it difficult to take care of the demands made upon them, through lack of rolling stock and adequate terminals. Shipments are handled over this group of lines for distances up to 350 miles or more, and the service rendered is from forty-eight hours to eight or ten days better than can be secured through any other means of transportation.

The lines centering in Indianapolis handled more than 8,000 carloads of live stock into the Indianapolis stock yards in 1922, which was three-quarters of the total received at those yards. The indications are that they will do much better during the current year, as stock raising has been taken up by many farmers who formerly thought that the effort was not warranted by results. Another line handled 2,500 carloads of cement up to Nov. 1 this year, and has contracted to move more than 3,500 cars during 1924. These cases are cited merely to indicate the extent to which freight business has been developed in the Central West.

What is probably of the greatest importance is that the lines in the territory referred to are showing a net profit in their freight operation of from 15 to 35 per cent on the investment in freight facilities and equipment. This balance appears after deducting from freight income all expense directly chargeable to freight operation, and in addition an equitable proportion of the cost of maintenance of roadway, track, distribution system, power plant, administration, taxes, etc.

Possibilities of conducting a remunerative freight business in the New England district are as good as if not better than in the Western territory, according to the speaker. New England is primarily an industrial section of the country, and there is hardly a town that does not produce tonnage, and of the class which can readily be handled with interurban equipment. It is realized that some of the lines in the New England district are carrying freight, but it is obvious that full advantage is not being taken of the possibilities.

While the motor truck is becoming an exceedingly important factor in the transportation of the country, it is handling tonnage every day which should be better and more economically moved by electric lines, and at much less cost to the public. Steam carriers are also beginning to realize that their equipment and facilities, which were necessarily designed and constructed for the movement of long hauls and heavy, bulky tonnage are not suitable for the economical handling of the comparatively short-haul tonnage, and this tonnage, particularly less than carload merchandise, is less profitable for them. As a result, some of the large trunk lines are giving serious consideration to ways and means of relieving themselves of the burden of transporting such tonnage of congested terminals for destinations 100 to 150 miles distant, thus relieving both terminals and rolling stock for use in the more remunerative and desirable long-haul traffic. One of the main trunk lines is also experimenting with the motor truck to relieve terminal congestion, while other roads are asking shippers at large terminals to consider shipping via electric lines where available, or to use esablished motor truck lines.

Experience has demonstrated, concluded Mr. Stoffel, that it is not impracticable or unreasonable to superimpose the operation of freight on the passenger service rendered by electric lines. Much of the road work can be done at night, or during off-peak hours when the power demand is low, and therefore no additions are necessary to power generating and distributing equipment. Practically the only added expense attached to the transportation of freight is to provide motive power, rolling stock, terminals and a competent and experienced traffic department, the cost of which is comparatively small. The net returns invariably more than warrant the effort.

Rotary Snow Broom of Type Used by Department of Plant and Structures on Staten Island Lines in New York

A.I.E.E. Midwinter Convention

TWO sessions will be devoted to national transportation problems at the midwinter convention of the American Institute of Electrical Engineers, to be held at Philadelphia Feb. 4 to 8. These will be held at the Metropolitan Opera House the afternoon and evening of Feb. 5. Among the speakers will be Ralph Budd, president Great Northern Railway; N. D. Maher, president Norfolk & Western Railway; C. H. Markham, president Illinois Central Railroad; Edward G. Buckland, vice-president New York, New Haven & Hartford Railroad; and L. G. Coleman, assistant general manager Boston &

Maine Railroad. Other speakers will be announced later.

A wide range of subjects will be discussed at the convention, including such topics as the superpower system and other transmission subjects, power-plant operation, insulation, generator design, radio telephony, and miscellaneous subjects. Monday evening will be devoted to a celebration of the fortieth anniversary of the founding of the Institute.

Proposed Motor Vehicle Statute

At Convention of Utility Commissioners, Committee on Motor Vehicle Transportation Recommends Regulatory Law and Sets Forth Its Advantages

AT THE annual meeting in Miami, Fla., last week of the National Association of Railway & Utility Commissioners, the committee on motor vehicle transportation suggested a "model motor vehicle statute." It is based somewhat on the present regulation in the State of Washington, and the report was presented by E. V. Kuykendall, chairman of the committee and director of the Departmnt of Public Works, Washington. According to this law all companies and individuals engaged in auto transportation would be divided into two classes, namely, Class A, embracing all supplying auto transportation between fixed termini over a regular route, and class B, those not operating between fixed termini or over a regular route.

Class A companies are required to take out a certificate of convenience and necessity, file quarterly reports with the commission and pay a fee, not to exceed 1 per cent of their gross revenue, to cover the cost of supervision and regulation.

Class B operators are those which in the past have usually escaped regulation, but are now forbidden to operate for the transportation of persons or property for compensation without having obtained a permit from the commission to do so. For such permit they will pay an annual fee of $10 for the vehicle, a fee of 50 cents per passenger seat, provided that the passenger seating capacity exceeds eight, and $2 per ton for weights over 3 tons.

The commission has power to supervise and regulate all such companies, whether in class A or class B, to fix, alter and amend just, fair, resonable and sufficient rates, various charges and classifications, require the filing of reports, describe rules and regulations for their service.

The law declares that an occasional accommodative transportation service by a person not in the transportation business shall not be construed as a service for compensation. Operation within a city or town, school buses and vehicles engaged exclusively in hauling farm products are also excluded.

Reasons for Statute

In explanation and support of this bill the report, said in part:

We realize that there are a number of states in which motor vehicle regulation is administered under general statutes authorizing regulation of the rates, service, and facilities of common carriers, but there are so many peculiar phases of motor vehicle regulation which are inapplicable to other modes of transportation that better results can be obtained through special statutes covering that subject alone.

The first question which would probably suggest itself is: Why divide auto transportation companies into two classes? The original auto transportation acts in several states undertook the regulation of companies operating between fixed termini or over a regular route only. Practical experience has disclosed that freight trucks and for-hire passenger cars, maintaining stands in the various cities and towns, are operating over the routes covered by the certificates of convenience and necessity issued to the auto transportation companies and are keenly competitive therewith. These independent operators do not come within the purview of most of the regulatory acts, for the reason that they do not operate between fixed termini or over regular routes. They escape all regulation. They are not put to the expense of fees nor the furnishing of bonds required of regulated concerns to protect the public against negligent operation. They frequently engage in cutthroat competition with each other and with certificate holders to their own detriment and to the injury of regular certified operators and ultimately to the detriment of public service. All auto transportation companies transporting passengers and/or property for compensation would be embraced either under one of the two classes mentioned in the act.

The proposed act does not go into detail as to the manner of regulating these operators. To do so would be impracticable. The details must be worked out by the regulatory body, based upon practical experience, and under the broad provisions of the proposed law, which require all rules and regulations to be just, fair and reasonable as to said two classes of companies in their relations to each other and to the public.

Certain Carriers Are Excluded

The proposed act excludes from regulation motor-propelled vehicles operated wholly within the incorporated limits of any city or town. This, of course, is a matter resting within the discretion of the legislature in enacting the law. We believe a majority of states now engaged in regulation of motor-propelled vehicles do not undertake the regulation of companies operating exclusively within city limits. This is a matter, of course, to be determined by the legislative policy of each state. If it is desired that such power be exercised, this exception should be stricken from the definition of auto transportation companies contained in the proposed act.

It will also be noted that motor-propelled vehicles, operated exclusively in the transporting of agricultural, horticultural, dairy or other farm products from the point of production to market, are excluded. This is a wise provision, particularly in the Western states, where the movement of bulky crops, such as apples or wheat, requires the use of every available truck in the vicinity for a short period of time. To require every truck engaged in hauling wheat or apples from the field or orchard to the railway station or local market to secure a certificate of convenience and necessity, furnish a bond, and conform to other regulatory details, would place a needless burden upon producers, operators, and regulatory bodies alike. School buses are also excluded. There may be a difference of opinion as to this exclusion. We are inclined to the view that they should be excluded but that some legislation should be enacted requiring such buses to be insured or bonded so as to provide indemnity for careless operation.

Certificates for Class A Only

Another question might be asked: Why require Class A companies to secure certificates of public convenience and necessity and at the same time authorize the granting of permits with very little restriction to Class B companies? It would be impracticable to apply the certificate of public convenience and necessity to Class B companies as they are not limited to any definite route or schedule, and often operate in a wide stretch of territory. To determine whether public convenience and necessity requires an additional operator in this class would be a hopeless and impossible task. The fares, character of equipment, and method of operation can be properly regulated, and competition will largely eliminate the unfit. The regulation of fares will prevent the elimination of the smaller operators by the more powerful concerns through rate wars.

Insurance

That portion of the act relating to insurance should be drawn in harmony with the insurance laws of the particular state. Some legislatures have made the mistake of requiring too large a bond or insurance policy, compelling the payment of premiums almost prohibitive to many small operators. This provision should be flexible so as to permit the regulatory body to make reasonable regulations under which a small operator in a sparsely settled territory would be required to pay a

much smaller premium than a large operator in a densely populated district.

Reasons for Proposed Fee Schedule

The proposed act undertakes to make regulation of auto transportation self-sustaining by requiring payment of certain fees by the companies. We believe this to be wise policy; first, because auto transportation companies enjoy certain privileges in the use of the public highways which other transportation companies do not enjoy, and, second, because the regulation of auto transportation is much more expensive in proportion to its volume than is the regulation of any other kind of transportation or any other public utility. Furthermore, it is doubtful, in view of the heavy burden of general taxation already existing, if the regulation of auto transportation would be undertaken by many states without some provision requiring operators to pay the cost of such regulation. The fee system which is proposed in this act is based largely upon the experience of the Department of Public Works in the State of Washington. It is believed that not to exceed 1 per cent of the gross operating revenue of auto transportation companies, together with the miscellaneous fees provided in the act, will yield a sufficient fund to finance the regulation of auto transportation companies in any state.

Taxes for Use of Highways

The fees so far discussed are those accruing to the state regulatory body for the sole purpose of covering expense of regulation. Some states are exacting certain taxes from motor vehicle companies as compensation for the use of the highways built and maintained at public expense. It is very likely that exactions of this character will ultimately be made in all of the states. There is a growing sentiment in favor of such a tax and a feeling upon the part of the public that stage and truck competition as now permitted is unfair to rail carriers, who are compelled to purchase right-of-way, construct grades, lay ties and steel, and maintain such structures at their own expense and pay taxes thereon.

While the exaction of taxes from auto transportation companies other than a sufficient amount to cover the expense of regulation is more properly a function of the taxing authorities of the states, it may not be improper briefly to discuss the same in this report. The statute which we have proposed places trucks and for-hire cars under regulation so that it will be possible to require such concerns to furnish statistical information upon which a reasonable tax may be formulated. To impose a gross revenue tax upon the earnings of vehicles operating between fixed termini and over a regular route without imposing an equal tax upon truck and passenger vehicles not so operating would work an injustice.

For instance, in the State of Washington, 36,323 truck licenses have been issued thus far in the year 1923. Only 284 of these are subject to regulation under the statute, which applies only to operations between fixed termini and over a regular route; 2,098 licenses have thus far been issued in 1923 for stages and for-hire cars, of which only 656 are subject to regulation.

About a year ago, the Department of Public Works of the State of Washington placed inspectors at strategic points on the highways who kept a check day and night for a limited period of all traffic being handled by trucks over the highways. This check disclosed that only about 20 per cent of the traffic passing such points was being transported by regulated freight carriers. No doubt a similar state of facts exists in other states.

If the proposed act should become a law, all of the concerns engaged in the transportation of either persons or property for compensation would come under some form of regulation and could be required to make such reports and furnish such statistical information as would enable a proper tax to be imposed.

There is still another class of vehicles, such as trucks engaged by private industries in transportation of their own products, such as oil companies, logging and lumber companies, creameries, and so forth, in relation to which difficulties would unquestionably arise in the imposition of a tax as compensation for use of the highways. It is also true that trucks so operated, though likely to escape the taxes imposed upon common carrier operators, are usually more heavily loaded and more injurious to the highways than those of any other class.

Gasoline Tax

At the present time the only form of taxation that operates equitably upon all users of the highways is the gasoline tax. Such tax would, of course, affect all who use the highways in proportion to the use they make of the same. The heavier the load, the more gasoline required to transport it. The only difficulty is that the gasoline tax must be paid by those who use the highways for pleasure as well as those who use them for profit. A number of states now impose a gasoline tax of two cents per gallon, which yields a handsome revenue. To increase this tax would work no injustice to the operators who use the highways for commercial purposes but, in the opinion of many, would be unjust to private car owners, who do not use the roads for gain and who have borne their share of taxation for the construction of the same. In any event, it is doubtful if legislatures will be inclined to increase the gasoline tax beyond the 2-cent limit unless the excess over the two cents could be made to apply to commercial users of the highways only; and, to make such distinction, would result in great difficulty and uncertainty of administration.

In imposing any form of taxation based on gross operating revenue, care should be taken not to destroy small operations in isolated regions. If it can be legally done, a reasonable return might be permitted tax-free to each auto transportation company, such return to be based on the value of the property devoted to public use. The rate of return might properly be prescribed by the state legislature and the value upon which it is based determined by the state regulatory body. All revenues in excess of such reasonable rate of return could then safely be taxed for the purpose of building and maintaining highways. In this way, the small operators, whose rate of return is usually low, would not be eliminated; and the larger concerns in thickly settled communities, whose operations are usually in competition with established rail and boat lines and whose earnings are usually ample, could be more heavily taxed without injustice.

Accommodative Service Excluded

In defining the words "for compensation," the following exception is made:

"An occasional accommodative transportation service by a person not in the transportation business, while on an errand for himself, shall not be construed as a service for compensation, even though the person accommodated shares in or pays the cost of the service."

The purpose of this provision is to save the kindly disposed individual and the regulatory body the annoyance occasioned by complaints arising from the occasional accommodative transportation of an article or of one person by another. In other words, regulation should not be so hidebound that a man could not accommodate a neighbor without violating the regulatory statutes.

Unions Must Develop Responsibility

DR. WILLIAM STARR MYERS, professor of politics Princeton University, was the principal speaker at the annual dinner of the New York Railroad Club, held at the Commodore, New York, Dec. 6. Dr. Myers' address was entitled "Thoughts on Our Present Discontent." Expressing himself as favoring the existence of labor unions, he also advocated the open shop—not "a shop open to none but non-union men, but to union and non-union men without distinction." He advocated making the unions really democratic by breaking up the "close corporations" of union leaders who control policies and finances, and the incorporation of the unions. He declared that they should assume the legal responsibilities commensurate with their rights and that if the unions did not reform themselves, it might be necessary for the government to step in and control their elections and their finances. The difficulty of today, he said, is not primarily with the rank and file of labor, but with the leaders, who seldom are

elected by really democratic methods, who have control of the policy of the organization, are practically a self-perpetuating and "close corporation" in many cases, and are totally irresponsible for the administration of the finances.

The dinner was the largest ever given by the club and about 2,600 were said to have been present.

Resolutions and Further Committee Reports of Commissioners

Would Clarify Jurisdiction of State Commissions and Interstate Commission and Have Latter Value Railroads by States—Conference to Be Called on Crossing Accidents

AT THE closing meetings in Miami last week of the National Association of Railway & Utilities Commissioners, the following were elected officers for the ensuing year:

President, Henry G. Taylor, chairman Nebraska State Railway Commission; first vice-president, W. D. B. Ainey, chairman Public Service Commission of Pennsylvania; second vice-president, A. G. Patterson, president Alabama Public Service Commission; secretary, James B. Walker, secretary New York Transit Commission; assistant secretary, Lewis G. Thompson, Florida Railway Commission; general solicitor, John E. Benton.

Resolutions of Interest to Electric Railways

Resolutions passed, of interest to electric railway companies, included the following:

That Congress be urged to make such amendments to the existing transportation law as shall clearly exclude from the jurisdiction of the Interstate Commerce Commission the regulation of the rates and service of electric railroads carrying on local street railway transportation.

That the president of the association call a national conference, consisting of representatives of the carriers, state regulating commissions, governors, highway commissioners, municipal officers and national automobile associations, to see what can be done to reduce accidents to automobiles at railroad grade crossings.

That Congress be urged to supply the Interstate Commerce Commission with sufficient funds so that it may report valuations of railroads by states, as well as by entire systems, the commission having reported that it has been unable to make this division in the past because of lack of funds.

That Congress so amend the interstate commerce act as to remove all question of continued power of the state authorities to require common carriers to make additions and betterments to their plant and facilities reasonably necessary for the safe and proper service of the public; that no intrastate rates may be changed or set aside without proof by competent evidence that such rate seriously affects interstate commerce, and that Congress amend the transportation act of 1920 so as to restore to the several states all the rights, powers and authority enjoyed by each state relative to certificates of convenience and necessity prior to the enactment of that act.

The report of the committee on valuation related principally to the Great Northern and Rock Island (steam roads) valuation cases. It is pointed out that the theory of the Great Northern Railway is that for the purpose of valuation it is assumed that the railroad is non-existent and therefore no portion of it available for the transportation of men or materials for the construction of other portions, and that the entire 7,000 main track miles will be reproduced in from two to three years. Under this theory, material would necessarily be transported over foreign lines of railroads and no part would be hauled over the lines of the Great Northern Railway itself, and the freight on the material hauled would be paid for at class rates. Such an assumption, the report says, is illogical.

A supplement to the report considers the question of valuation of ill-conceived railroads, in connection with one or two recent decisions on this subject on steam road valuations by the Interstate Commerce Commission. The committee believes that for such properties the method of determining value by means of the cost of reproduction is not appropriate.

Other Reports

The committee on uniform regulatory laws submitted an extended study of the railroad and utility laws in the different states. It makes up a printed pamphlet of more than 300 pages, the statutes on the same subject, as in existence in the different states, being grouped together. Many differences are found.

The committee on motor vehicle transportation submitted a report, of which an abstract appears in another column.

The committee on statistics and accounts of public utilities reported on a uniform classification of accounts for electric, gas and water utilities.

Further report on the proceedings at Miami will probably be published next week.

Subway Car Design Topic at A. S. M. E. Meeting

"MODERN Subway Cars and Their Operation," a paper by Selby Haar, assistant electrical engineer with the Transit Commission of the State of New York, was the principal topic at the meeting of the Railroad Division of the American Society of Mechanical Engineers, Dec. 5. E. B. Katté, chief engineer electric traction, New York Central Railroad, acted as chairman.

The paper by Mr. Haar gave various details of the steel car construction and equipment of trains used by the rapid transit lines in New York. These details have been published from time to time in various issues of ELECTRIC RAILWAY JOURNAL. Mr. Haar also referred to measures undertaken to overcome congested conditions in the subway so as to bring about a reduced time for loading and unloading passengers, thus reducing the time for station stops. This has enabled the operation of trains on more frequent headway, and the length of trains has also been increased, this latter requiring increased length of platforms. Ten-car express trains are now operated and six-car local trains.

Mr. Haar also referred to the development of the articulated train and declared that this type was being considered among other new designs for future equipment of the New York subways. According to the tentative designs, four units of this type will be substantially as long as eight of the standard cars. Each unit has a body of three sections, articulated and supported on four trucks. A special feature is that no intermediate end doors will be used, and there is but one guard for each unit and he is located at the end of the unit. Preliminary designs have wide single side doors instead of pairs of narrower doors.

The discussion following the presentation of Mr. Haar's paper showed the attention which has been given by designers of cars and equipment intended for New York subway service toward increasing schedule speeds, decreasing the length of station stops, and providing for the comfort and safety of passengers.

F. M. Brinckerhoff, who as a member of the L. B. Stillwell firm of engineers has devoted considerable time to the design of cars for New York subway service, described some of the features of the Brooklyn-Manhattan Transit Corporation's cars which were mentioned in Mr. Haar's paper. Mr. Brinckerhoff brought out the fact that in the development of this design considerable attention has been given to rapid interchange of passenger movement and to produce as light a car body construction as was advisable, in view of the extreme service to which this equipment is subjected.

Joseph C. McCune, district engineer Westinghouse Traction Brake Company Company, New York, described some of the advantages of the electro-pneumatic brake equipment and the empty and load brake device as installed upon the Brooklyn-Manhattan Transit Cor-

poration's cars. He brought out the fact that the improvements in air-brake equipment had done considerable toward decreasing the congestion of rapid transit operations by providing increased rates of retardation, quick release of brakes and rapid recharge of the air-brake system. He said that the distance for a stop of the Interborough trains from a speed of 40 m.p.h. has been more than cut in two by improvements in air-brake equipment and that the time taken to stop from this speed has been decreased one-third. Mr. McCune also described the features of the automatic air and electric couplers as used on subway equipment, and gave some illustrations of the saving in time that resulted in making up trains for service.

Fred Butt, of the equipment department of the New York Central Railroad, gave some figures of the detentions in multiple-unit train service on the New York Central and asked several questions as to the value of certain equipment used on subway cars. H. L. Andrews, railway engineer General Electric Company, told of the efforts which his company had made to reduce the fire hazard on subway equipment by adopting flameproof and heat resisting insulation. He also spoke of the advantages of articulated units for train operation, and as evidence of the economies effected he declared that a three-car unit would have but four trucks and four motors, while three individual motor cars would require six trucks and at least six motors. The recently constructed two-car articulated unit used in Detroit has a weight of but 550 lb. per passenger seat.

George L. Fowler, consulting engineer, New York, told of the reasons for removing the coupler centering devices on the Brooklyn-Manhattan Transit Corporation's cars. The supporting attachment to the truck used to keep the couplers accurately centered produced large strains with danger of derailment. He also spoke of an investigation which he had made into the excessive nosing of these cars, which was found to be due to too free oscillation of the car body.

American Association News

Midyear Dinner Committee

THE committee on arrangements for the midyear meeting to be held in St. Louis, March 4, met in St. Louis on Dec. 11. It was decided to hold the meeting at the Hotel Chase, and E. B. Meissner, E. D. Payne and H. D. McBride were appointed a sub-committee to conclude negotiations with the hotel management.

The committee plans to engage the Chase Hotel orchestra, which is said to be one of Paul Whiteman's best. There will be special entertainment during the dinner. It was decided to print menu cards suitable to the occasion. It was planned to have a definite assignment of tables and places for all those whose reservations are received by Monday noon, March 3.

On the question of entertainment for the ladies, the committee thought that they could be well taken care of without the association making any special arrangements.

B. W. Frauenthal was designated to take up the matter of transportation to determine whether arrangements could be made for fare at one-half rate, as was done for the Atlantic City convention.

A hotel reservation sub-committee was appointed to follow all details of giving each member the rooms he wanted in so far as available. It was brought out that all attending the meeting can probably be taken care of within a radius of three blocks of the Hotel Chase. Frank O. Grayson, St. Louis, was appointed chairman of the hotel reservation committee.

It was suggested that an informal get-together meeting be held on Monday night, just prior to the midyear meeting, and it is probable that this will be handled by the Birney Club, St. Louis. An organization committee was appointed for this purpose as follows: C. O. Birney, chairman; B. W. Stemmerick, R. W. Williams, Herman Spoehrer and B. W. Frauenthal.

The committee on arrangements will probably not hold another meeting until February of next year.

The following members of the committee were present: W. H. Sawyer, chairman; E. B. Meissner, F. G. Buffe, V. W. Berry for G. H. Clifford, L. E. Gould, H. J. Kenfield, C. E. Allen for M. B. Lambert, A. T. Perkins, Ernest Stenger, E. D. Payne for E. P. Waller.

In addition, Fred A. Kehl, H. D. McBride, J. A. Laird, Mr. Johnson for W. A. Layman were present from the St. Louis Electrical Board of Trade. From the Birney Club of St. Louis, C. O. Birney, Frank V. Cook, Otis E. Turner, F. A. Richards, R. W. Williams, B. W. Stemmerick, F. O. Grayson, and B. W. Frauenthal were present. Fred C. J. Dell represented association headquarters.

Way Committee

A TWO-DAY meeting of the committee on way matters of the Engineering Association was held in New York, Dec. 6 and 7. Those present were H. H. George, chairman; E. M. T. Ryder, C. F. Gailor, W. W. Wysor, W. R. Dunham, J. H. Haylow, E. B. Entwisle, C. A. Alden, R. B. Fisher, V. Angerer, R. C. Cram, sponsor, and G. C. Hecker, special engineer.

The first day was taken up entirely with meetings of sub-committees.

The committee voted to recommend the use of seven standard frogs for all radii of 130 ft. or less, using association standard spirals through the frogs. It was voted to use intermediate radii at even degree angles so as to make them coincide with the length of the curved heel arms for iron bound construction. Standardization of the length of frogs was referred to a subcommittee composed of Messrs. Angerer and Alden.

On the design of substitute ties, sub-Chairman S. C. Baker was directed to secure from the tie manufacturers or elsewhere a list of railways using such ties, extent of use, and particularly how many were placing repeat orders from time to time. It was also decided that a questionnaire should be sent out to all companies using substitute ties with the idea of developing data relative to this subject.

Mr. Wysor reported on the progress of the investigation by the welded rail joint committee. He outlined the status of the schedule of tests and research work recently adopted.

A preliminary report by Mr. Angerer on the design and specifications covering solid manganese crossings was approved.

The subject of standardization of switches and mates was discussed quite extensively. The committee requested each manufacturer member of the subcommittee to prepare and submit drawings showing a specified switch, so that a study can be made to ascertain the possibility of designing a composite switch. On the subject of standard design of narrow groove guard rail, Mr. Entwisle submitted a preliminary report and the sub-committee was instructed to continue the study of this subject.

A progress report was made by Mr. Haylow on the design of a standard hook-head spike, and each member was requested to furnish him with such additional data as they have on this subject.

A report by Mr. Spencer on surface hardening of rails was read, which described the results of recent experiments with this process in Toronto. Various data on this subject were submitted by different members.

Mr. Dunham reported progress on the subject of specification and design of tie rods.

It was voted to refer Specification Ws 10a to a sub-committee for action in accordance with the recommendations of the 1923 way committee.

It was decided to hold the next meeting at Easton, Pa., Feb. 13 and 14.

State Committee Men to Meet

ARRANGEMENTS are being made to have a round-table discussion of all directors of state committees on public utility information at the time of the midyear meeting of the American Electric Railway Association at St. Louis, March 4.

The News of the Industry

Mr. Mayo Discusses Transit

General Manager at Detroit Regards Construction of Underground Lines Downtown as Imperative

William B. Mayo, general manager of the Detroit Department of Street Railways, has issued a statement relative to the plans for rapid transit for the city of Detroit. Mr. Mayo analyzes critically some of the provisions outlined in the Rapid Transit Commission's report and states that in his opinion the conditions to be met in Detroit make it appear that the first logical step to be taken toward rapid transit is the construction of an underground tube in the central district, built first in short sections for surface car operation, but so designed that it can be converted to rapid transit operation.

Definite Enabling Act Needed

The first consideration is to secure passage by the Legislature of a clean-cut enabling act. After that assistance and thought should be given to the question of the extent of the rapid transit system required in the next five or ten years. Mr. Mayo says that what the city really needs most is increased terminal facilities.

Mr. Mayo believes that careful consideration should be given to the relation between the Street Railway Commission and the Rapid Transit Commission, if the latter is to be a permanent feature, as unified operation can not be guaranteed unless one or the other is made definitely responsible for the transportation of the city's population.

A serious thing to be considered in connection with rapid transit development is the matter of fares. The surface lines must have at least a 5-cent rate of fare until the purchase contract is completed, Mr. Mayo believes, and rapid transit lines cannot operate for less than 10 cents until a ten-year period has passed or the total annual traffic has grown to somewhere near the billion mark.

Financing Details Discussed

In regard to the report of the Rapid Transit Commission outlining proposed methods for financing, Mr. Mayo is of the opinion that it is very unfortunate that the present enabling act retains the double column assessment plan. This he thinks should be eliminated. The bill referred to provides for a special assessment district along established routes by a so-called double column assessment. The first column would represent the value of a given parcel of land without a subway; the second column would represent the increase by reason of the subway's construction. The same city tax rate would be levied against both columns, but the proceedings of the column due to alleged increased property value following subway construction would constitute a so-called special assessment fund to be used to pay for the subway work. This, Mr. Mayo believes, would entirely relieve the property owners of any real special assessment for a subway and conflicts with the apparent intentions of the Rapid Transit Commissioners.

If the second plan in the new act were adopted, he cites, the general assessment would be the same as the sum of the two columns suggested in the first plan, but would provide a genuine special assessment against the entire property value.

The new financial plan provides for an assessment at large of 17 per cent and a local assessment of 51 per cent, the balance of 32 per cent being the equipment cost which is to be financed by the car rider from the fares. This plan is not objectionable to Mr. Mayo except in the detail of its application.

Serious consideration of the metropolitan area and the Port of Detroit plans are recommended because the present transit plans contemplate the whole proposition as a local one.

Another feature of the enabling act to which Mr. Mayo called attention is the fact that the act seems to assume that all of the costs of changing gas and water pipes, telephone conduits, etc., shall be considered part of the cost for the subway. Inasmuch as a tremendous strain would be put upon the taxing power by the cost of the subway, it is apparent to Mr. Mayo that the settlement of this question should be a discretionary one instead of compulsory.

Moving Pictures to Tell Story.—Motion pictures are to be used in telling the story of the growth and development of many public utilities properties in the Central West, knit together in the Illinois Power & Light Corporation, formed last June by the merging of the McKinley and Studebaker interests. Pictures of the various properties and industries served will be taken in Illinois and Missouri. The pictures will show the tremendous growth of the public utility business and particularly the development of the many properties now under the management of the Illinois Power & Light Corporation, which operates a very large trunk line interurban railway and numerous city railway systems in seven states.

Recent Session of Union

One-Man Cars, Seniority and Other Matters Discussed by Amalgamated at Oakland Meeting

W. D. Mahon, international president of the Amalgamated Association of Street & Electric Railway Employees of America, reiterated his stand for the eight-hour day at the recent meeting of the association at Oakland, Cal. Mr. Mahon advocated one day rest in seven. Among other things he said that contracts covering labor agreements should be for two years instead of one and that there should be arbitration without suspension of work.

Seniority Rule Discussed

During the proceedings a delegate from Vancouver suggested changing every two or four weeks between the day and the night men. The present association rule calls for seniority in selecting runs. The association voted for a pension plan for men members of more than twenty years' standing who had reached the age of sixty-five.

Mr. Mahon indicated that the one-man car was here to stay. The attitude of the officers of the association toward the one-man car was that the locals should try to get as much extra wages as possible for operating this type of equipment. It was recommended that the locals should be permitted to handle this matter. With further regard to the operation of these cars, Mr. Mahon said the men should be protected at crossings.

Would Fix Size of One-Man Car

A recommendation was adopted favoring the passage of a law against one-man cars except those not more than 25 ft. long, with seats for not more than thirty passengers, equipped with an emergency exit door and automatic emergency control and brake, and on which the operator is not required to collect fares while engaged in operating the car.

It was further voted to increase the dues of the association.

In a talk which he made on the situation affecting the former employees of the International Railway, Buffalo, Mr. Mahon said:

> Members of the Amalgamated throughout the country stood by the men in Buffalo and I want to say to their everlasting credit that they have helped to preserve the Amalgamated, and "Mittenism" is as dead as a door nail in the United States and Canada today.
>
> My friends, what we have done in Buffalo has set a lesson; it has shown what we can do; and if all our members will only be as true and loyal as the men of Buffalo, and stand as they have stood, they will never defeat the Amalgamated Association on this continent.

Massachusetts Towns Worried

Begin to Fear for Their Future at Prospect of Withdrawal of Railway Service—Review of Affairs Affecting More than 80 Miles of Road

HOPE has been shattered that the Massachusetts Supreme Court would prove a modern Moses in showing the Northern Massachusetts Street Railway a way out of its sea of financial difficulties, enabling it to continue operation of its lines. Foreclosure by bondholders on Dec. 31 has been ordered unless the property has been disposed of as a whole, or in part, prior to that time. D. P. Abercrombie, the receiver, has been authorized to continue or discontinue service on all or any lines of the corporation at any time he may see fit, but it is anticipated that he will operate the greater part of the road until Dec. 31.

Public Shows Its Concern

Threatened with the loss of virtually their only public means of transportation the residents of the possible trolleyless territory are beginning to show real concern. Gardner, one of the principal centers of the system, has asked its City Council to take action to provide transportation for residents, Templeton residents complain the town will be hard hit by the suspension of the lines, storekeepers and patrons in Athol are disturbed, and in the other towns served by the railway there is a growing realization of what the loss of the trolleys will mean.

The Northern Massachusetts serves far-flung territory, not very populous, it is true, but territory with a network of trackage that has knitted together a big section of the northern part of Worcester County. Even so, the facilities afforded by the railway have been at the command of approximately 125,000 persons, if not more. Nevertheless, in this territory there lives the type of suburban resident who believes in the convenience, yes, and even the necessity, of the automobile. The discontinuance of the lines will be no great hardship to this class of patrons except possibly during the winter months. The automobile owning class, however, is restricted in numbers. On the other hand, many daily wage workers will suffer who have not acquired the wherewithal for maintenance of motor cars.

At Orange, one of the extremities of the line, there is not much call for transportation of workers. It is a small town and few live sufficiently far from employment to find the trolley a convenience. It is, however, a necessity in travel to other towns. Starting there, the line runs to Athol, another thriving manufacturing town, spread out more and with greater need for adequate transportation facilities. This branch was formerly the Athol & Orange Street Railway. At one time, the travel between Athol and Orange was heavy.

The largest center beyond Athol for the Northern Massachusetts is Gardner, a city of population estimated at close to 20,000. Big chair factories and other industries abound. While the working forces at Gardner are recruited largely within the city, the suburban territories send no small number of laborers. Gardner has two central villages and the travel between them is heavy. It has more modern stores than have surrounding towns and over the weekends draws throngs of shoppers, many of whom have found the trolley a necessity. The shopkeepers are the persons who really are worried at the passing of the trolley. They fear it will affect business, but are hoping there will come a way to meet the emergency.

Gardner is the center for the lines that pass through Templeton and its villages, where are virtually no trading centers. From Gardner there is also a branch that runs to Winchendon, another large town, the residents of which find the trolley very useful in traveling to the larger trading centers. There is a summer park between Winchendon and Gardner, maintained by the railway, that enjoys large patronage.

From Gardner the Northern Massachusetts main line runs through Westminster and into West Fitchburg, connecting with the lines of the Fitchburg & Leominster Street Railway. Fitchburg is an industrial city of 43,000 with up-to-date stores. It is the objective of residents living in towns and cities to the northwest, the very territory which the railway serves.

No Help from Steam Lines

The railroads offer no avenue of escape to the residents confronted with the prospects of losing the trolley. There is passable steam service between Gardner and Fitchburg, but that is the extent of the railroad convenience offered. Between the other towns and cities now served by the trolley trains are few and far between and offer little inducement for travel by that means. They have not been a convenience and in many of the towns the railroad station is an impossible distance from the main village.

Other inconveniences are threatened. Three of the post offices, Templeton, East Templeton and Otter River, all receive mail by trolley. The accommodating trolley has also carried books between the branch libraries. Students attending the high school in Baldwinville, one of the villages of Templeton, are transported by trolley, as are many children attending elementary schools.

Residents of Templeton, overlooking their own patronage of the bus, place the blame for the predicament of the trolleys on the selectmen and the Gardner City Council. They declare the decrease of the trolley receipts is mainly due to issuance of jitney licenses.

In fact, Templeton is taking the trolley passing more to heart than most of the towns. Leading residents fear the discontinuance will seriously hurt the few industries in its various villages as virtually all of the manufacturing plants get their fuel by way of the trolley. The discontinuance of such service will mean a long haul of coal as well as increased expense.

At a meeting in Athol on Nov. 26 it was voted to institute steps for the purchase of the section of the Northern Massachusetts Street Railway running between Athol and Orange, with a view to maintaing this line in operation after retirement of the Northern Massachusetts on Dec. 31. A committee composed of representatives of the two towns was appointed to canvass for subscriptions for the purchase of the line. Although sentiment favored the electric railway, a proposal has been made to put on several buses between the two towns.

Gardner's next move is, perhaps, the most eagerly awaited, for the trolley abandonment will be of direct concern to a larger number of people there than any other place. Already experts from a bus company are preparing a survey and report for the installation of a permanent bus line to take care of every possible transportation need. There are buses now in operation between some sections of the city drawing their chief patronage from the workers in the factories. There is no dearth of taxicabs operating almost on a jitney fare level between the Gardner railroad station and the center of the city known as West Gardner. They claim patronage is encouraging.

The only possibility of Gardner retaining permanent railway service is for the city or private interests to take over a part of the corporation's lines and operate them. This possibility is considered remote.

Similar Situation on Connecticut Valley Line

Judge DeCourcey of the Massachusetts Supreme Court on Nov. 16 ordered a decree entered directing D. P. Abercrombie, receiver for the Connecticut Valley Street Railway, to cease operating all lines of that system by March 1, 1924. The receiver is empowered to issue $10,000 on a receiver's certificate to pay bills. Petitions for foreclosure of mortgages on lines of the Amherst and Turners Falls divisions have been filed. The court advised attorneys to confer concerning the sale of the company's properties and report to the court.

The Northampton Chamber of Commerce has considered how to keep the line from Northampton to Amherst in operation, and it is hoped that the Holyoke Street Railway will take over that line and also the line running from Northampton to Hatfield, operating these lines and allowing the section farther north, through Whately and Deerfield to Greenfield, to be discontinued. It seems probable that the service between Greenfield and Turners Falls will be replaced with a bus service.

Rental the Question—Report Praises P. R. T. Activities

After making a study of transit development in Philadelphia and the question of what rentals the Philadelphia Rapid Transit Company should pay, the transit committee of the Real Estate Board recently submitted a report saying that the issue, so far as new lines are concerned, is up to the new administration.

The report states that the size of the transit property the city will build depends on the amount of rent the Philadelphia Rapid Transit Company can afford to pay. This in turn resolves itself into the question whether it is better for the city to build a small transit property to serve a comparatively small number of people with rapid transit and get a high rent, or whether it is better for the city to build a larger transit property supplying rapid service to greater numbers and accepting a lower rental, but getting the additional interest on the investment through increased real estate values. In the opinion of the Real Estate Board's committee that is the question that will have to be settled in working out an operating agreement.

The report reviews the activities of the company during the present year in the matter of track extensions and new equipment saying that the company spent more this year than in any other year in this respect. Horace Groskin, chairman of the committee, said that this was proof that the Philadelphia Rapid Transit Company had not only kept faith with the worker in higher wages and with the stockholder in dividends, but also with the people of Philadelphia in the matter of service.

Removal of Part of New York Elevated Suggested

Julius Miller, Borough President of Manhattan, has proposed that the Sixth Avenue elevated structure be torn down and that a subway be constructed along its route without incurring the obligation of one cent on the city. His suggestion was contained in a communication to the Board of Estimate. Mr. Miller set forth that owners of property amounting to $20,000,000 along the proposed route from the Battery to Fifty-ninth Street had agreed to submit to an assessment to bear the cost of removing the elevated and building the subway, which is estimated at about $25,000,000. He expressed the hope that the owners of all of the property involved, which totals about $260,000,000, would agree to the project.

At an assessment of one-tenth of the value of the property, Mr. Miller pointed out, the financial burden would be lifted from the city and shifted to those whose property would benefit. He also proposed that the assessment be spread over ten years, which would result in a 1 per cent assessment a year.

Mr. Miller brought his plan up at this time because the Board of Estimate had called a public hearing on Dec. 14 on relocating the columns of the Sixth Avenue elevated structure. He has already asked the Corporation Counsel to frame a bill giving the city the right to go ahead with his project.

Main Entrance at Wilson and Broadway to New Uptown Station, Chicago

Orders Physical Connection in Tulsa

The Oklahoma Corporation Commission has issued an order requiring the St. Louis-San Francisco Railway and the Sands Springs Railway to make physical connection with the Oklahoma Union Railway at Tulsa so as to facilitate the handling of freight in carload lots and less over the lines of the Oklahoma Union Railway. The Oklahoma Union Railway operates an electric interurban line between Tulsa and Kiefer, Okla., a distance of 18.84 miles.

New Uptown Electric Station in Chicago

The Chicago Elevated Railroads and the Chicago, North Shore & Milwaukee Railroad have augmented the station facilities at Wilson Avenue, formerly laid out primarily to serve the elevated, by the construction of a new depot underneath the elevated structure. The new station is of quite imposing appearance, both inside and out. It is located on the north side of Wilson Avenue at the intersection with Broadway, which is at the center of the uptown district on the North Side. It will serve the through passengers of the North Shore line and the Evanston division of the elevated. Local passengers from and to Wilson Avenue will be handled from the station on the opposite side of Wilson Avenue, and therefore the local and through passenger business will be separated.

The building is of brick and tile construction with terra cotta facing. The interior is decorated with art marble for flooring and side walls up to the height of the wainscoting. The grand staircase leading up to the track level is exceptionally attractive and provides a generous passageway for passengers. The total cost of the building, including the cost of removing the building which previously occupied this site and was owned by the elevated railroad, was approximately $200,000.

The Waiting Room Facilities Are Pleasing in Appearance and Generous

The Grand Stairway Leading to the Platform Above; Ticket Booths and Comfortable Waiting Benches Near By

Wages Advanced 1.65 Cents in Philadelphia

As was reported in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 8, the Philadelphia Rapid Transit Company has granted a wage increase to its trainmen, effective Jan. 1, 1924 amounting to about 1.65 cents an hour over the 1923 average scale. Under the new agreement the men will receive 67½ cents and of that 2½ cents will go into the dividend fund. At the end of the year each employee will be credited with 10 per cent of his year's earnings. The new basic rate is placed at 65 cents and with the 10 per cent wage dividend it will amount to 71.5 cents. In 1923 the average rate has been 63.5 cents with a 6.35 wage dividend. Employees of the Philadelphia Rapid Transit Company are paid by agreement according to the average paid in Cleveland, Chicago and Detroit. The increase involves an outlay of approximately $550,000 to the company.

Discussing the wage matter President Dunbar said:

> At the beginning of 1923 the wage based on the trainmen's 62.5 cents per hour was thought to be as high as wages would go. This, with a 10 per cent co-operative wage dividend thereon, was considered possible of accomplishment. When the three-city average wage brought up to 64 cents an hour on May 1 the wage dividend was still thought possible of accomplishment, but when the three-city average went to 67.5 cents June 1 it was at once seen impossible to pay this large increase and in addition pay a 10 per cent co-operative wage dividend.
>
> Upon the explanation being made that the continued purchase of P. R. T. stock for the workers' account depended upon the payment of the full 10 per cent wage dividend, all employees at once agreed that the equivalent of 3.5 cents per hour should be deducted from the three-city average wage, to which they were entitled, and paid to the trustees of the wage dividend fund, the wage of 64 cents per hour being thereby continued.

President Dunbar referred to Mr. Mitten's desire to have the basic wage at 65 cents an hour. He said that the company, however, would have to make up the $50,000 which it was short in the full earning of the present year's $1,850,000 wage dividend, but that even with that in mind he strongly approved increasing the basic wage to 65 cents and endeavoring to earn and pay a 10 per cent co-operative wage dividend during 1924.

Rockford Traction Applies Again for Franchise Grant

The Rockford City Traction Company has made a second application to the City Council of Rockford, Ill., for a franchise grant. The last franchise application was voted down in a referendum on Dec. 12, 1922. In the present application the company proposes not to pay for any new paving or repaving of any street upon which its tracks are now or shall later be laid. It proposes, however, to pay for repairs to pavements within the length of its cross ties, with such materials as may be ordered by the City Council.

With the exception of the paving clause the franchise application is practically the same as the original one, including the rate of fare, double tracks on Seventh Street, relaying of rails on State Street in business districts and extension of lines to city limits on East State Street and to Black Hawk Park on Fifteenth Avenue.

The new traction application makes no provision for a referendum. Early action on the franchise application by the Council is expected.

The company's franchise expired on Oct. 3 last, and the company has been operating since that time on a special permit granted by the Council.

Would Compel Railroad to Halt Cars at Crossing

A hearing was held before the Public Service Commission on Dec. 5 on a complaint filed by the State Bureau of Highways against the Hudson Valley Railway, Glens Falls, N. Y., asking that the crossing at grade at the Waterford-Mechanicsville county highway and said company's railway shall be protected. The crossing in question is located immediately north of Waterford on the highway leading from Albany, Troy and Cohoes to Saratoga and points north. The highway will be reconstructed next season. The State Highway Bureau at the hearing asked for an order directing the cars of the railway to come to a dead stop before crossing the highway. It was shown that there are nineteen passenger trolley cars and four express cars that cross this highway daily, together with about 1,500 automobiles. The automobile traffic will be heavier when the highway is rebuilt of concrete.

The decision of the commission will be announced later and will be received with more than ordinary interest, as the request itself "to bring transportation to a stop before crossing a highway" marks a departure from the accepted practice of a railway crossing a highway, almost since the inception of the railway itself.

Recent Booklets Furnish Excellent Examples of Publicity

Three examples have recently been presented of real efforts by utilities to tell their story to the public through the printed page. The corporations issuing the booklets are the Public Service Corporation of New Jersey, the Middle West Utilities Company and the United Light & Railways Company. The Public Service booklet is one of eighty pages. It covers the twenty-year period of the company from 1903 to 1923. Twenty years of real service furnishes the text. More than 60,000 copies of the booklet have been distributed. The Middle West booklet is one of sixty-four pages. It is entitled "Essential Service in Fifteen States." The United Light & Railways has seized upon the results secured by it during the year 1922 to tell its story. This is essentially an annual report, but it is excellently arranged and has been made most readable by the presentation of considerable material not until recent years regarded as suitable to be introduced into such matter of fact affairs as an annual report.

Full Operation Restored in Saginaw

Full operation has been restored by the Saginaw Transit Company, Saginaw, Mich. It is believed that in this respect a record has been established. It was on Sept. 26 that the car shops were opened and repairs to equipment started. New switches were laid, track and overhead repairs made. Cars were made ready for operation, and twenty-five buses were ordered. Twenty are at Saginaw and in service. Thirty-two street cars are at present available for service.

During the first month's operation with competition from jitneys and only 25 per cent of the equipment in use, the company carried 466,800 passengers. Of these, 393,307 were revenue passengers, 73,027 transfer pasengers and 466 rode on passes. On Dec. 8 the company carried nearly 30,000 revenue passengers. This is much better business than was expected, Charles S. Kressler, general manager of the company, said.

The company has ninety-two operators, nearly all of whom knew little or nothing about street car or bus operation prior to Nov. 1.

The return of street cars has caused a traffic problem. The City Council wants two men on the double-truck cars to facilitate loading and unloading. Mr. Kressler says this means receivership for the company. He advocates the construction of loading docks in the business district to relieve the congestion. The Council will probably follow his suggestion.

Maine Company Seeks Relief from Reconstruction Order

The Public Utilities Commission of Maine will hear the appeal of the Androscoggin & Kennebec Railway, Lewiston, from certain regulations and requirements made by the municipal officers of Brunswick relative to the reconstruction and resurfacing of Main Street in that town. The regulations ordered the railway to reconstruct a certain portion of Main Street and stipulated that the expense of resurfacing the track location should be paid by the company, and the expense of the cement surfacing of the remainder of the street should be assumed and borne by the town of Brunswick. It is the contention of the railway that the municipal officers acted entirely beyond their authority, for it claims that about one-half the total distance named in the order is entirely covered in, and constitutes the subject matter of an order of the Public Utilities Commission, dated July 11, 1921, which is still in force and with which the town of Brunswick has neglected to comply. The company also maintains that the requirement that the company bear the entire expense is unjust and unreasonable, and that the character and kind of paving and resurfacing ordered are unreasonably expensive and unnecessary.

Railway Secures Injunction to Prevent Discrimination.—The Waterloo, Cedar Falls & Northern Railway has been granted an injunction against the city of Cedar Falls, Iowa, restraining the city from enforcing an ordinance compelling buses to follow certain routes within the city limits. The road alleged discrimination by the City Council between buses operated as an adjunct to the railway between Cedar Falls and the Iowa State Teachers College on Normal Hill and buses operated by a rival company.

Franchise Granted.—The franchise of the Tri-City Railway asking permission to operate its cars into Milan, Ill., without further hindrance was granted T. C. Roderick, general manager of the Illinois division, by the Milan village board of trustees in session. The franchise is for twenty years.

Elevated Will Be Continued.—Contrary to statements early in 1923 that the Public Utilities Department of Seattle planned to abandon the municipal elevated railway paralleling the waterfront, Superintendent of Railways D. W. Henderson states that the elevated will be continued in use, as at present. In order to reroute the cars so as to abandon the elevated, it would be necessary to build a long trestle, an expensive structure for which the Seattle Municipal Railway has no funds available at present.

Must Explain Failure to Build.—The Wisconsin Railroad Commission, concerned at the thirteen years' delay of the Milwaukee Western Electric Railway to begin construction of its proposed electric railway from Milwaukee to Beaver Dam and from Sussex to Waukesha, has requested executives of the company to appear before the commission at a hearing to present facts, plans and other data involving the building of this line. Certificates granting permission to begin construction and operation of the line were issued in 1910.

Would Reconsider Roof Erection.—The City Council of Youngstown recently passed and later voted to reconsider a resolution authorizing the Pennsylvania-Ohio Electric Company to increase its capital stock to permit the erection of roofs on the loading platforms in Central Square. Council President Backus announced that he had not signed the ordinance because he believed it contained no provision for a decrease in capital stock if later the platforms should be removed. Commissioner Engle added that according to the franchise such increases remain permanent. The amount involved is $3,000.

Will Investigate Accidents.—John P. Stouch, former city commissioner and city controller, has been named as investigator of accidents, in the claims department of the Altoona & Logan Valley Electric Railway, operating in Altoona, Tyrone and Hollidaysburg. The position is a newly created one. Mr. Stouch will investigate all reports, taking over that branch of the work handled by Attorney Samuel B. Hare.

Hearing on Shawmut Branch.—The Public Utilities Commission by an act of this year's Legislature held a hearing recently to determine what price, not exceeding $1,000,000, the city of Boston should pay the New York, New Haven & Hartford Railroad for the tracks, roadbed and other equipment of the Shawmut Branch. The act provides for the purchase by the city of the Shawmut Branch in connection with the new rapid transit extension in Dorchester, which, it is estimated, will cost about $4,000,000. This extension has been referred to previously in these columns. Attorney Joseph P. Lyons, assistant corporation counsel for the city, who attended the hearing, said the city in financing the project would make a profit because the act provided that the Boston Elevated, which is to use the tracks, shall rent the property from the city and shall pay one-half of 1 per cent more than the city pays in interest on the bonds, this amount to be placed in sinking funds and used to pay off the bonds. The city, according to Mr. Lyons, would therefore ultimately get its money back and still own the branch.

Foreign News

Progress Slow on Central American Property

During 1922 some progress was made on the Government railway (Ferrocarril de los Altos) to connect Quezaltenango with the International Railways of Central America at San Felipe. Work was begun on this railway several years ago, but because of the war, the difficult engineering problems involved, and heavy construction costs, progress has been very slow. The motive force is to be electricity. The electric equipment and railway material are being purchased in Germany.

Trolley System as Auxiliary in Salvador

It is proposed to install a trolley system to replace the storage-battery cars now running on the main line of the International Railways of Central America, Salvador Division. This trolley system will be used merely for trips through the main streets of the city of San Salvador to and from the station.

Electrification Progress in London District

Electrification plans of the Southern Railway of England are progressing and construction work is now being begun. This company is a consolidation under the railways act of 1921 of the London & Southwestern Railway, the London, Brighton & South Coast Railway and the Southeastern & Chatham Railway. Each of these companies had electrification schemes for its suburban lines leading out of London, the first two for extensions and the Southeastern for an initial installation.

The accompanying map shows the extent of the electrification ordered. On the southwestern section, formerly the London & Southwestern Railway, plans have been approved for the extension of the electrification to Guildford and Dorking. This work, along with that on the other sections, will cost about £5,000,000, and it is intended that it will be completed by the end of 1925. The arrangements will provide for carrying on the electrified lines 200,000,000 passengers per annum.

Altogether the Southern Railway now has 85 miles of route and 248 miles of track of electrified lines. This will be increased to 145 miles of route involving 358 miles of single track.

The following figures give the estimated cost of the electrification.

LONDON, BRIGHTON & SOUTH COAST SECTION	
Line equipment	£276,600
Motors and trailers	395,000
SOUTHEASTERN SECTION	
Conductors and rails	£786,000
Electric equipment of rolling stock	730,000
Substations and d.c. feeders	720,000
Conductor rails and track bonding	515,000
Electric light and supply system	200,000
High-tension feeders	315,000
Repairs to stations	300,000
New car sheds	100,000
Repair and inspection shops	110,000
Signaling, permanent way, drainage, etc.	324,000
SOUTHWESTERN SECTION	
Extension to Guildford and Dorking	£840,000

The "Underground" Extension to Hendon

The London Electric Railways has opened its extension from Golders Green to Henden, Central, together with an intermediate station at Brent. The new portion of railway is 1.63 miles in length. The work includes, in addition to the two new stations at Brent and Hendon, an enlargement of the Golders Green Station, a fine girder bridge across the Golders Green Road, and a viaduct, 30 ft. high, over the River Brent. An extension, 3.05 miles in length, is also under construction forward to Edgware, with intermediate stations at Colindale, 1.31 miles, and at Burnt Oak, 2.21 miles from Hendon. From the terminus at Edgware to that at Clapham Common will be 16.44 miles, which will be covered, without any change of carriage, in 49 minutes.

Line Under Construction in Bolivia

An electric line in Bolivia, 56 miles in length, is under construction. It will extend from the town of Cochabamba toward Chemore.

Financial and Corporate

Reorganization Affairs Reviewed

Committees Representing Kansas City Railways Holders Issue Appeals and Consider Prospects

A circular dated Dec. 8 has been addressed to the noteholders of the Kansas City Railways to inform such holders regarding the status of affairs of the Kansas City Railways. Accompanying the circular is a preliminary report of the reorganization committee. It is explained that the reorganization committee was formed recently through action taken by the committee representing the noteholders and by the committee representing holders of first mortgage bonds.

The membership of this committee is composed as follows: Melvin A. Traylor, president of the First Trust & Savings Bank, Chicago, chairman; H. L. Stuart, Halsey, Stuart & Company, Inc., Chicago; J. K. Newman, Newman, Saunders & Company, Inc., New York; J. F. Downing, president of the New England National Bank, Kansas City, Mo., and P. W. Goebel, president of the Liberty National Bank, Kansas City, Mo., and the Commercial National Bank, Kansas City, Kan.

COMMITTEE REPORTS PROGRESS

The reorganization committee explains that it is doing everything possible to expedite reorganization. It says that it has made a tentative settlement of the litigation, controversies and claims arising as a result of personal injuries and damages prior to the receivership. This settlement contemplates that a plan of reorganization will be submitted in the near future for approval by the various security holders and other creditors. The committee says, however, that in the event an adjustment of the various claims against the company is not secured the first mortgage upon the property will be foreclosed.

So far as the operation of the property is concerned, the committee explains that for the first ten months of 1923 the total income from all sources was practically the same as for the similar period of 1922. Net earnings, however, showed an increase. Revenue passengers for the first ten months of 1923 numbered 112,436,921, as compared with 112,325,578 for the first ten months of 1922. In view of the very intense jitney competition at the commencement of the receivership, the elimination of the jitney as a factor in transportation at Kansas City is regarded as a very important accomplishment.

On Dec. 7 the holders of the second mortgage bonds, Series A and B, of the Kansas City Railways were addressed in regard to the affairs of the company. At the suggestion of a number of holders of these bonds a committee has been organized consisting of Eugene V. R. Thayer, New York, chairman; Frederick J. Horne, vice-president of the New York Trust Company, and H. P. Wright, H. P. Wright Investment Company, Kansas City.

The original protective committee represented all issues of the funded debt. As the circular to the holders of the second mortgage bonds explains, there were apparent certain conflicts of interest between the issues of securities represented with the effect that the protective committee found it advisable to discontinue representing the bond-secured notes and the second mortgage bonds. The original committee, changed somewhat as to personnel, continued to represent the first mortgage bonds. A separate committee was formed to represent the noteholders. No committee was formed at the time to represent the second mortgage holders. In making its plea for deposits the committee representing the second mortgage holders said:

> Recently, in anticipation of a reorganization, the committees representing the first mortgage bondholders and the secured noteholders appointed from their number a joint reorganization committee. This committee has entered into negotiation with various classes of creditors claiming priority, including the personal injury judgment creditors and claimants, in an attempt to work out an amicable solution of the controversies and accomplish a reorganization without the delays and expense incident to final judicial determination of the issues involved in the litigation. Conditional agreements have been arrived at between certain of the interests. The court has indicated a desire, and it is obviously essential, that representatives of the second mortgage bondholders be constituted and empowered to negotiate and, if found advisable, conclude amicable agreement with reference to the second mortgage bonds, or, as an alternative, to continue the litigation if need be.

As has been indicated previously in the ELECTRIC RAILWAY JOURNAL, the court has set Dec. 27 as the day for hearing and passing upon such agreements as may have been made between the various claimants and has stated that, in the event substantial progress toward amicable adjustment has not been made at that time, the matter will be set down for judicial determination on Jan. 7.

Receiver's Duties Extended

A. L. Reynolds, general manager of the Washington-Virginia Railway, has been appointed receiver for the property of the company in the District of Columbia by Justice Hitz in the District Supreme Court. Mr. Reynolds had previously been appointed receiver for the company in Virginia by Judge Brent in Circuit Court at Fairfax.

Provides for Expansion

United Light & Railways Company Arranges for Larger Capitalization —Special Dividends Declared

Changes in the corporate structure of the United Light & Railways Company, Grand Rapids, Mich., to provide for prospective growth and development have been announced.

At the present time the combined debt and capital stock of the company, at face value, total $55,917,253, the capitalization of outstanding stock of the United Light and subsidiary companies in the hands of the public amounting to $23,120,453 and the fixed debt totaling $32,796,800. The new capitalization will be "substantially larger," it is announced.

The corporate title of the new company will be the United Light & Power Company. It will be organized under the laws of Maryland. The present company is a Delaware corporation. Elimination of inheritance taxes for non-resident stockholders, issuance of stocks of no par value, and distribution of more profitable securities to stockholders are listed as some of the major advantages of the new plan.

All of the assets of the old company, subject to mortgage liens and indebtedness, will be sold to the new United Light & Power Company, and the securities of the latter will be distributed in equitable proportion, according to classes and preferences, to the stockholders of the United Light & Railways Company, the present corporation.

It is announced in the same connection that the old company will acquire in the near future all of the common capital stock of the Iowa Electric Power Company, which will construct, own and operate a large power plant on the west bank of the Mississippi near Davenport, Iowa. Erection of this power station has already been announced in this publication.

The Grand Rapids, Grand Haven & Muskegon Railway, the Mason City & Clear Lake Railroad and the Tri-City Railway are among the railways controlled by the company.

DIVIDEND DECLARATIONS ANNOUNCED

At a meeting of the board of directors of the United Light & Railways Dec. 6 the regular quarterly dividend of 1¼ per cent was declared on the first preferred stock of the company, payable Jan. 2.

There was also declared the regular quarterly dividend of 1¾ per cent on the participating preferred stock of the company, payable Jan. 2. A special dividend of one-quarter of 1 per cent on the participating preferred stock, payable Jan. 2, 1924, was declared at the board meeting which was held on March 8 last.

There was also declared the regular quarterly dividend of 1¼ per cent and an extra cash dividend of three-quarters of 1 per cent on the common stock of the company, payable on Feb. 1, 1924, to common stock holders.

Selling Stock Part of Employee's Job in Quincy and Peoria

All divisions of the Illinois Power & Light Corporation, Chicago, are actively engaged in the campaign for selling the 7 per cent preferred stock which is being offered only in the State of Illinois. Large cards advertising this stock will be placed in the interurban cars, and folders describing the stock and how it may be purchased will be carried in all the cars. The cars in Peoria and Quincy are now carrying front-end banners reading "7 37/100 per cent with Safety—Ask the Conductor." Here it is that the conductor has the advantage of explaining in detail how it is possible to invest in the preferred stock of the Illinois Power & Light Corporation on a basis that gives a liberal and regular return. In many cases, according to "Current Topics," the official publication of the company, sales of stock have been traced directly to the conductor. This method of advertising is being used in Peoria and Quincy first, as these divisions furnish transportation service only and the employees there do not have the advantage of talking to their customers over the counter as do the employees of the electric and gas properties. Employees of the Illinois Power & Light Corporation are still privileged to buy its 7 per cent preferred stock on the same basis that has prevailed since the stock was first offered. Up to the present time about 61 per cent of the members of the company family are owners of the securities of their company.

Increase in Passengers Carried in Baltimore

The Industrial Bureau of the Board of Trade, Baltimore, has issued a report showing the number of passengers carried by the United Railways & Electric Company, Baltimore, for the first ten months of 1923 as compared with the corresponding period of 1922. The report follows:

	1923	1922
First six months	119,847,962	115,160,811
July	19,701,606	19,653,996
August	19,377,492	19,379,492
September	19,143,158	19,346,983
October	20,586,863	20,360,456
	198,657,081	193,901,738

Interurban Reorganization in Michigan Completed

Reorganization of the interurban system connecting Jackson, Lansing, Battle Creek and Kalamazoo, Mich., has been completed, according to announcement made on Dec. 10 by the reorganization committee. The system was formerly owned by the Michigan United Railways, which went into receivership in December, 1922. Former holders of the bonds of the Michigan United Railways are receiving under the reorganization plan $500 face amount of the bonds of the new company and $600 par value of its Class A preferred stock for each $1,000 face amount of the old bonds. Holders of debentures and preferred stock of the predecessor company are entitled to participate in the issue of Class C preferred stock of the new company.

As has been indicated before in the ELECTRIC RAILWAY JOURNAL, John F. Collins, the Federal receiver, will be operating manager of the Michigan Electric Railway, the successor company.

Auction Sales in New York

At the public auction rooms of A. H. Muller & Sons there were sold on Dec. 12 the following securities:

200 shares of Tennessee Electric Power, second preferred, $47 per share.

$55,000 of Boise & Interurban Railway first mortgage 5 per cent gold bonds, $100 lot.

200 shares Interborough Consolidated, $1 lot.

100 shares Interborough Consolidated Corporation, preferred, $7 lot.

Court Suggests Settlement of Mortgage Liens.—Judge Moynihan in the Circuit Court at Detroit, Mich., has handed down a decision that an allocation of responsibility between the city and Detroit United Railway must take place for the purpose of settling a $5,000,000 mortgage executed by the railway with a number of trust companies Jan. 24, 1922. The mortgage is one of a number of liens on the city lines of the Detroit United Railway when the latter were purchased by the city. Judge Moynihan invited attorneys for the city and the company to come before the court and agree to an equitable solution of the difficulty.

Loss Sustained.—The Dubuque Electric Company, Dubuque, Iowa, in the operation of its traction lines sustained a loss for operations during 1922 and 1923. Although figures show a book profit depreciation, replacement and other costs have not been figured. According to the report, the gross operating revenue in the railway department for the twelve-month period ended Oct. 31 last, was $368,392, with total operating expenses of $357,150.

Receiver Appointed.—Fred Alderman has been named receiver for the Hocking-Sunday Creek Traction Company, Nelsonville, Ohio. Mr. Alderman is an Athens, Ohio, banker.

More Lighting Properties Taken Over by Chicago Interests.—Properties of ten operating Missouri public utility companies in the central part of the state have been acquired by the newly organized Missouri Power & Light Company, Mexico, Mo., the common stock of which is owned by the North American Light & Power Company. The North American Light & Power Company is closely associated with the Illinois Power & Light Corporation in the ownership and management of public utility properties in Illinois, Missouri, Iowa, Kansas, Nebraska and Oklahoma. Another Illinois public utility property, that of the Monmouth Public Service Company, Monmouth, Ill., has been purchased by the Illinois Power & Light Corporation.

Another Hearing on Abandonment.—A further hearing will be held before Commissioner Pooley at Buffalo on Dec. 17 in the matter of the application of the International Railway for approval of a declaration of abandonment of part of its line in Niagara Falls.

Faces New Problem.—A new problem in finance confronts the Boston Elevated Railway. Having taken over the West End Street Railway, which formerly constituted the surface lines as distinct from the elevated lines of the company, it is now trying to fund some of the indebtedness and encounters a peculiar limitation. Under the laws of Massachusetts the Elevated can issue bonds equal to the stock plus the premiums paid into the treasury in connection with the sale of stock; but now it develops that the Elevated cannot issue bonds against the premiums that were paid in connection with the issuance of West End Street Railway stock. In the early days of railway operations in Boston high premiums were paid for both Elevated and West End stock, and if the Elevated today were permitted to take advantage of the West End premiums it could issue new bonds. The Elevated board of public trustees has petitioned the Legislature for legislation to remedy this situation.

Elected to Executive Board.—Travis H. Whitney, the Transit Commission representative on the board of directors of the Brooklyn-Manhattan Transit Corporation, has been elected a member of the corporation's executive committee.

Extra Common Dividend Declared by Canadian Road.—The Ottawa Traction Company, Ottawa, Ont., has declared an extra dividend of 2 per cent in addition to the regular quarterly dividend of 1 per cent, both payable Jan. 2, to stock of record Dec. 15. The stock is all of one class.

Mortgage Gold Bonds Offered. — A syndicate, headed by Harris, Forbes & Company, New York, N. Y., is offering $8,500,000 of the Northern States Power Company first lien and general mortgage gold bonds, known as series A 6 per cent. The bonds are offered at 97½ and interest, yielding about 6.20 per cent. They are dated Nov. 1, 1923 and are due Nov. 1, 1948. Upon completion of the present financing the company will control practically all of the common stock of the Wisconsin-Minnesota Light & Power Company.

Foreclosure Action Against Interurban Averted.—Possible legal action by bondholders against the Oregon Electric Railway, operating in the Willamette Valley in Oregon, whose earnings have been below operating expenses, has again been averted by the announcement of the parent company, the Great Northern and the Northern Pacific, that the semi-annual interest due Nov. 1 on the $2,000,000 of outstanding 5 per cent first mortgage bonds would be paid. The bond interest is $50,000. The deficit for the current year is estimated by W. F. Turner, president of the Spokane, Portland & Seattle Railroad, the holding corporation, at $300,000.

Traffic and Transportation

Startling Station Statistics

More Than 53,000,000 Fares Collected at Times Square Station in New York in One Year

The rapid transit traffic center of New York is for the first time at an uptown point. It has shifted to Times Square from Brooklyn Bridge during the past fiscal year. According to figures compiled by the Transit Commission from the reports of traffic at the various stations on the lines of the Interborough and B.-M. T. systems, the number of rapid transit fares collected at the Times Square stations went ahead of the number at the downtown traffic center by nearly 1,250,000. The figures just compiled are for the fiscal year ended June 30 last.

The fares collected at the Times Square station during the year were 53,835,135, as against 49,036,746 in 1922. At the Brooklyn Bridge center there were 52,613,113 passengers, as against 51,758,609 the year previous. Thus Times Square, with a gain of 4,798,389 passengers, forged ahead of the Brooklyn Bridge center, which gained only 824,504 passengers. The Times Square figures, moreover, include the fare collections only at the stations of the Interborough West Side subway and at the Broadway B.-M. T. stations, while at the Brooklyn Bridge the figures include collections for the Brooklyn elevated lines at the City Hall station of the Second and Third Avenue elevated lines, at the Brooklyn Bridge station of the Interborough East Side subway and at the B.-M. T. terminal beneath the Municipal Building.

Of the fares collected at Times Square, 34,678,063 represented traffic to the Interborough, and 19,157,072 to the B.-M. T. Incidentally, these figures show that these two stations are the largest from the standpoint of passenger traffic upon either of the individual systems. The Interborough traffic represented an increase of 2,711,826, while that on the B.-M. T. showed a gain of 2,086,563. Up to two years ago the traffic on the Interborough at Times Square was practically equal to that at Grand Central Station. While it has grown at the latter point, it has not grown at the rate which marked the increase at Times Square. The great bulk of the B.-M. T. line traffic has been developed in a little less than six years, the B.-M. T. station having been first placed in service on Jan. 5, 1918. The present Times Square station of the Interborough was opened to traffic on Aug. 2, 1918. The fare collections of both systems at Times Square were greater than those upon the entire length of several of the branches of both systems, exceeding for instance, combined totals of stations on the Queensboro subway, the Pelham Bay Park Branch, the Jerome Avenue Branch and the Lenox Branch on the Interborough, and of several of the elevated and subway branches of the Brooklyn system.

Among the important Brooklyn traffic centers, together with the figures of passengers, are the following:

ATLANTIC AVENUE	
I. R. T. Atlantic Ave. Station	15,620,943
B.-M. T. Pacific Street Station	7,555,989
B.-M. T. Atlantic Ave. (Brighton Line) Station	2,050,452
B.-M. T. Atlantic Ave. "L" Station	1,581,205
	26,808,589
FLATBUSH AVENUE—FULTON STREET	
B.-M. T. Dekalb Ave. Station	10,681,184
I. R. T. Nevins St. Station	8,918,708
B.-M. T. Fulton St. Line Station	3,125,835
B.-M. T. Fifth Avenue "L" Line Station	1,496,376
	24,222,103
BOROUGH HALL	
I. R. T. Station	13,467,607
B.-M. T. Court St. Station	4,343,488
B.-M. T. Boerum Pl. "L" Station	1,143,919
B.-M. T. Myrtle Ave.-Court St. "L" Station	964,081
	19,919,095

Of the above stations, Atlantic Avenue gained approximately 641,000 over last year; Flatbush Avenue and Fulton Street about 1,665,000, and Borough Hall about 450,000.

The most important stations, from the standpoint of traffic, on the Interborough system are the following, with the figures of fares collected in both the fiscal years 1922 and 1923:

	1923	1922
Times Square	34,678,063	31,966,237
Grand Central	33,137,199	29,938,128
Penn. Station	27,772,768	25,009,851
14th St. (E. S. subway)	18,430,910	16,966,522
Atlantic Avenue	15,620,943	15,545,431
Brooklyn Bridge	15,162,584	14,984,289
Borough Hall	13,467,607	13,845,912
Fulton St. (E. S. subway)	13,663,465	13,530,045
14th St. (W. S. subway)	11,840,502	10,949,399
86th St. (E. S. subway)	10,516,093	10,266,701

The most important stations on the B.-M. T. subway and elevated lines are as follows:

	1923	1922
Times Square	19,157,072	17,070,509
34th Street	16,434,286	14,723,077
Union Square	15,936,475	14,721,993
Coney Island Terminal	14,908,399	13,868,226
Brooklyn Bridge ("L")	13,886,717	13,908,471
Chambers Street	13,808,395	13,238,249
Essex Street	11,776,459	11,126,708
Cortlandt Street	11,459,474	10,466,274
DeKalb Avenue	10,681,184	9,552,077

The total Interborough subway traffic last year was 676,650,431, a gain of 31,674,957, while the elevated traffic was 348,524,700, a gain of 7,484. The total B.-M. T traffic, which is not segregated as to subway and elevated lines, on account of joint operation, was 480,900,869, a gain of 36,153,641.

Taxpayer Wants Cincinnati Fare Kept to Five Cents

Raising the new point that the Cincinnati Traction Company could not be permitted by the city of Cincinnati to charge more than a 5-cent fare, Attorney Robert S. Alcorn, as a taxpayer, has filed suit in the Hamilton County Superior Court against the traction company seeking to enjoin it from charging the present rate of fare, which is 8 cents, or any fare other than the 5-cent fare stipulated in the enabling act which was passed by the Ohio State Legislature and under which the railway system was leased to the traction company by the Cincinnati Street Railway.

At the time the lease was made the Cincinnati Street Railway had no other authority than was contained in the act, the petition declares, and it further sets up that no other authority different from that contained in the act ever has been procured or enacted by the Ohio Legislature. For this reason, Attorney Alcorn contends the Cincinnati Traction Company now can have no authority to charge more than the maximum fare charged by the Cincinnati Street Railway, its lessor, which was 5 cents for a continuous ride in the same direction.

It is the contention of Attorney Alcorn that, notwithstanding the city ordinances passed by Council under which the Cincinnati Traction Company increased its rate of fare the traction company could receive no authority so to do, because of the fact that such acts by the Council were inconsistent with the enabling legislation by the state, which never has been changed, he avers. Attorney Alcorn asks that the court enjoin collection of more than a 5-cent fare from passengers. City Solicitor Saul Zielonka was asked to bring the suit, but refused, Alcorn says.

Preliminary reports of the Cincinnati Traction Company for the months of October and November indicate the receipts of the company will not equal the amount necessary to meet the various items of the service-at-cost franchise, and that another increase of one-half-cent in fares is in prospect, Jan. 1. This will make the rate of fare 8½ cents. If the increase is determined upon—and that appears probable—official notice of the increase will be posted by the traction company on Dec. 15.

Railway at Youngstown Protests Jitney Licenses

The Youngstown Municipal Railway filed a protest on Dec. 4 with the Public Utilities Commission against the issuing of certificates under the new motor bus law to sixty Youngstown operators of "jitneys" who have made application for authority to operate. The applications are set for hearing Dec. 12.

Ross Raymond, head of the jitney men, filed the applications in Columbus. He is to file other applications

within a few days that will bring the number of jitneys licensed by the State to operate in Youngstown above the 100 mark, if the applications are granted.

The commission recently refused to grant Mr. Raymond a blanket franchise for all the jitneys and instructed him to make separate application for each.

The ordinance prohibiting jitneys from entering the congested district was passed by City Council of Youngstown Dec. 3 as an emergency measure.

Councilman Parrock fathered the ordinance at the request of Street Railway Commissioner Engle, who said that the "jitneys must go if the street railway is to exist."

The ordinance provides for a fine of not less than $5 or more than $10 for the first conviction and from $10 to $25 for subsequent convictions.

Allentown Employees Give Advice to Auto Driver and Owner

The Lehigh Valley Transit Company, Allentown, Pa., through its general safety committee is carrying on a campaign for the reduction of accidents between automobiles and its cars. The general safety committee called on patrons who owned and drove automobiles and talked to citizens relative to highway accidents in order that cooperation could be had between the drivers of automobiles and the trainmen of the transit company. This committee is composed of motormen and conductors of the Lehigh Valley Transit Company, who have compiled a few thoughts which they have printed in pamphlet form and are distributing to auto owners and drivers. The pamphlet gives in detail statistics of grade crossing accidents and general news of automobile accidents. It warns against careless driving especially in the coming holiday season. The pamphlet states that the committee is trying to do its part and is urging Mr. Auto Owner and Auto Driver to do their part. In the opinion of the committee 99 per cent of all accidents could be eliminated by respect for the rights of others and strict observance of road rules.

Another Employer in New York Staggers Hours

In an attempt to "stagger the peak" of subway traffic congestion, the Brooklyn Edison Company announced on Dec. 11 that it had reorganized the schedule of 1,000 employees in the office of its auditing department at the main office in Pearl Street, Brooklyn, so that they would arrive at work at 8:30 and 8:45 a.m. instead of 9 o'clock. If the system shows beneficial results it will be extended to all the 6,000 employees of the company. This is the third instance of a large business organization in New York City following the recommendation of the Transit Commission for improving transit traffic conditions pending the construction of new subways The others are the Texas Company and Corn Products Refining Company.

Special Christmas Shoppers' Service Put On by Chicago Elevated

Special express service throughout the day for the convenience of Christmas shoppers was started on all of the divisions of the Chicago Elevated Railroads early in December. This service is designed to encourage use of the elevated during the shopping period and is made particularly convenient by operating these trains around the loop structure which embraces the heart of the shopping district.

Time-tables announcing the new service have been distributed at all elevated stations and have stimulated travel during the non-rush periods. The "Shoppers' Specials" are scheduled from 9:18 a.m. to 4:13 inbound and 9.55 to 4.50 outbound. They carry conspicuous signs at the front ends of the trains. On the backs of the time cards is printed an announcement of the new service and a list of the benefits to be derived by the public.

Safety Order Effective. — Accepting the proposition made voluntarily by the Rockford & Interurban Railway, designed as a safety measure to protect auto traffic at dangerous crossings, the Wisconsin Railroad Commission will enter an order effective at once requiring all interurban cars running between Beloit and Janesville to slow down to 5 miles an hour within 100 ft. of the town line bridge and after sundown to stop at points where the tracks cross the adjoining concrete highway.

Fares Increased. — The Mississippi Valley Electric Company operating in Iowa City with both trolley and buses, recently increased its fare from 5 cents to 7 cents, according to J. O. Schulze, president. No opposition to the increase was entered by the city or by citizens.

More Truck Lines for D. U. R.—The Detroit United Railway has organized the Detroit United Railway Trucking Company to operate between Jackson and Sturgis, Mich. The truck line will serve as a feeder for the electric lines, connecting with them at Jackson. It will afford freight service to and from Detroit to a territory which has hitherto been difficult to reach.

Will Hear Increased Fare Request.— The State Railroad Commission of Florida, will hear in the City Council chamber of Jacksonville, on Dec. 17 the petition of the Jacksonville Traction Company for an increase in fares. The company now charges 7 cents for fares in the city, with concessions to school children. It does not ask for any fixed increase.

Additional Parlor Train Car in Service. — The Milwaukee Northern Railway placed in service recently an additional parlor train car between Sheboygan and Milwaukee, which is known as the "Sheboygan Limited." It will be a sister car to the one that is now running as the "Lake Shore Limited."

Fare Bills Appear at Washington.— Bills have again begun to appear in Congress directed against the local railways operating in the District of Columbia. A bill by Mr. McKellar, referred to the committee on the District of Columbia, would prohibit the local Public Utilities Commission from fixing rates of fare for the street railways of the District in excess of those that are stipulated in their charters. A bill introduced in the House would provide one-half fare for children riding on the street railways within the District of Columbia, "and for other purposes."

Veiled Prophet Brings Business.—All previous records for the United Railways, St. Louis, were broken on Oct. 2, the day of the visit of the Veiled Prophet to that city, when 1,007,615 revenue passengers were hauled, and the receipts totaled $70,533. In addition there was 869 children's fares and 473,674 transfer passengers, the grand total being 1,482,158 passengers. A total of 1,465 cars was in service, twenty-eight more than were put into service on a similar occasion last year. There were no serious accidents on the record day. The previous record was set on Oct. 5, 1920, when the gross receipts were $69,595. On that occasion a visit of the Veiled Prophet again brought out the record business.

Will Readjust Zones. — Despite the fact that the Virginia State Corporation Commission granted it permission to increase its revenue by 5 per cent on the Richmond-Petersburg Interurban line, General Manager John E. Harvell of the Richmond division of the Virginia Railway & Power Company stated recently that no increase in fares would go into effect, but that a readjustment of zones would be substituted. He said that in accordance with the orders of the commission the company would arrange to correct what the commission considered inequalities in the fare zones by making the mileage of the respective zones more uniform. Further, he stated that the company would simplify its commutation tickets by issuing only one form or one fifty-trip book. Heretofore the company issued four different kinds of tickets, and five different kinds of books. The changes go into effect Dec. 16.

Eight-Cent Fare Continued. — The Nebraska State Railway Commission has continued indefinitely the 8-cent fare on the lines of the Lincoln Traction Company and fixed a valuation of $2,824,000 for the company's property. The valuation is about $100,000 less than the total outstanding capitalization of the company.

Another Aid to Safety.—The Portland Railway, Light & Power Company, Portland, Ore., has placed safety islands, made of strong timbers, at various points along congested street railway lines, with the view of lessening traffic congestion at these points, and adding to the safety of the patrons of the lines it operates.

Personal Items

Barron Collier Subject of Magazine Sketch

Barron Collier is the subject of a personal sketch in a recent issue of the *National Magazine* which brings out forcefully the multifarious activities of the man. The work of Mr. Collier in the railway field is too well known to need reiteration here. Except to his intimates, however, it appears unlikely that all the various activities and interests of the man are known. Mr. Collier was born in Memphis, Tenn., in 1873, and there laid the foundation for the present nationally known Collier service. Some pertinent quotations from the article follow:

"One of the most graphic, dynamic charts of the business of the United States is the great panoramic display in the street cars containing the Collier advertisements. These cars run night and day. Think of it, 50,000 cars—and there are some advertisers who appear in these cars continuously.

"Barron Collier sees things quickly and acts decisively and works as hard in public service, without salary, as in his own business.

"A small list of his activities today would cover a page or two of 'Who's Who.'

"Mr. Collier owns, among other great properties, famous Luna Park, the most original place of amusement in the world.

"American to the core, he has been pointed out as a true type of one of the eminently successful men in this great age of business expansion primarily through the magic of advertising.

"The genius of Barron Collier as an executive is reflected in his talents as a toastmaster and entertainer.

"It is recognized, even in the swirl of busy activities in New York, that Barron Collier is about the busiest man in the metropolis. He seems to have a masterful grasp of what to do today to make things go on tomorrow."

In conclusion the writer says that all the multifarious Collier activities keep right on moving and developing under the magic and forceful leadership of Mr. Collier, who, after all is said and done, "is just a great, big human, full of the spirit of constructive helpfulness for his fellowmen."

C. A. Brooks Manager Again in Poughkeepsie

Charles A. Brooks has again been made manager of the Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., from which position he resigned about a year ago to go into the automobile business. He succeeds the late R. J. Morrisson. Mr. Brooks is well acquainted in the territory served by the company with which he has again become identified. It was a little more than ten years ago that he entered its employ. Prior to that time he had been engaged in similar activity with the Third Avenue Railway, the South Shore Traction Company and on properties in the Central West.

F. R. Phillips Heads Pennsylvania Association

Official of Pittsburgh Railways Elected President at Meeting in Harrisburg on Dec. 4

F. R. Phillips, acting general manager of the Pittsburgh Railways, was elected president of the Pennsylvania Street Railway Association at the meeting held in Harrisburg on Dec. 4. Mr. Phillips was formerly superintendent of equipment of the Pittsburgh Railways. This position he held from 1910 until July, 1923, when he was appointed to succeed the late P. N. Jones. Before

F. R. Phillips

going to Pittsburgh Mr. Phillips was master mechanic of the Cleveland Railway. He entered the employ of that company in 1894 after leaving high school in Cleveland. When the Cleveland City Railway and the Cleveland Electric Railway were consolidated in 1903 as the Cleveland Electric Railway Mr. Phillips accepted the position of master mechanic of the Cincinnati, Newport & Covington Railway. Subsequently, he became chief engineer in charge of all but the transportation department of the Michigan United Railway, in Lansing. In 1906 Mr. Phillips entered the employ of the Ohio Brass Company, Mansfield, as designing engineer in charge of railway overhead work, and made a study for that company of the electric railway conditions of most of the large cities of the United States east of the Mississippi River. In July, 1908 he became master mechanic of the Cleveland Traction Company, in charge of buildings, shops and equipment. Mr. Phillips is the inventor of a number of railway devices and has appeared before several railway commissions as an expert.

Mr. Phillips has been very active in the activities of the American Electric Railway Engineering Association, serving not only as a member of committees but as chairman of important committees. From 1916 to 1919 he was president of the Engineering Association. During 1922-1923 he served as a member of the committee on standards and also as a member of the special committee to study methods of voting on standards on the unit basis.

Obituary

Sir William Mackenzie

Sir William Mackenzie, one of Canada's empire builders, died in Toronto on Dec. 5. Sir William's name is inseparably linked with the building of both the Canadian Pacific and the Canadian Northern Railroads. He was one of the foremost Canadian promoters of electric railway, light and power companies. For thirty years he was head of the Toronto Railway.

He was also one of the promoters of utility enterprises in South America and had a large interest in the Brazilian Traction, Light & Power Company, which operates the tramway and power properties at São Paulo and Rio de Janeiro. Sir William was also interested in the Winnipeg Electric Railway and was a director of the Shawinigan Water & Power Company and the Canadian General Electric Company. He was president of the Monterey (Mexico) Railway, Light & Power Company for years. He was the senior partner of the well-known building firm of Mackenzie & Mann. With the changes wrought by the war Sir William was forced, as he grew older, to drop many of his responsibilities and the chief enterprises in Canada with which he had been concerned passed to others and the group of so-called Mackenzie financiers was dissolved. Sir William was born in Kirkfield, Ont., in 1849.

William V. Brumby, head of the publicity department of the United Railways, St. Louis, Mo., died in St. Louis, of pneumonia, on Dec. 7. As head of the publicity department of the railway for the last six years, Mr. Brumby was editor of the *United Railways Bulletin* and also *Trolleygrams*, published periodically by the company, to keep its patrons advised of company activities, etc. For a time he was also editor of *Know St. Louis*, a weekly journal dedicated to boosting St. Louis. Prior to his connection with the United Railways, Mr. Brumby was city editor of the St. Louis *Republic* and later was managing editor of the St. Louis *Star*. He was born in Atlanta, Ga., forty-seven years ago and had resided in St. Louis about sixteen years. He was one of St. Louis' best known newspaper men.

Manufactures and the Markets

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

Reconstruction in Japan

Rolling Stock in Tokio Is Being Replaced Rapidly by the Local Car Builders

Although no accurate statistical figures are yet available concerning the extent of the damage done by the recent earthquake to the Japanese railways the report of American engineers who were in the country at that time gives a rough idea of the resulting destruction. In the municipality of Tokio there were formerly about 2,500 electric railway cars. The rolling stock was being added to at the rate of approximately 200 cars a year, of which two-thirds were double-truck cars and one-third single truck. It is said that upwards of 1,000 cars were destroyed by the earthquake and the fire which followed it. Orders have already been placed for 500 new cars to replace those demolished. It is understood that these orders have been given to Japanese firms who will build the equipment in Japan. Only the air-brake material is being purchased in the United States, and the car bodies, trucks, motors, etc., all will be made in Japan.

In the Yokohama district even less is known concerning the extent of the damage and subsequent plans for replacement. It is likely, however, that practically all of the rolling stock was destroyed.

Electrification Work Will Probably Continue

A great deal of damage was also done to the Imperial Government Railway and its substations. Orders for the replacement of much of this material have already been given and described on these pages in the previous issues. It is expected that no change will be made on account of the catastrophe in the plans to continue the electrification work.

Just what effect the earthquake will have on plans for subway construction in Tokio is problematical. Before the calamity occurred, three companies had been organized to build subways in that district. Plans for financing this work had been almost completed and actual construction would probably have commenced within a short time. The earthquake, however, has focussed a great deal of engineering attention on the comparative merits of various types of construction in Japan. It seems doubtful whether the subway plans will be carried out until a careful study has been made to show how different structural designs withstand such shocks. If it is found that the usual methods of subway construction are unsuitable for conditions in Japan and that more expensive methods will have to be employed it may cause the curtailment or even the abandonment of the project.

Satisfactory Year for General Electric Predicted

According to latest available estimates, the General Electric Company at the end of the current year will have finished one of the most satisfactory years in its history with production at top speed and orders near to a record rate. The company should show at the end of the current year new orders booked well over $300,000,000 and goods billed of about $270,000,000. For the first half of the year new business reached the record volume of $164,000,000, easily exceeding production. Subsequent orders declined some 20 per cent, but of late an upward trend has taken place. More than $90,000,000 in unfilled orders will be carried into 1924 as compared with $76,000,000 this year. Working capital will be somewhat reduced compared with the approximate $180,000,000 at the close of 1922. Cash and government securities should amount to around $80,000,000 at the end of 1923, a reduction of $5,000,000 being explained by increased business and new plant construction. It is generally expected that the company's business will hold up at about the same level as this year. No recent large orders for railroad electrification have been placed, but several important railroads are contemplating electrification.

Price of Bituminous Coal Is Steady

No marked change has occurred in the price of bituminous coal at the mine during the past eight weeks. During this time the cost per ton has ranged between $2.20 and $2.25. Prior to that there was a steady decrease in price from an average of $3.66 per ton during the first quarter of the year to $2.66 for the second quarter and $2.41 for the third quarter.

The present price level is below that of any recent year. In 1922 the average for the first three months was $2.18 per ton but thereafter the price level was much higher, reaching the maximum of $5.35 during the third quarter. In 1921 the price ranged between $2.89 in the early part of the year and $2.31 in the latter part of the year. The average price for the year 1920 was $5.64 and for the year 1919 it was $2.59. It is interesting to compare the present price of $2.25 per ton with that of 1913, when bituminous coal at the mine cost $1.23.

Railways Are Buying Larger Trolley Wire

A somewhat general tendency to use trolley wire of larger diameter has been noticed by the Bridgeport Brass Company in its recent orders from electric railways. In the past the No. 00 size has been the wire in greatest demand, although the No. 0000 size has been used to some extent by the street railway systems in the larger cities, and the No. 0 wire has been in some demand for the smaller properties. Lately, however, the number of orders for No. 000 wire has shown a marked increase. The smaller sizes are still being bought for replacement work where such sizes are the standard and for lines where the traffic is very light. But for ordinary conditions of city service many railways seem now to require the larger sizes.

U. S. Economic Prosperity Certain

Analyzing the situation in the United States in regard to its susceptibility to the influence of European misfortunes, it would seem that this country is so strongly buttressed by its natural advantages and so largely self-contained as an economic and financial unit that it is likely to be comparatively immune from the serious conditions in other countries. This is the opinion of F. H. Sisson, vice-president of the Guaranty Trust Company, delivered in an address on the economic outlook in Europe before the Economic Club of New York. In referring to the United States foreign trade, which has the most direct interest, he said that when the markets in Great Britain and on the Continent were in normal activity they absorbed between 60 to 70 per cent of American exports. In comparison with pre-war averages of exports to Europe the volume of the present trade is not diminished, while the value has increased materially. Considering the extremely adverse conditions that have existed these facts indicate that the United States is likely to retain a fairly satisfactory volume of trade with the Continent. It was his belief that American economic stability was a fact. To emphasize this he pointed to the almost unlimited production of raw materials, food and manufactures.

Metal, Coal and Material Prices

Metals—New York	Dec. 11, 1923
Copper, electrolytic, cents per lb.	13.15
Copper wire base, cents per lb.	15.75
Lead, cents per lb.	7.25
Zinc, cents per lb.	6.61
Tin, Straits, cents per lb.	46.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.50
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.45
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags	$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.94
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.93

Rolling Stock

Cleveland, Southwestern & Columbus Railway's twelve new lightweight interurban cars are equipped with four General Electric No. 265 35-hp. motors and single-end K-35 control with straight airbrake equipment and CP-27 compressors. The purchase was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 17.

General Electric Company, Schenectady, N. Y., has announced some of the details of the order received by it from the city of Detroit for 100 four-motor car equipments for use in new cars to be operated by the Municipal Railways of that city. They will be installed on Peter Witt double-truck type cars, duplicates of 250 such cars now in use. The order calls for No. 265 motors with K-35 single-end control and CP-27 compressors. Fifty complete air brake equipments were also ordered.

Morris County Traction Company, Morristown, N. J., suffered the loss of a car shed at Dover on Dec. 9 as the result of a fire which destroyed the building, two safety cars, two 400 class steel cars and three 310 class semi-convertible. One steel car and one snow sweeper were slightly damaged. There was also some damage done to the sand drying house. A storeroom containing a part of the regular supplies was also destroyed. The total loss of the building and supplies amounted to approximately $65,000, largely covered by insurance. Full service on the entire line was restored within three hours after the fire. No plans for replacement have been discussed.

Montreal & Southern Counties Railway, Montreal, Canada, ordered during 1923 one trailer for suburban use and one baggage car from the Ottawa Car Company.

Track and Line

Durham Public Service Company, Durham, N. C., during 1923 rebuilt 2,100 ft. of single track.

Lafayette Street Railway during 1923 built 1,500 ft. of track extension and rebuilt 832 ft.

Aurora, Elgin & Chicago Railroad, Fox River Division, rebuilt during 1923 3 miles of city track and 4½ miles of interurban track.

Cincinnati Traction Company during 1923 built 5,764 ft. of track extension and rebuilt 24,254 ft.

El Paso Electric Railway, El Paso, Tex., will complete shortly the laying of new steel on the Sheldon "loop." The new steel cost $70 a ton for ordinary and $300 to $400 a ton for special work. About $19,000 was spent on special work steel.

Clinton, Davenport & Muscatine Railway, Davenport, Iowa, has received authority to lay a service track over the combined tracks and right-of-way of the Burlington, Milwaukee and Davenport, Rock Island & Northwestern Railroads east of Davenport in order to ship in materials for the new $12,000,000 superpower plant which the United Light & Railways company is erecting at that point. The Clinton, Davenport & Muscatine Railway is a subsidiary of the United Light.

Iowa City Electric Railway, Iowa City, Iowa, is making an extension on its North Dodge Street line.

Manitowoc & Northern Traction Company, Green Bay, Wis., during 1923 laid 1,110 ft. of new rail.

Eastern Wisconsin Electric Company, Oshkosh, Wis., has completed track repair and improvement work to the southern end of the north and south divisions of its system in Sheboygan.

Des Moines City Railway will be able to put into operation before Christmas the new Crocker Street line as far as Thirty-third Street.

New York, N. Y.,—The Transit Commission has announced that a public hearing will be held on Dec. 21 at its office upon the draft form of contract for the construction of the crosstown subway. Plans are now practically completed for the section extending under Bedford Avenue from DeKalb Avenue to Keep Street. Commissioner Harkness stated that unless substantial changes were needed in the contract, the advertising for bids for this section should promptly follow the holding of the public hearing which is required by the rapid transit act. The advertisement for bids might be looked for possibly the latter part of this month, but surely the first part of January.

Power Houses, Shops and Buildings

Los Angeles Railway recently completed its Fifty-fourth Street substation building. It was built at a cost of approximately $21,000, and will house machinery to improve the power facilities in the southwest section of the city.

Ottawa Electric Railway, Ottawa, Canada, is constructing a building adjoining its Albert Street carhouse which will contain a modern substation. The building will be 200 ft. long and 35 ft. wide. It will be of reinforced concrete, steel and brick construction and fireproof throughout. A Westinghouse commutating pole synchronous rotary converter of 2,000-kva. capacity, six-phase alternating current, 600 volts direct current will be installed in the substation next month. This is one of the largest of its type in Canada. The 600 volts direct current will be carried in underground conduits in lead cable to the overhead trolley and feeder circuits and rail returns. The garage will be used for the storage of the company's motor cars and trucks and will also contain the linemen's quarters as well as workshop and stores for the line department.

Pacific Electric Railway, Los Angeles, announces work is to commence at once on two additional automatic substations to take care of increased traffic on its Long Beach, Newport Beach, Hollywood and Glendale lines, involving an estimated expenditure of $245,000. The substation to take care of increased traffic on the company's Hollywood and Glendale lines will be erected at Second and Toluca Streets, Los Angeles, and will provide the increased power requirements for 100 new cars soon to be placed in service on the company's Hollywood lines. The second automatic substation is to be erected at North Long Beach, where traffic has rapidly increased due to the development of the Long Beach industrial district. During the past year more than $800,000 has been expended by the company for increased power facilities.

Trade Note

Pantasote Company, Inc., New York, N. Y., has been changed from a partnership to a corporation. It is now known as the Pantasote Company, Inc.

New Advertising Literature

Westinghouse Electric & Manufacturing Company, East Pittsburgh, has issued three descriptive leaflets dealing with railway motors and electric locomotives. Leaflet Number 20,124 gives specifications for the Class B-1 50-ton locomotive, including ratings of hourly continuous and maximum capacity. The particular application of the locomotive is described and the details of its construction are enumerated. Leaflet Number 20,125 contains specifications for the No. 562 railway motor. It gives hourly and continuous capacity ratings, as well as a descriptive paragraph of the application of the motor and a table indicating the performance of a 50-ton locomotive equipped with four of these motors. The third, Leaflet Number 20,047, gives specifications for the Number 557 railway motor. This contains essentially the same information regarding the No. 557 motor as leaflet No. 20,125 regarding the No. 562 motor. The only difference is that the table on the first page of this publication is one to determine the suitability of the motor for a desired schedule.

Oakite Chemical Company, New York, N. Y., in its November-December issue of "News Service" has some interesting information with illustrations on how to clean cars. The company has also available a new sixteen-page booklet, entitled "Cleaning in Railroad and Car Shops," which will no doubt be of use to railway executives.

PEACOCK

Notice the Peacock Staffless Brakes

on the modern double-truck cars!

The Peacock Staffless

Chosen because they are lighter, occupy least platform space and require little or no maintenance. These reasons are all strong ones! But even stronger is this final clincher — Peacock Staffless Brakes possess a braking power which will even lock the wheels; and sufficient chain-winding capacity to overcome any possible condition of slack-rigging or worn brake shoes.

Especially suitable for the medium-weight one-man, two-man, double-truck car.

National Brake Company, Inc.
890 Ellicott Sq. Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Company, Limited, Montreal, Canada

BRAKES

Bankers and Engineers

The Value of the Statistical Number

The following is an excerpt from the record in a recent court proceeding:

Q. Have you some figures taken from the ELECTRIC RAILWAY JOURNAL?

A. I have.

Q. What is the ELECTRIC RAILWAY JOURNAL?

A. It is a publication generally recognized as an authority on street railway operation.

Q. Have you the figures shown by the ELECTRIC RAILWAY JOURNAL of the cars ordered by city railways within the United States during the eleven years past?

A. I have.

Q. How many cars have been ordered during the past eleven years in the United States?

A. 28,417.

Q. Of that number, how many were open cars?

A. 342.

Q. Have there been any open cars ordered within the United States, according to the articles of the ELECTRIC RAILWAY JOURNAL, since 1916?

A. No.

Q. In 1916 how many cars were ordered?

A. 3,046.

Q. How many of these were open cars?

A. 131 were open cars, or 4.31 per cent.

Q. As you state, no open cars have been ordered since 1916. Is that correct?

A. That is correct.

Q. What was the total number of cars ordered in 1917?

A. 1,998.

Q. In 1918?

A. 1,842.

Q. In 1919?

A. 2,129.

Q. And the following year?

A. 2,889.

Q. And in 1921?

A. 1,059. I might add that these figures cover cars for city service only.

Tie-up with this!

Testimony, like that reprinted at the left, indicates the reliance placed on the Statistical Issue of ELECTRIC RAILWAY JOURNAL.

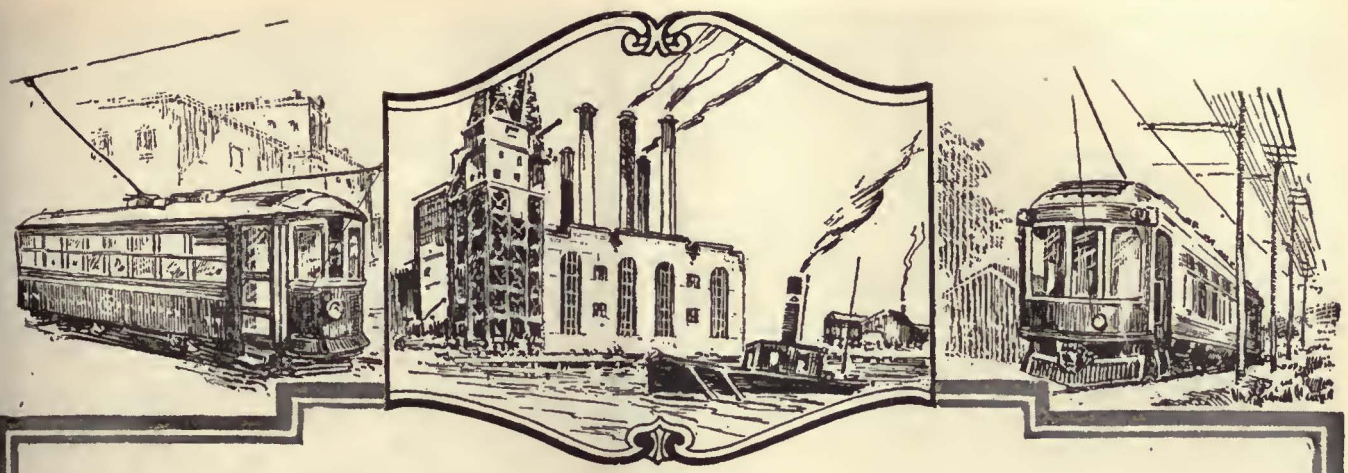
We repeat—the Annual Statistical Issue is depended upon — used — re-used and kept for reference.

Your advertisement in such a medium will command attention.

Our Service Department will gladly co-operate in the preparation of appropriate and effective advertising copy without charge. Space rates on request.

JANUARY 5, 1924
ELECTRIC RAILWAY JOURNAL
The Annual Statistical and Review Number

ELECTRIC RAILWAY JOURNAL
Tenth Avenue at Thirty-sixth Street, New York



THE TEXAS COMPANY U.S.A. TEXACO PETROLEUM PRODUCTS

Do You Know What a TRADE-MARK is for?

Possibly you think a trade-mark is put on goods to protect the manufacturer, so that no competitor can imitate his product.

That's only partly true.

The real purpose of a trade-mark is to indicate the origin of the goods so that the public can be protected.

In other words, a buyer, once having bought a trade-marked article, will know later on, at future purchases whether to seek or to avoid products bearing the mark in question.

So, then, a trade-mark should protect the buyer.

The Texaco Trade-Mark does protect the buyer of lubricants.

Every barrel, every can of oil or grease bearing the Texaco Red Star, Green "T" is manufactured at The Texas Company's refineries and is backed up by a positive assurance of uniformity and efficiency.

The more you think of this, the more it will mean to you.

It means no "picking up" of oils and greases and then branding them with the name of the company who "sells" them—but does not always "make" them.

On the contrary, we repeat, every barrel with the Texaco trade-mark contains oil and grease made and handled from the Crude Product to Delivery exclusively—by TEXACO.

Hence, a Texaco guarantee is a real guarantee.

There is a Texaco Lubricant for Every Purpose

TEXACO

THE TEXAS COMPANY

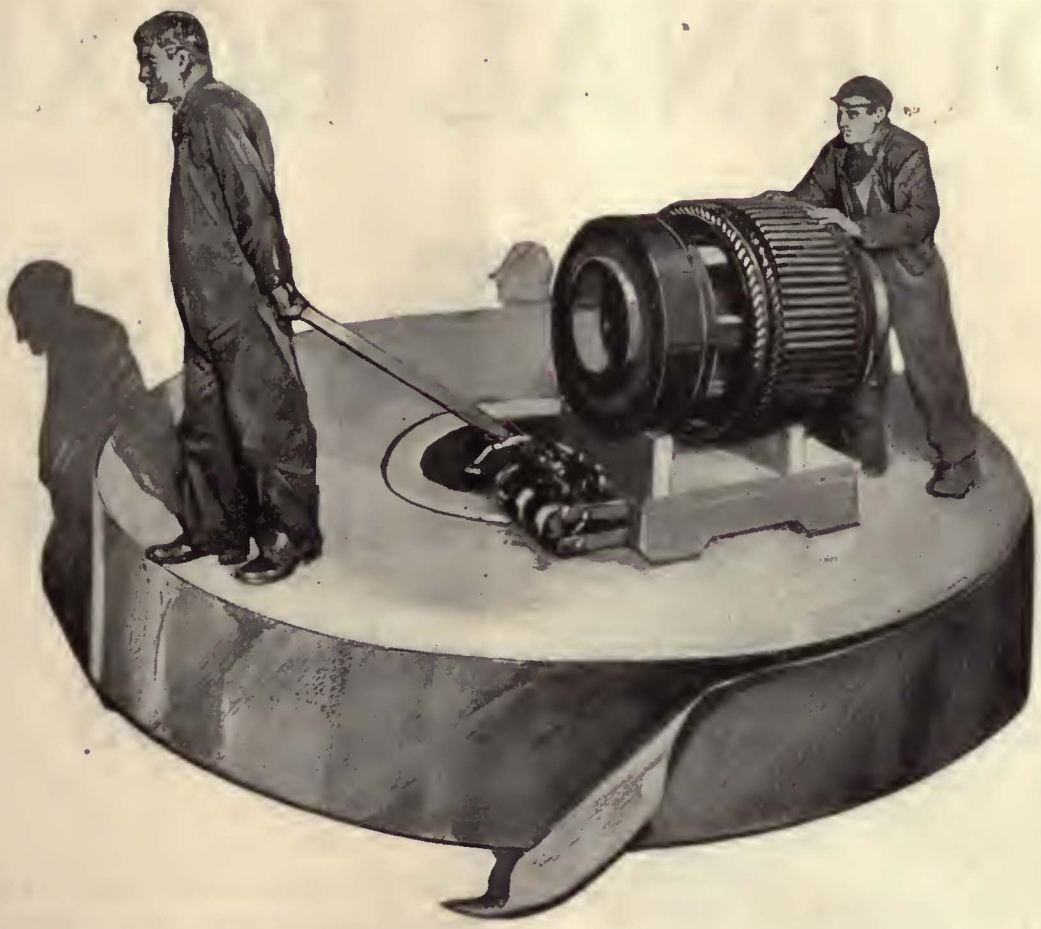
DEPT. R-J. 17 BATTERY PLACE NEW YORK CITY

HOUSTON - CHICAGO - NEW YORK

OFFICES IN PRINCIPAL CITIES

TEXACO


The solid, substantial character of
COLLIER SERVICE
has placed it high among those permanent organizations recognized as National Institutions
Barron G. Collier
INCORPORATED



Putting Insulation Requirements on a Firm Foundation

It is not enough for a motor manufacturer or an industrial plant to standardize on one kind of varnished insulation simply because he buys it from the largest manufacturer of that product such as "Irvington."

It is not enough that today the majority of high tension insulated wires and cables in the United States are protected by Irvington Black Varnished Cambric.

But when we say that in comparison with yellow varnished cambric, Irvington Black Varnished Cambric has 30% higher dielectric strength; 100% better heat resistance; 100% more alkali and acid resistance; 200% better aging qualities; 200% more resistance to oil, no further explanation of the foregoing facts is necessary.

Like many other manufacturers, you can build on a firm foundation, by standardizing on Irvington Black Varnished Cambric Tape.

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.
Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
F. G. Scofield, Toronto
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
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E.R.J.

POSITIONS VACANT

DRAFTSMEN-COMPUTERS wanted on railway trackwork working knowledge of and facility in trigonometry essential. State in letter, age, education, experience and approximate salary. Employment Dept., Bethlehem Steel Co., Steelton, Pa.

SHOP foreman wanted for interurban car shop handling eight or ten cars, doing cleaning, inspection and light repairs; excellent opportunity for right man. State experience and salary expected. P-628, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

ENGINEER of equipment, technical graduate, with several years' experience. PW-623, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation and equipment, with eighteen years' experience, open for position of superintendent or manager, Jan. 1. PW-629, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT of transportation, at present with a large successful property that has been placed on a sound basis largely through efforts of advertiser, solicits correspondence or interviews with managers of city and suburban properties that require effort and ability to get results. A wide practical experience places me in a position to build up an efficient organization that would be a credit to any property. Also recognized as an economical operator, quick to locate leaks and correct same. High grade references from present employers as to character and ability to get results regardless of size or condition of property. Personal reasons for desiring a change. PW-604, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

MASTER mechanic, city or interurban railway; experienced on all branches, fourteen years' experience. PW-619, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

Receiver's Sale of Property and Franchises of Northern Massachusetts Street Railway Co.

Notice is hereby given that D. P. Abercrombie Receiver of Northern Massachusetts Street Railway Company pursuant to decree of the Supreme Judicial Court of Massachusetts, sitting in Suffolk Country, entered November 9, 1923, in the case of William Gilmour v. Northern Mass. Street Railway Company No. 35532 Equity, *will receive sealed bids* for the purchase of all the property and franchises of the Northern Massachusetts Street Railway Company, at the office of the Receiver, Greenfield, Massachusetts, *up to ten o'clock A. M. on December* 27, 1923, at which time said bids will be opened.

The property is to be sold in parcels which are fully described in circular on file at the office of the Receiver in Greenfield. Copies of this circular may be had upon application.

D. P. ABERCROMBIE, Receiver, P. O. Box 614, Greenfield, Mass.

Three Electric Cars

New cars still in the shop, modern in every way, 45 passengers, standard gauge, designed for interurban service in Cuba, each equipped with two G. E. 50 hp. motors for D.C. 1200 v. Acquired by judgment. We will sell cheap.

The Davison Chemical Company
Garrett Building, Baltimore

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago
OFFICES AND PLANTS AT
St. Louis, Mo. Detroit, Mich.
Pittsburgh, Pa.
1324 Woolworth Bldg., New York City.
San Francisco, Cal. McKees Rocks, Pa.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

RAILWAY MOTORS

2—Unused General Electric, type 210-H, 50% of market price.

GEORGE SACHSENMAIER CO.
926 N. Third St., Philadelphia, Pa.

FOR SALE

RELAYING RAIL

30 Tons 5-in. 80 lb. A.S.C.E. Section. Lengths 30-33-ft. Excellent condition.

ALBANY SOUTHERN R. R. CO
Rensselaer, N. Y.

FOR SALE

MOTORS

28 WHs 101-B-2 Motors
10WHs 101-D Motors

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

RAILS

Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morae Standard Gage Gasoline Motor Car; Seats 34 people

ZELNICKER IN ST. LOUIS

400 Tons 65 lb. rails

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Think "*SEARCHLIGHT*" First!

0098

WHAT AND WHERE TO BUY

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

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

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

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

Armature Shop Tools
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.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

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

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Elec. Service Supplies Co.
Int. Register Co., The

Barges, Steel
American Bridge Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Baldwin Locomotive Works
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Bridges & Buildings
American Bridge Co.

Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bus Seats
Hale-Kilburn Co.
Heywood-Wakefield Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Cables. (See Wires and Cables)

Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

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

Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heati'g Co.

Cars, Passinger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Works, P. A.
Wason Mfg. Co.

Cars, Gas, Rail
St. Louis Car Co.

Cars, Second Hand
Davison Chemical Co., The
Rec'v'r Northern Mass. St. Railway Co.
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Car Signal System
Fahnestock Elect. Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

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

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Pantasote Co., The

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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

Cloth, Stencil Silk Sign
Kress & Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.

Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Elec. Devices Co.
Elliot-Thompson Elec. Co.
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co

Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

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

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

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

Cranes
Allis-Chalmers Mfg. Co,
Universal Crane Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.

Crossing Signals (See Signals, Crossing)

Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.

Crossing Manganese
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc., O. M.
Elec. Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., The
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Hyman, Michaels
Indiana Service Corp.
Zelnick Supply Co., W. A.
Transit Equip. Co.

Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm.

Derailing Swiches, Tee Rail
Ramapo Ajax Corp.

Detective Service
Wish-Service, P. Edward

Doors & Door Fixtures
Edwards Co., Inc., O. M.
Hale-Kilburn Co.
St. Louis Car Co.

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.
Rail Welding & Bonding Co.
Seymour Rail Grinder Co.

Electric Rivet Heaters
Amer. Car & Foundry Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Extension Platform Trap Doors
Edwards Co., Inc., O. M.

Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Nat'l Ry. Appliance Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Star Brass Works

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

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Flexlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Elec. Service Supplies Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Funnel Castings
Wharton, Jr., Inc., & Co. Wm.

Furnace, Electric
Pittsburgh Elec. Furnace Corp.

Furniture, Metal Office
Edwards Co., Inc., O. M.

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Carnegie Steel Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind. Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.
Seymour Rail Grinder Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Cattle
American Bridge Co.

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

Hammers Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Pantasote Co., Inc., The

Heaters, Car (Electric)
Consolidated Car Heati'g Co.
Economy Elec. Devices Co.
Gold Car Heat. & Light. Co
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter

Heaters, Electric Rivet
American Car & Fdry. Co.

Helmets—Welding
Railway Track-work Co.

Hoists and Lifts
Columbia M. W. & M. I. Co
Ford Chain Block Co.

Hoists, Portable
Ingersoll-Rand Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Indicating Signals
Oskel Equipment Co

Industrial Co-ordination
Sherman Service, Inc.

Instruments Measuring, Testing and Recording
Economy Elec. Devices Co.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Anderson, M. Co., A. & J. M.
Electric Ry. Equiptmt. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulators (see also Line Material)
Anderson, M. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co., Inc.

Insurance
Travelers Insurance Co.

Jacks (See also Cranes, Hoists and Lifts)
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
Symington Co., The T. H.

Junction Boxes
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Anderson M. Co., A. & J. M.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Lighting Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Anderson, M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Ry. Equipmt. Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wharton Jr., & Co., Wm.

Locomotives, Electric
Baldwin Locomotive Works
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Lockers, Metal
Edwards Co., Inc., O. M.

Lubricating Engineers
Galena Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Co.
Texas Co.
Universal Lubricating Co.

Machine Tools
Columbia M. W. & M. I. Co.

Machine Work
Columbia M. W. & M. I. Co.

Machinery, Insulating
Amer. Insulating Mach. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches Frogs & Crossings
Ramapo Ajax Corp.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Westinghouse E. & M. Co.

Motors and Generators, Sets
General Electric Co.

Motormen's Seats
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Elec. Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Oils (See Lubricants).

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)

Paint Guns
De Vilbiss Mfg. Co.

Paint Spraying Devices
De Vilbiss Mfg. Co.

Paints and Varnishes (Insulating)
Mica Insulator Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Pavement Breakers
Ingersoll-Rand Co.

Paving Brick, Vitrified
Nat'l Brick Pav. Mfrs. Assc.

Paving Guards, Steel
Godwin Co., Inc., W. S.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Power Specialty Co.
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipmt. Co.
Hubbard & Co.
Western Electric Co.

Pole Reinforcing
Hubbard & Co.

Poles & Ties Treated
Baker Wood Preserving Co.
International Creosoting & Construction Co.

Poles, Ties, Posts, Piling & Lumber
Baker Wood Preserving Co.
Bell Lumber Co.
International Creosoting & Construction Co.
Southern Cypress Mfrs. Assn.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Bell Lumber Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipmt. Co.
Elec. Service Sup. Co.

Porcelain, Special High Voltage
Lapp Insulator Co., Inc.

Potheads
Okonite Co.

Power Saving Devices
Economy Elec. Devices Co.
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.

Production Engineering
Sherman Service, Inc.

Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

Pumps, Vacuum
Ingersoll-Rand Co.

Punches, Ticket
Bonney-Vehslage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.

Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rails, Steel
Carnegie Steel Co.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rail Welding
Railway Track-work Co.

Rattan
Amer. Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Reclaimers, Waste & Oil
Oil & Waste Saving Mch. Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.

Repair Work (See also Coils)
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.

Resistances
Consolidated Car Heat. Co.

Resistance, Grid
Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Rivet Heaters, Electric
Amer. Car & Foundry Co.

Roofing, Car
Pantasote Co., Inc., The

Sanders, Track
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.
Edwards Co., Inc., O. M.
St. Louis Car Co.

Sash, Metal, Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.

Seats, Bus
St. Louis Car Co.

Seats, Car (See also Rattan)
Amer. Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seating Materials
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc., The
St. Louis Car Co.

Second Hand Equipment
Albany Southern R. R. Co.
Electric Equipment Co.
Hyman Michaels
Sachsenmain Co., Geo.
Transit Equip. Co.
Zeinicker Supply Co., W. A.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.
Oakes Equipment Co.

Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Elec. Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Elec. Signal Co.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow Sweepers, Rattan
Heywood-Wakefield Co.

Snow-Plows, Sweepers and Brooms
Amer. Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)
Irvington Varnish & Ins. Co.

Special Trackwork
Lorain Steel Co.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steps, Car
Universal Safety Tread Co.

Steel Castings
Wharton, Jr., & Co., Wm.

Steel and Steel Products
Morton Mfg. Co.

Steps, Car
Morton Mfg. Co.
Universal Safety Tread Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Oakes Equipment Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Strand
Roebling's Sons Co., J. A.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands & Fixtures
Ramapo Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Allis-Chalmers Mfg. Co
Anderson Mfg. Co., A. J. & J. M.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Tamper Tie
Ingersoll-Rand Co.
Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Ramapo Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heat. Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Elec. Service Supplies Co.

Tickets & Transfers
Globe Ticket Co.

Ties, All Metal
Metal Safety R. R. Tie Co.

Ties and Tie Rods, Steel
American Bridge Co.
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tongue Switches
Wharton, Jr., & Co., Wm.

Tool Steel
Carnegie Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Torches, Acetylene (See Cutting Apparatus)

Tower Wagons and Auto Trucks
McCardell & Co., J. R.

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Expansion Joints
Wharton, Jr., & Co., Inc., Wm.

Track Grinders
Metal & Thermit Corp.
Railway Track-work Co.
Rail Welding & Bonding Co.
Seymour Rail Grinder Co.

Trackless Trolley Cars
St. Louis Car Co.

Track, Special Work
Barbour-Stockwell Co.
New York Switch and Crossing Co.
Ramapo Ajax Corp.
Wharton, Jr. & Co., Inc., W.

Transfer (See Tickets)

Transfer Tables
American Bridge Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety, Stair, Car Step
Morton Mfg. Co.
Universal Safety Tread Co.

Trolley Bases
Anderson Mfg. Co., A. J. & J. M.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Elec. Service Supplies Co.

Trolley Shoes
Miller Trolley Shoe Co.

Trolley Wheels and Harps
Thornton Trolley Wheel Co.

Trolleys and Trolley Systems
Ford Chain Block Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.
Thornton Trolley Wheel Co.
Western Electric Co.

Trucks, Car
Baldwin Locomotive Works
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Tubing Yellow & Black Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg Co., Inc.

Upholstery Materials
Amer. Rattan & Reed Mfg. Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers
Irvington Varnish & Ins. Co.

Varnished Silk
Irvington Varnish & Ins. Co.

Varnishes
Beckwith Chandler Co.

Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Waste Saving Machine
Oil & Waste Saving Mach. Co.

Welded Rail Joints
Alumino-Thermic Corp.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.

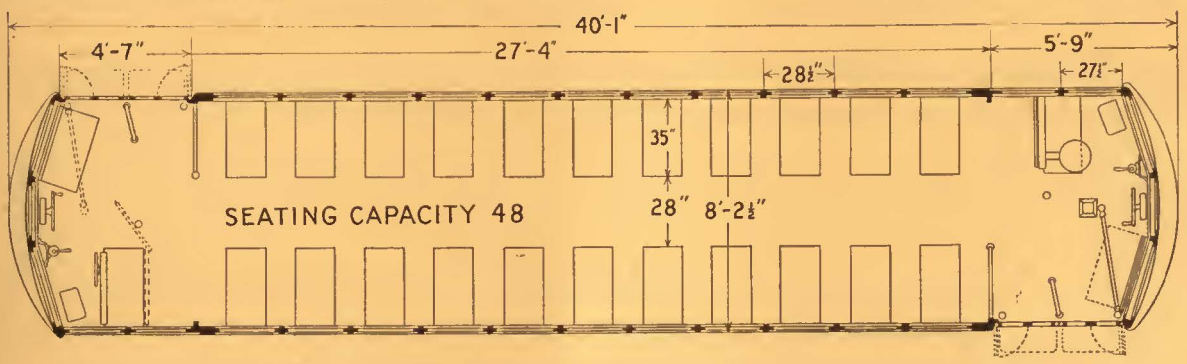
Welders, Portable Electric
Elec. Ry. Improvement Co.
Ohio Brass Co.
Railway Track-work Co.
Seymour Rail Grinder Co.

Welding Wire & Rods
Page Steel & Wire Co.

Welding Processes and Apparatus
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
General Electric Co.
Green Equip. Co.
International Oxygen Co.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Stone and Webster Light-Weight Cars for Texas Properties



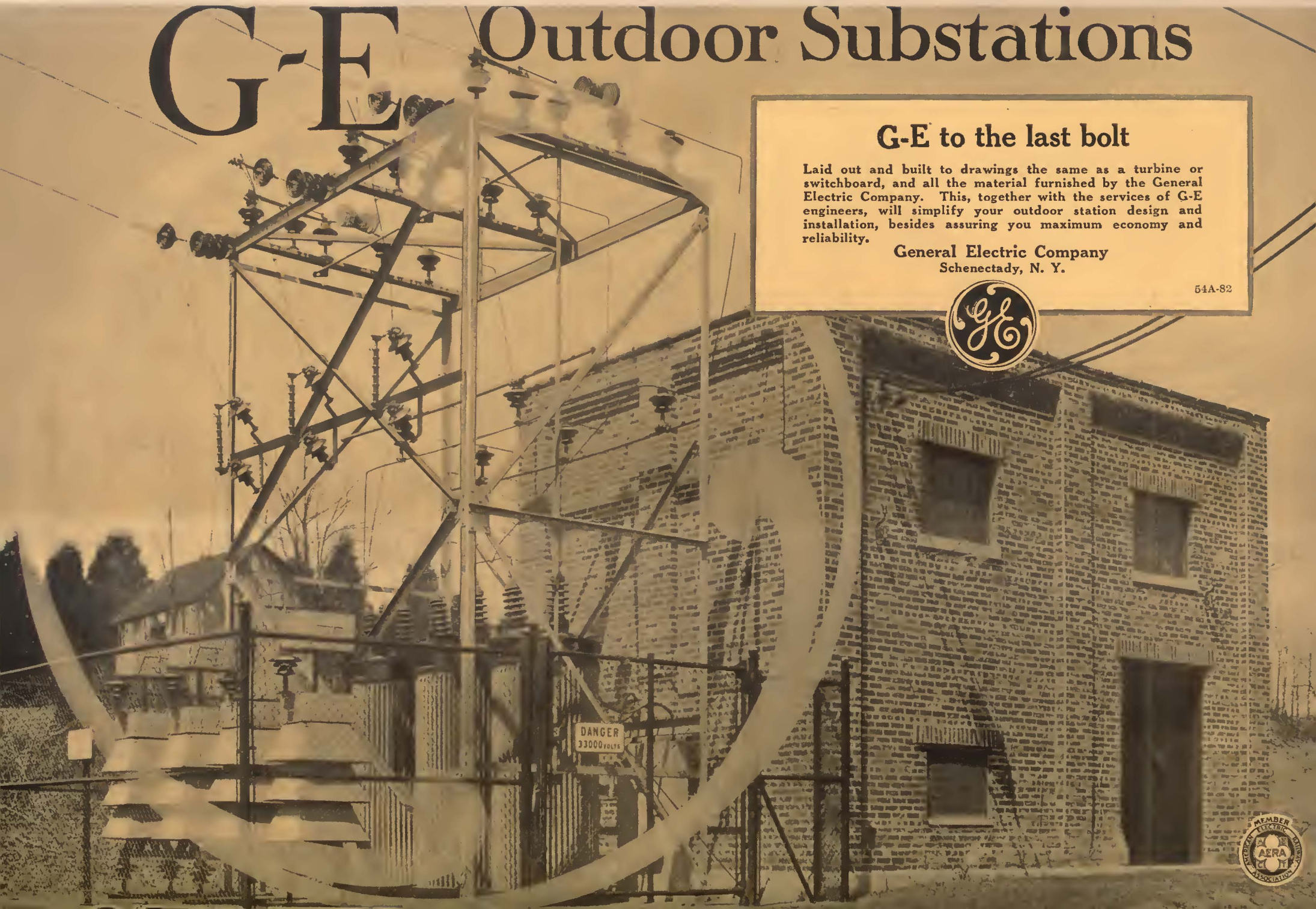
American Car Company furnishes Double-end Double-Truck Safety Cars for Beaumont, Fort Worth and Houston Lines

Twenty-seven cars of this type with separate entrance and exit doors to the operator's right on each platform at diagonally opposite corners and having an aisle width of 28 inches, were built recently by the American Car Company for the Stone & Webster Properties in Texas.

While of larger proportions and arranged to handle larger passenger loads, these cars are constructed in accordance with general safety-car practice, insuring light weight and operating economies as well as being of sufficient strength to meet the transportation requirements.

They are mounted on Brill 77-E-1 Low-Level Trucks.

G-E Outdoor Substations



G-E to the last bolt

Laid out and built to drawings the same as a turbine or switchboard, and all the material furnished by the General Electric Company. This, together with the services of G-E engineers, will simplify your outdoor station design and installation, besides assuring you maximum economy and reliability.

General Electric Company
Schenectady, N. Y.

54A-82

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