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ELECTRIC RAILWAY JOURNAL

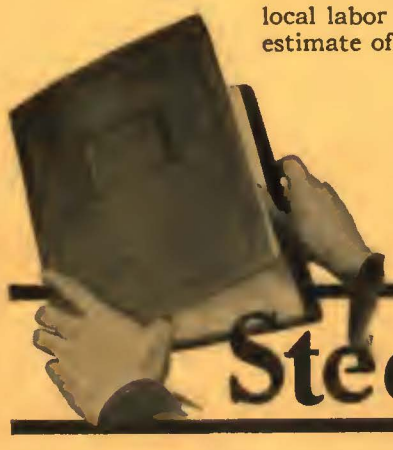
Track costs per man-hour and per track-foot with steel ties

DETAILED costs have been analyzed for Twin Tie Construction and boiled down into the man-hour estimate form shown above.

By substituting your local unit material figures and multiplying the man-hour time for various operations of Twin-Tie Construction by your local labor rate you can have a close estimate of the per foot initial outlay for this high class construction on your property.

You will need the delivered price on Twin Ties at your job, which we will send on request, including with the quotation several blank man-hour estimate forms.

Ask today for the delivered price on Twin Ties for your proposed work.



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Cleveland, Ohio

Look it up in your "Paved Track Note Book"

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Vol. 69
No. 16

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APRIL 16, 1927

Your Professional Shopper

EASTER shopping is women's prerogative. Witness her Paquin coat, Chanel frock and new-style cloche. Joy on earth for her at this season means to buy and let buy with little regard for the day of reckoning. In the flush of Easter adornment, the bargain instinct which usually serves to guard, guide and glorify the shopper is disregarded. Thus the buying flood carries prices up to a sharp seasonal peak.

Demand in the railway field is seldom seasonal. In this industry, prices do not fluctuate 25 or 50 per cent before and after a holiday. But the costs of basic materials over a period do show distinct trends and variations.

Each week ELECTRIC RAILWAY JOURNAL supplies the railway operator with a table of metal, coal and material prices, supplemented in the third issue, namely the Monthly Maintenance Issue, with data more varied and more extended. The alert manager and his purchasing agent will study the contents of these pages over a period of months, but unlike the Easter shopper will anticipate and avoid seasonal premiums.

This market page, if preserved in file form, will serve as an indicator to the observer of price trends, as a guide to the buyer of materials and as a valuable aid to economy in the year's operations.

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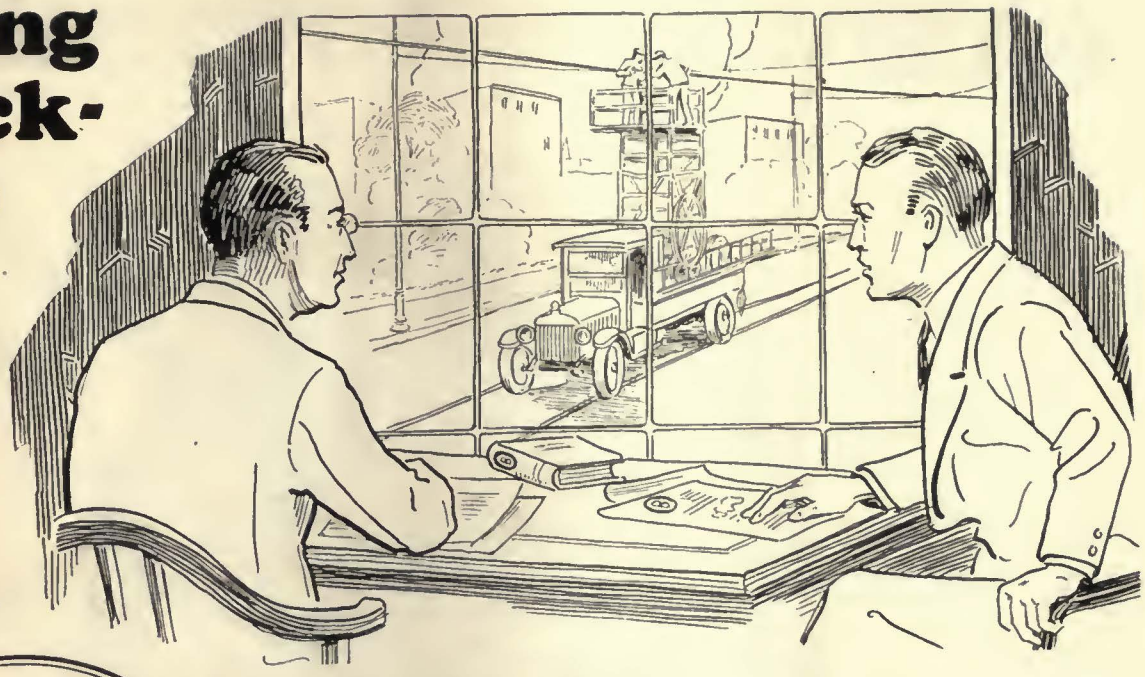
Spring Check-up

time to profit by O-B Line Material Results



for instance —

Marathon Ears

Catalog page 534

BC Frogs

Catalog page 573

Lock Hangers

Catalog page 467

Type C Splicer

Catalog page 542

Live Crossover

Catalog page 579

Write for detailed information

Increase Net Income
By Reducing Up-Keep

ALTHOUGH passenger revenues continue to mount steadily, progressive properties are not depending entirely on increased traffic for larger earnings in 1927. Many properties are realizing that savings in operating expense, every dollar of which equals the net income received from 250 or more additional passengers, *are* possible—particularly through the use of modern O-B Line Materials.

Take Marathon Ears, with service records of 350,000 car passes and more, as an example. Properties using Marathon Ears report from two to three times the length of service formerly received per ear. Furthermore, line breaks have been reduced as much as 46 percent with the use of Marathons. The saving amounts to thousands of dollars yearly in some instances.

Other O-B Line Materials—Frogs, Cross-Overs, Hangers, Splicers,—effect similar worth while economies in operation. It is on the basis of their ability to increase net income by reducing operating expenses that O-B Line Materials have won industry-wide recognition and usage.

Take advantage of the Spring "Check-Up" by replacing worn out overhead materials with modern, long-life O-B Materials.

Ohio Brass Company, Mansfield, Ohio
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada
3448

Ohio Brass Co.

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VALVES

BASIC IMPROVEMENT

WHEEL performance can be no better than the material of which the wheel is made.

By using a special composition steel and heat-treating it to develop unusual qualities, the Davis "One-Wear" Steel Wheel gives long life without maintenance.

A new and different steel was necessary to make practical the "One-Wear" idea. Only the Davis Steel Wheel is made of this material.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Where Specifications Agree

For three years the Department of Street Railways of the City of Detroit has been making experiments and service tests to determine the proper type of double deck coach equipment for its requirements. Westinghouse Air Brakes were included on all test coaches, and following this actual operating experience, were included in purchase specifications for new equipment.

Fleet Operators everywhere have quickly recognized the value of air brake control and purchase specifications now read—"Air Brakes—by Westinghouse."

Progressive Coach Builders—whose engineers, in addition to forecasting future design trends, must consider the utility of every element in its relation to the reliability and economy of the complete unit, and whose sales executives must provide a vehicle to meet operator demand, with distinctive sales features—have responded by adopting Westinghouse Air Brakes as standard factory equipment.

Builders and Buyers specifications now agree—Air Brakes—by Westinghouse.

WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, Wilmerding, Pa.

WESTINGHOUSE
AUTOMOTIVE AIR BRAKES

Astonishing Endurance

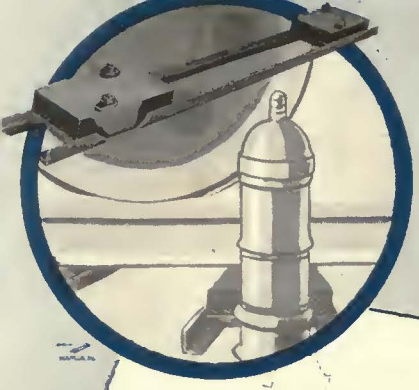
Proves the value of Dayton Ties

TRACK laid on Dayton Mechanical Ties has hung up astonishing records. We can't tell you how long such track will last, because since its inception 15 years ago, none of it has ever worn out or cost a penny. of maintenance.

You know what it would mean to your property to so lift the burden of track maintenance and replacement. You know what permanently smooth track means in saving of rolling stock repairs.

Cities all over the United States testify to the enduring smoothness of track laid on Dayton Mechanical Ties.

The Dayton Mechanical Tie Co.,
DAYTON, OHIO



Every Blue Tie,–
a Dayton Installation

See a Dayton Tie Installation For Yourself

This map, which gets more crowded every day, shows the wide-spread use of Dayton Ties.

There is an installation near you. Write us, and we'll tell you the specific property and location. See it for yourself, and talk to the engineers.

We're so certain of favorable testimony, we'll send you any number of names.

The Dayton Mechanical Tie Co.,
Dayton, Ohio.

On April 15th, 1927

THE NATIONAL PNEUMATIC COMPANY

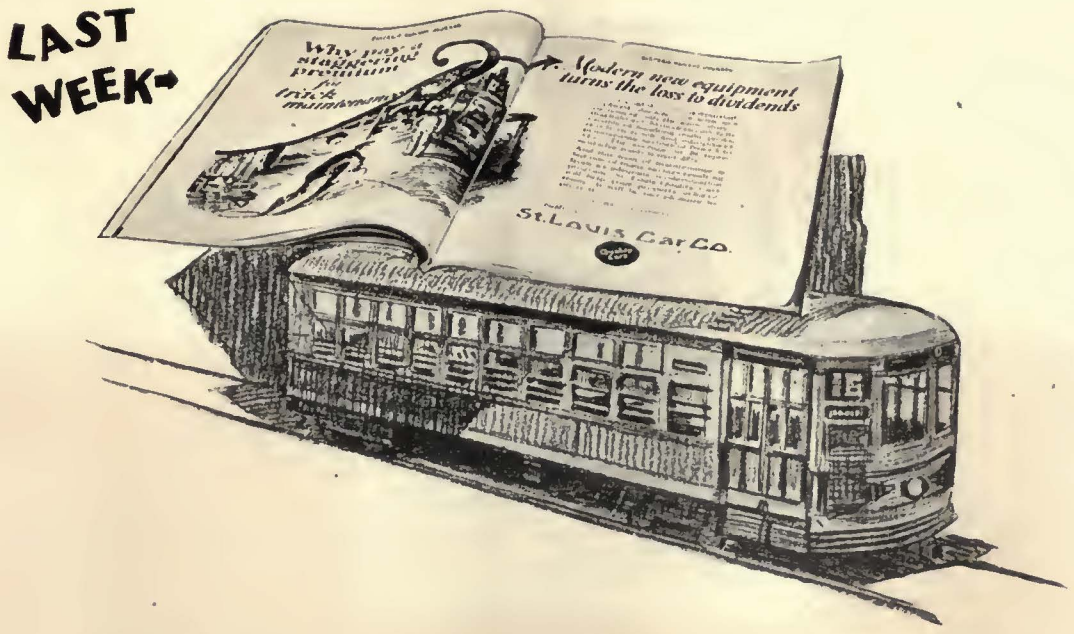
moved its New York offices to the

GRAYBAR BUILDING

420 Lexington Avenue, New York

THIS new building, shown above, is located in the heart of the Grand Central business section, adjacent to the New York Central Railroad Terminal and, by subway connection, to the Pennsylvania Railroad Terminal.

NP



This Week—we accept a challenge

"In the struggle to co-ordinate various vehicles into modern transportation systems, the electric railway manufacturer must meet the development and merchandising aggression of his competitors. The electric railway manufacturer must tell his story frankly, even bluntly, if he expects to move ahead under modern conditions. . . Our big job is to develop and sell a product which will attract patrons."

As car builders the St. Louis Car Company accepts this implied challenge of Mr. Willis H. Sawyer speaking for the American Electric Railway Association.

St. Louis Car Co.

Quality Cars

A New G-E Welding Electrode

They said:

G-E Type "B" is great for automatic work, but a little fast for hand. "Give us a G-E Electrode with the same good features for hand work."

And Type "F" G-E Welding Electrode was developed by General Electric. It has exceptional stability—an operator using it can work longer with less fatigue. Because of less dissipation it will deposit more metal to the work.

Type "F" is a good bare electrode, chemically treated so that it has for hand welding the same characteristics that have made the Type "B" fluxed electrode a leader in the automatic field. Although primarily for hand work, it can be used on automatic welders. Write the distributor nearest you.

Special Distributors for G-E Welding Electrodes

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GENERAL ELECTRIC

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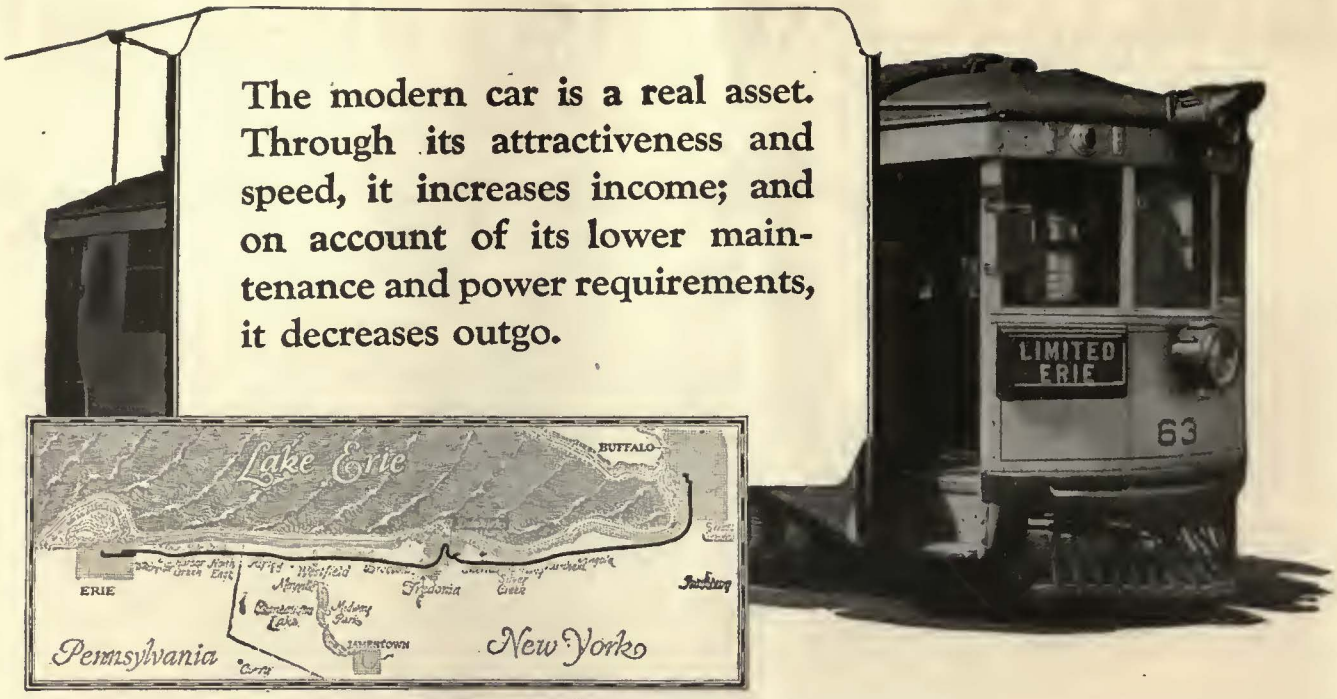


A loser for 16 years becomes a profit maker

The Buffalo & Erie Railway earned in 1925 a profit for the first time since its completion in 1909. And this was accomplished in the face of a business depression in that locality.

The management attributes this transformation to the use of modern light-weight one-man cars, with which this company renders the utmost in attractive service. In addition, operating cost was reduced 14.4 per cent and gross revenue was increased 7.5 per cent in the first 10 months.

These new cars, equipped with four G-E 247 motors, K-35 control, and CP-27B compressor, are capable of a speed of 60 miles per hour. Energy consumption is less than 2 kw-hr. per car mile. A comparison of operating figures per car mile shows:

	1924 (Old Cars)	1925 (New Cars)
Way and structures	5.6¢	3.1¢
Equipment	2.3¢	1.9¢
Power	5.0¢	3.4¢
Transportation	14.0¢	10.7¢
General and miscellaneous	10.6¢	9.8¢
Total	37.5¢	28.9¢

General Electric equipment has played an important part in the successful modernization of numerous roads. It has helped to make many of the operating records which have proved conclusively the value of the modern light-weight car.

330-40

GENERAL ELECTRIC

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

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Publishing Company, Inc.

CHARLES GORDON, *Editor*

Volume 69 New York, Saturday, April 16, 1927 *Number* 16

Patching When the Material Is Too Old to Hold the Stitches

EVERY woman who does sewing knows well enough that it is a waste of time to put on a patch unless the material is strong enough to hold the stitches. Similarly, every electric railway manager should know that it is futile to build up a piece of special trackwork by welding when there is not enough rail left to hold the new metal. Unfortunately, however, that is just what some companies are doing.

To take a specific case, a railway in an Eastern city has spent much good money patching up a right-angle double-track crossing that was worn out long ago. Welding has been done on this special trackwork on an average of once in two months for years past. The crossing is so old, however, that the repairs never last long.

Every time repairs are undertaken it is necessary to transport the welding apparatus to the job, open up the pavement, weld, grind, close the pavement and take the apparatus away again. A crew of seven men has usually been employed on this job—a foreman, two traffic flagmen, a welder and his helper, and two laborers to take up and restore the pavement and operate the rail grinder. Always the work has been much hampered by traffic and has taken many hours for completion. In its effort to maintain the old crossing, this company is spending considerably more every year for labor alone than the interest and depreciation charges on a piece of new special trackwork.

Truly in this case it may be said that the railway is paying for new material without getting it.

Repair Defective Cars Before They Break Down

MECHANICAL men agree that higher standards of maintenance will improve performance. Many examples where records are kept carefully have shown that when once the equipment has reached a state of excellent repair, costs of the work are reduced considerably. The expense of putting the equipment in the condition desired, however, has proved a serious obstacle on many railways. At the present time most electric railway men are more alert to the need of high-class overhauling than ever before. Increased study is being given to maintenance problems and many railways are adopting higher standards with closer fits for wearing parts.

In the class of inspection work to prevent failure much can be accomplished, not only in reducing ultimate maintenance costs but also in improving public relations through preventing failures in service where the public will see them. Defective parts should be renewed before they cause difficulties and equipment should be kept as nearly as practicable in its original condition. This requires a carefully arranged organization with work so laid out that it will not be done hurriedly and the workmen will have ample time to make sure that all parts are inspected and repaired where necessary.

The great tendency where men are hurried and overworked is for them to slight parts which will continue to operate without producing an immediate failure. Frequently complete breakdown will result before the car is due for its next regular inspection and then costs mount rapidly, for the damaged parts often cannot be repaired but must be replaced.

Those responsible for maintenance of electric cars will do well to collect all the data possible regarding costs which result from repairing equipment after it fails, and present these to general managers in as convincing fashion as possible. Such arguments as this are needed in order to put across any campaign for higher standards of repair work and improvements in car equipment so as to give the best service from the car rider's standpoint.

Home-Made Tools Are Often Crude and Expensive

ONLY one field remains that is not flooded with tools for every inconveniently located bolt or screw. That is the railway industry. In fact, the tool manufacturers have scarcely entered it. In the past each master mechanic made most of his own tools when he had a special application where a standard tool would not accomplish the desired results. This habit of making his own tools is expensive, for it requires a great deal of his time for supervision which should be spent in studying ways and means of improving maintenance conditions. When the home-made tool is completed it will have cost more in man-hours to make it, which will be charged to the maintenance account, than would a corresponding factory-made tool. Home-made tools are generally very crude. When questioned as to why the tool was made the usual answer is, "We needed it and did not know where to buy it."

Since electric railway equipment is standard, if one master mechanic needs a special tool for a special application it is almost certain that some other master mechanic would be glad to get the same tool if he knew such a tool was in existence. The tool manufacturers have a group of engineers who are trained in the design and application of special tools. These staffs of engineers are available to assist in solving the tool problem in the railway field if they are consulted. Often it

This is the issue in April that is devoted essentially to maintenance and construction subjects

may only be necessary to make a slight change in some existing tool to fit the special purpose. Even though it may be necessary to design and make the tool from the ground up, the manufacturer can do it cheaper than it can be made in a railway shop. If the manufacturer can be convinced that a special tool developed for one railway can be sold at a profit to a number of others the cost of development may be absorbed by him.

By consulting tool manufacturers for all special tools two important things will be accomplished: First, the "Jack of all trades" is kept from wasting a lot of valuable time and material making some unnecessary tool just because he would rather do that than work at some productive job, and, secondly, if a tool manufacturer develops all special tools every railway operator can avail himself of these tools.

In the Annual Maintenance Number and in this issue of ELECTRIC RAILWAY JOURNAL a section is devoted to "Improved Equipment for Electric Railway Maintenance." Literature from these manufacturers should be obtained by maintenance foremen and kept on file for ready reference.

The Public Likes Soft Seats

WHERE, oh, where, is the man named Legion who argued that seats of slats or formed wood were so durable, so sanitary and so cheap to buy and maintain? Why provide shock absorbers in the seats, when kindly Nature had provided them in the passengers' anatomy?

Oddly enough, these arguments were so unconvincing to the pushful automotive fellows that not one of them put out an automobile with springless seats. To them "seat" was synonymous with "cushion." The purveyor of the cheapest cars incased his springs with near-leather; while the maker of cars "of the better kind" went to limp leather and over-stuffed cushions for the open cars and plush or velours for the closed ones. The very air itself was made to serve as down.

These improvements followed naturally, since the seat user was primarily the buyer of the vehicle, whereas in railway transportation the seat-user's choice was controlled by others. Now that almost everybody has enjoyed the experience of riding on air, the public utility carrier on rails is following in the wake of the personal carrier on rubber.

Desirable and even vital to ride selling as this use of softer seats may be, two factors must not be overlooked that make a direct, complete imitation of personal car standards unnecessary: First, a good car running over a good rail does not have as much jounce and bounce as the automobile. The simplest proof of this is the greater ease of reading. Second, a public transportation vehicle, especially in city service, cannot afford as much area per passenger as a personal car.

So it appears that eminently satisfactory seats can be provided for trolley cars without too wide a departure from the shapes and over-all dimensions of standard cross-seats. It is to be expected that over-stuffed or air cushions and extra-padded backs may increase seat centers to the point where 44 seats of the old type allow room for only 40 seats of the new. This is perhaps as large a concession as can sensibly be made.

It hardly seems necessary to go to the extent of installing individual bucket seats or otherwise striving to secure the effect of a Pullman chair car. Such arrangements are excellent for long-ride, interurban service, or for de luxe service, but are likely to prove rather confusing for the most expeditious handling of short-ride, city passengers during the "standing" hours. Recent visits to cities with soft-seat cars leads to the conclusion that the public is well pleased with standard cross-seats in the modern cushionings and is not likely to insist that its bread should be buttered on both sides.

Perfection of Detail Differentiates the Artist from the Dabster

FOREMOST among the qualities which have distinguished the great artists of all periods has been meticulous attention to detail. The painter does not execute his central figure with great care and then fill in the background in a hit-or-miss fashion. Perhaps it is a far cry from the painter with his palette to the painter of electric railway rolling stock, but the latter might profit by following some of the principles by which the former is guided.

Frequently the effect of a really creditable car design is marred by the intrusion of a few inharmonious elements. Take, for example, a car interior where the seats have been upholstered in leather, the floor has been covered with linoleum and the woodwork finished like fine furniture. After taking these steps to make the car comfortable and attractive, it is a pity to cover nearly all the available flat surfaces with the railway's prohibitions and warnings. Yet this often is done. A single de luxe car has been placarded with these several notices:

No smoking.
Spitting is unlawful.
Watch your step.
Do not talk to the operator.
Passengers are allowed to ride on front platform.

Variations of these themes, as well as many other ones, can be found in countless cars. At best the effectiveness of such stereotyped notices is extremely doubtful. Every one knows that smoking and spitting are forbidden, yet a certain number of passengers persist in doing these things despite the signs. Riding on the platform and talking to the operator are matters that can be controlled without plastering notices on the bulkheads. If the railway management really wants to attract the motorist by furnishing transportation approximating the private automobile in comfort, he should avoid covering the inside of his vehicle with notices and warnings that detract from its appearance and irritate the passenger.

Temporary Repairs Are a Source of Danger

SOMETIMES, due to a shortage in the working force or to an abnormal number of crippled cars, temporary repairs are made in order to allow the car to re-enter service immediately. The intention in some cases is to bring the car into the shop the following day and make permanent repairs. However, in many cases the following day's work schedule is filled completely and the car is allowed to continue in service.

The necessity for making permanent repairs promptly cannot be over-emphasized. Experience has proved that delayed repairs are uneconomical. They make the ultimate repairs more expensive, both in actual cost and in the length of time that the equipment must be with-

held from service in order to make them. Frequently breakdowns that result on the road cause delays and inconvenience to passengers. In order to foster a good feeling with the public, delays in service must be kept to a minimum. This can be done by immediate care of repairs and frequent inspection which should cover all details thoroughly, even to small and seemingly unimportant parts.

Principles and Methods of Rate Regulation

JUST about the time that the decision was announced in the St. Louis & O'Fallon Railroad case there appeared the April issue of the *Yale Review*, with an article "Principles and Methods of Rate Regulation," by Arthur T. Hadley. This article, like the decision, has been widely quoted. Dr. Hadley's presentation is a brief but learned discussion of the matter. He goes back to the earliest times and says that for more than 2,000 years there has been a conflict between traders and philosophers as to the basis of value. His idea is that a reasonable rate is one that can be justified on grounds of public policy. It must not be so high as to place an unfair burden on the people who require the service, nor so low as to inflict an unfair disability on the people that render it.

To the leading electrical men in the United States Mr. Hadley pays a tribute by saying they have known how to avoid some of the difficulties into which the railroads have fallen. They have grasped the principle that the interests of the public service corporation are closely identified with those of the public which it serves, and they have done a great deal to make the people grasp it. They have taken the authorities into their confidence. They have consulted them in advance as to matters of financial policy. They have not been content with avoiding legal action; they have tried to avoid grounds of suspicion. The consequence is that public service commissions have generally been friendly to the electrical industry, and as a secondary consequence there has been more rapid and more varied development of electric service in this country than anywhere else, and the public has obtained its current at comparatively cheap rates. This is a nice compliment. On the whole, it is well deserved.

Where freedom is abused the abuse can be prohibitive, but a few abuses should not be made a reason for abolishing freedom. Seven principles are cited by Mr. Hadley as having been proved by experience but ignored by governments at their peril. He holds to the opinion that the use of cost of plant, and especially original or historical costs, as a rate base is wrong in principle and often dangerous in practice. He says that the true basis for judging whether rates are reasonable is comparison with those of other companies working under similar conditions. If the rate is low in comparison with what prevails elsewhere, and has developed traffic to an unusual degree, profits from that traffic have been well earned.

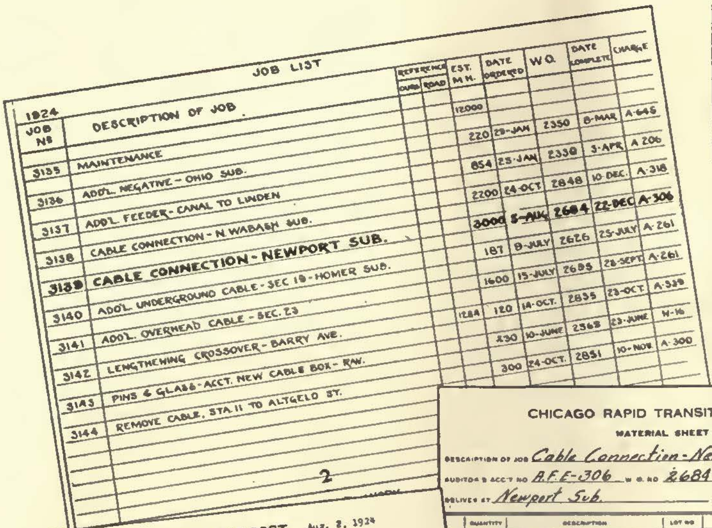
An important need, as he sees it, is to give public service commissions an opportunity to study the history of past attempts at regulation and the economic principles which have determined their success and failure, and to encourage them in such study. It is his idea that they should not be so overwhelmed with specific cases and complaints as to have no time for dealing with general questions of economic policy. They should be regarded and should regard themselves as expert advisers of the courts, the legislatures and the public on matters of vital importance to the country's future. His doctrine certainly is sound that the question of rate regulation must be considered from both ends—producers' and consumers'. And the conclusion is inescapable that it is quite as important for all parties to secure a supply equal to the demand at any given price or rate as it is to have that rate fixed as low as possible. There will be general agreement, particularly among utility men, with the observation of Mr. Hadley that politicians find it easier to concur in a widespread popular error than to decide for themselves what will prove best in the long run. It certainly takes a good deal of firmness and a good deal of economic and historical knowledge on the part of a commission or a court to protect the interests of the future against the loud-voiced demands of the present.

Massachusetts Companies Work in Concert

LESS attention in railway circles than it deserves appears to have been received by the operating agreement entered into recently by the New England Transportation Company, bus operating subsidiary of the New York, New Haven & Hartford Railroad, and the Eastern Massachusetts Street Railway. Under the terms of the arrangement between the companies the electric railway will receive from the bus company 18 cents for each passenger transported between East Walpole and Boston and Boston and East Walpole on the run from Attleboro to Boston.

The route covered by the buses encroaches upon territory served by the electric railway. The sole issue before the Massachusetts Department of Public Utilities in the case was whether public convenience and necessity required the operation of motor vehicles over the proposed route. The commission thought that it did. It ruled on this point, and this point alone. It volunteered the opinion that "however unjustifiable and unwarranted the payment to a street railway of a portion of the fare received by the transportation company may be, it does not affect the question which presents itself on this petition." And that question, as previously indicated, was one of public convenience and necessity.

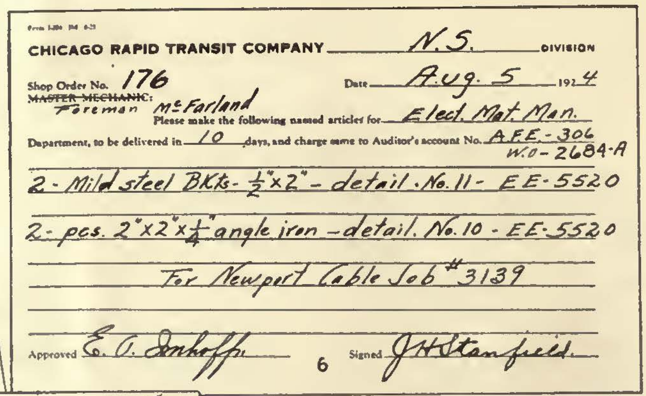
The participation issue appeared to be clear cut. The transportation companies apparently found it not only expedient but mutually advantageous to enter into the agreement they did. All the points are not plain to the outside commentator, but it is not difficult to see that the disposition the companies made of the matter was advantageous to the public. Competition in the territory, if it received state sanction, which is unlikely, is unthinkable and not in the best interests of the public or the company. On the other hand, one of the companies involved was in a position better than the other to give the service, and it seems only sensible that the utilities of their own volition should conclude between them an arrangement satisfactory to each other. Certainly the end achieved seems on its face to be much more salutary than other so-called solutions resorted to in the past. If some such arrangement as this could have been amicably worked out in another Eastern state, to mention just one instance, recourse would not have been necessary there to the courts with all that such action implies of a struggle to the bitter end. It would not do to say that any compromise is better than such a contest, but it does appear in the Massachusetts case that compromise was much better than contest.



JOB LIST

1924 JOB No	DESCRIPTION OF JOB	EST. M.H.	DATE ORDERED	W.O.	DATE COMPLETE	CHARGE
3135	MAINTENANCE	12000				
3136	ADD'L NEGATIVE - OHIO SUB.	220	29-JAN	2350	8-MAR	A-645
3137	ADD'L FEEDER - CANAL TO LINDEN	854	25-JAN	2330	3-APR	A-206
3138	CABLE CONNECTION - N. WABASH SUB.	2200	24-OCT	2848	10-DEC	A-318
3139	CABLE CONNECTION - NEWPORT SUB.	3000	5-AUG	2684	22-DEC	A-306
3140	ADD'L UNDERGROUND CABLE - SEC 19 - HOMER SUB.	187	9-JULY	2626	25-JULY	A-261
3141	ADD'L OVERHEAD CABLE - SEC. 23	1600	15-JULY	2695	28-SEPT	A-261
3142	LENGTHENING CROSSOVER - BARRY AVE.	120	14-OCT	2835	23-OCT	A-339
3143	PINS & GLASS - ACCT. NEW CABLE BOX - RAV.	230	10-JUNE	2362	23-JUNE	W-16
3144	REMOVE CABLE, STA. 11 TO ALTGELD ST.	300	24-OCT	2851	10-NOV	A-300

2



CHICAGO RAPID TRANSIT COMPANY N.S. DIVISION

Shop Order No. 176 Date Aug. 5 1924

Foreman McFarland

Please make the following named articles for Elect. Mat. Man.

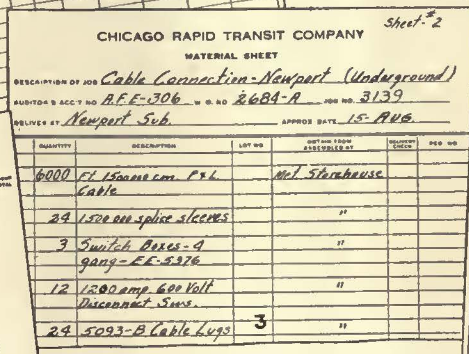
Department, to be delivered in 10 days, and charge same to Auditor's account No. A.F.E.-306 W.O.-2684-A

2 - Mild steel BKts - ½"x2" - detail No. 11 - EE-5520

2 - pcs. 2"x2"x¼" angle iron - detail No. 10 - EE-5520

For Newport Cable Job #3139

Approved E. O. Imhoff 6 Signed J. H. Stanfield



CHICAGO RAPID TRANSIT COMPANY Sheet #2

MATERIAL SHEET

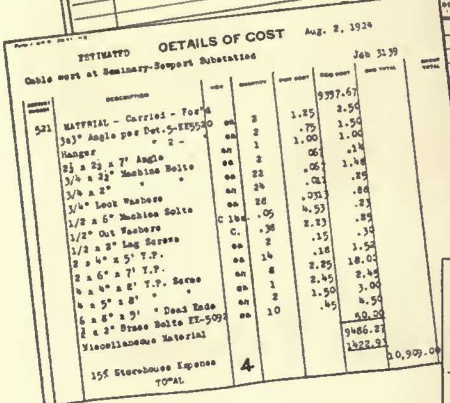
Description of job Cable Connection - Newport (Underground)

Auditor's acct no A.F.E.-306 W.O. No 2684-A Job No 3139

Deliver at Newport Sub. Approx date 15-Aug.

Quantity	Description	Getting from
6000	Ft. 1500000 c.m. P & L Cable	Met. Storehouse
24	1500000 splice sleeves	"
3	Switch Boxes - 4 gang - EE-5976	"
12	1200 amp 600 Volt Disconnect Sws.	"
24	5093-B Cable Lugs	"

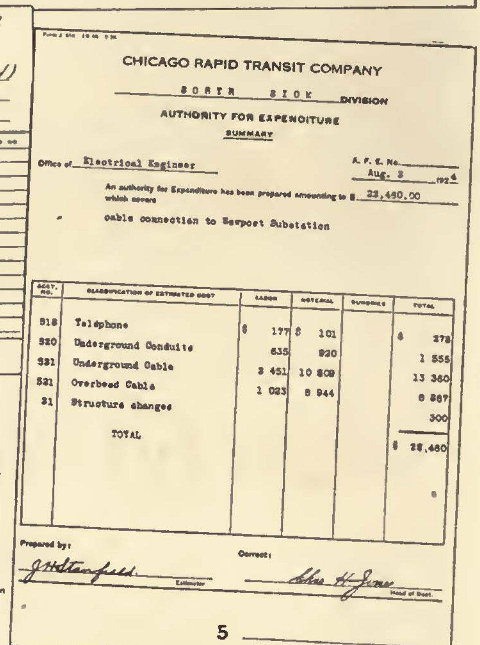
3



ESTIMATED DETAILS OF COST Aug. 2, 1924

Cable work at Seminary-Newport Substation Job 3139

4



CHICAGO RAPID TRANSIT COMPANY

NORTH SIDE DIVISION

AUTHORITY FOR EXPENDITURE

SUMMARY

Office of Electrical Engineer A.F.E. No. Aug. 2 1924

An authority for Expenditure has been prepared amounting to $ 28,480.00 which covers

cable connection to Newport Substation

Acct. No.	Classification of estimated cost	Labor	Material	Sundries	Total
318	Telephone	$ 177	$ 101		$ 278
320	Underground Conduits	635	920		1 555
331	Underground Cable	3 451	10 809		13 360
331	Overhead Cable	1 023	5 944		6 967
31	Structure changes				300
	TOTAL				$ 28,480

Prepared by: J. H. Stanfield Correct: Chas. H. Jones

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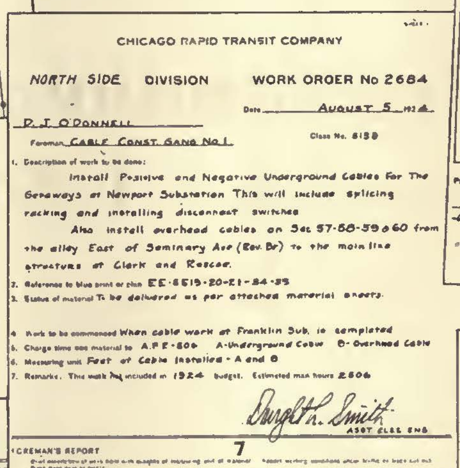


CHICAGO RAPID TRANSIT COMPANY

NORTH SIDE DIVISION WORK ORDER No 2684

Date August 5 1924

D. J. O'DONNELL

Foreman CABLE CONST. GANG No 1 Class No. 3139

1. Description of work to be done: Install Positive and Negative Underground Cables For The Getaways at Newport Substation This will include splicing racking and installing disconnect switches. Also install overhead cables on Sec 57-58-59 & 60 from the alley East of Seminary Ave (Bev. Br) to the main line structure at Clark and Roscoe.

2. Reference to blue print or plan EE-5519-20-21-34-35

3. Status of material To be delivered as per attached material sheets.

4. Work to be commenced When cable work at Franklin Sub. is completed

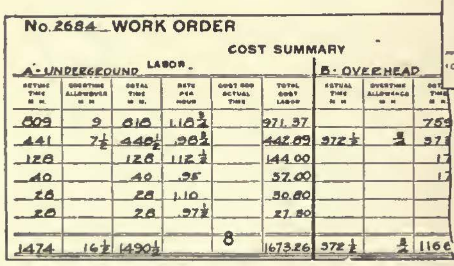
5. Charge time and material to A.F.E-306 A-Underground Cable B-Overhead Cable

6. Measuring unit Feet of Cable Installed - A and B

7. Remarks. This work included in 1924 budget. Estimated man hours 2806

Dwight L. Smith ASST. ELEC. ENG.

7

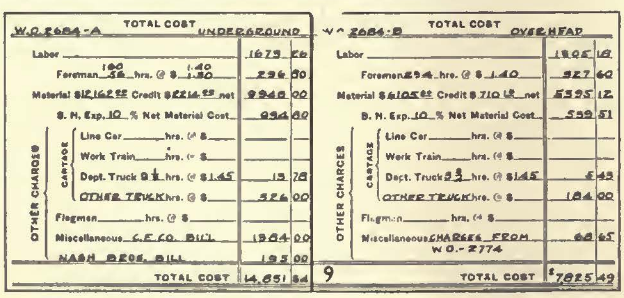


No. 2684 WORK ORDER

COST SUMMARY

A - UNDERGROUND LABOR: Actual time M.H.	Overtime allowance M.H.	Total time M.H.	Rate per hour	Cost for actual time	Total cost labor	B - OVERHEAD: Actual time M.H.	Overtime allowance M.H.
809	9	818	1.18½		971.37		
441	7½	440½	.98½		442.69	372½	½
128		128	1.12½		144.00		
40		40	.95		37.00		
28		28	1.10		30.80		
28		28	.97½		27.30		
1474	16½	1490½			1673.26	372½	½

8



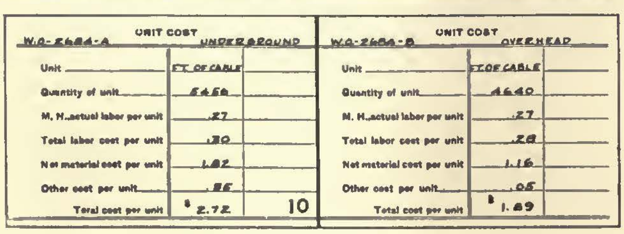
W.O. 2684-A TOTAL COST UNDERGROUND

Labor	1673 26
Foreman 196 hrs. @ $ 1.40	274 40
Material $12162.25 Credit $2214.25 net	9948 00
S. H. Exp. 10 % Net Material Cost	994 80
Dept. Truck 9½ hrs. @ $1.45	13 78
Other Truck hrs. @ $	576 00
Miscellaneous C. E. CO. BILL	1384 00
NASH BROS. BILL	195 00
TOTAL COST	14,651 84

W.O. 2684-B TOTAL COST OVERHEAD

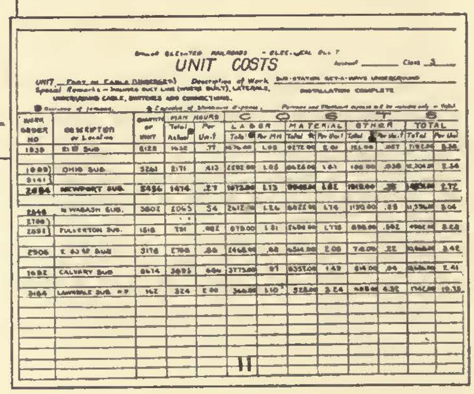
Labor	1805 18
Foreman 234 hrs. @ $ 1.40	327 60
Material $6105.62 Credit $ 710.12 net	5395 12
S. H. Exp. 10 % Net Material Cost	539 51
Dept. Truck 3 hrs. @ $1.45	4 35
Other Truck hrs. @ $	184 00
Miscellaneous CHARGES FROM W.O.-2774	68 65
TOTAL COST	$7825 49

9



W.O.-2684-A UNIT COST UNDERGROUND		W.O.-2684-B UNIT COST OVERHEAD	
Unit	FT. OF CABLE	Unit	FT. OF CABLE
Quantity of unit	5456	Quantity of unit	4640
M. H. actual labor per unit	.27	M. H. actual labor per unit	.27
Total labor cost per unit	.30	Total labor cost per unit	.28
Net material cost per unit	1.82	Net material cost per unit	1.16
Other cost per unit	.56	Other cost per unit	.05
Total cost per unit	$2.72	Total cost per unit	$1.89

10



UNIT COSTS

11

A few of the forms used for following up and recording progress of work

Fig. 2—Sheet from job list for cable work, which is Class 3.

Fig. 3—The material sheet shows the quantity of each item needed to do the work.

Fig. 4—Form of sheet used to work out details of estimated cost.

Fig. 5—The authority for expenditure gives a summary of labor and material items.

Fig. 6—Items to be made in the department shop are requisitioned on a shop order.

Fig. 7—The work order is the actual authority for beginning construction work.

Fig. 8—Summary of cost is given on completed work order sheet.

Fig. 9—The total cost sheet gives much valuable information.

Fig. 10—Unit costs are figured and entered on a separate sheet.

Fig. 11—The condensed record of unit costs makes comparison easy with other similar jobs.

In pulling in lead-covered cable, particular care is used not to injure the sheath

Careful Organization of Force Stimulates Effort

By Dwight L. Smith
Electrical Engineer Chicago Rapid Transit Company, Chicago, Ill.

To complete work speedily and make sure that finished jobs will be done in a manner to minimize service interruptions the electrical department must be organized thoroughly and be provided with many labor-saving tools

WORK in the electrical department of the Chicago Rapid Transit Company includes the operation, construction and maintenance of all electrical equipment except for rolling stock, signals and interlocking. It includes third rail, cables both underground and overhead, telephones, lights, bells, overhead trolley, pole lines, track bonding, storage batteries and such substations as are owned by the company. Maintenance of the system requires about 50 men, and work which can be classed properly as construction requires about 50 more.

This organization includes a centralized control, a definite and logical routing for all work, and specialists for each step in this routing. No step is begun before each preceding one is completed and checked, so that the personnel responsible for each step can proceed with full assurance that everything previous is in readiness, and entire attention can be devoted to doing each part with the utmost efficiency and dispatch.

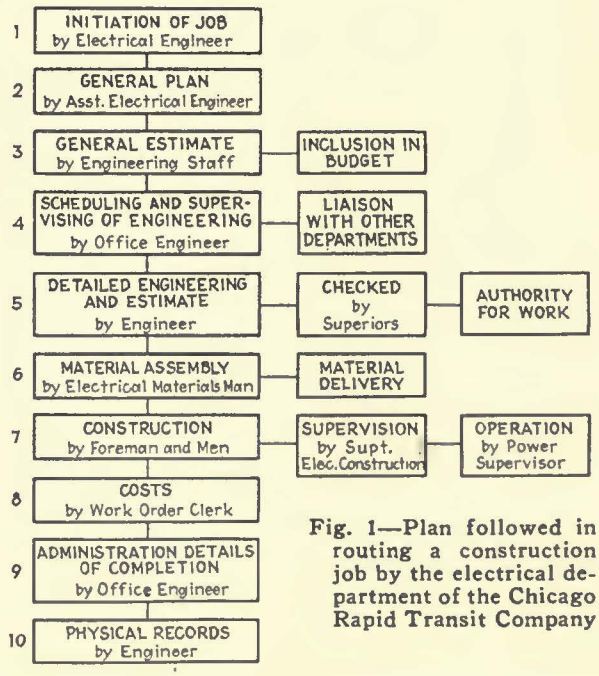


Fig. 1—Plan followed in routing a construction job by the electrical department of the Chicago Rapid Transit Company

The general plan of routing construction work is shown on Fig. 1, Construction Job Routing. As a large engineering staff is employed, the construction organization does not even hear of a job until the engineering is completed, the work laid out for it in the smallest detail, all materials on hand and ready for delivery to the job, necessary permits obtained, and accompanying work by other departments arranged for; in fact, until there is nothing for the construction forces to look after but to do the physical work as planned. Frequently the actual construction work is the smallest part of the job. As an illustration of the methods employed, a job recently completed of making the cable connection to a new substation will be referred to in detail.

Most items of work initiate within the department, although certain items become necessary because of work of other departments. The greater part of a year's work is decided by inclusion in the budget at the beginning of a calendar year. As soon as the budget is approved all such known items are listed on a job list, Fig. 2. Such a list is made for each class of work, cable work being Class 3, and each individual job is given a number the first digit of which indicates its class. This job number is the office reference, and in a file identified by this number all information on the job is kept together.

The job list provides: (1) A ready record of the jobs which must be completed during the year; (2) a quick reference of the estimated time required for each job, and (3) a running record as to the status of each job, i.e., whether it is still untouched, under construction or completed.

At the commencement of each year the job list is first used to make a survey of labor and material requirements. The man-hour figures are based on unit man-hour costs for past work of a similar nature. The estimates as included on the job list are of course rough, for no details of the coming jobs are yet known, but are sufficiently close to make estimates of the total amount of labor for each class. These totals indicate the number of men required to complete all work in the year's program. This property has found that for the average cable job a gang of six men and a foreman is the most efficient and the total man-hours thus indicates the number of gangs necessary.

The job list is a continuous one. It is not closed until the end of the year and then any unfinished work is transferred to the next year's list. When work unforeseen at the beginning of the year develops it is entered, given a number and placed at the bottom of the list. There is always a certain amount of this additional work and so any estimate for man strength must make the necessary allowance.

Material requirements are also estimated at the beginning of each year, considering the items of major material on similar jobs in the past. It is not possible to estimate exactly all minor material, but this is a small part of the total. Estimating the major items gives the purchasing department an opportunity to buy on favorable markets and to order in ample time to have the material on hand when needed. Deliveries are specified throughout the year in accordance with the work program, sufficient leeway being allowed to make sure of receipt but allowing delivery at the same rate as that of use, thus keeping the storekeeper's amount of stock as low as possible.

The number of construction gangs having been determined, a job schedule is next made for each of them, showing the order in which each job will be started, and, from the man-hour estimate and the number of men at work, the actual date for starting. The order in which the jobs are scheduled is, in general, determined by the degree of necessity. In making the schedule the correlated work of other departments must be considered, and they are consulted and necessary compromises made to suit best all those concerned. The job schedule also gives information as to the progress of the work and references to allied work, status of authority. layout and material.

Jobs are assigned to the engineering staff for layout in the same order that they appear on the job schedule and from one to six months in advance of the time set for commencing the construction. Up to the time of assignment only the most general information on them is known, as a few preliminary sketches, correspondence and the general plan dictated by the department head. This information has been kept together carefully in the job file and is turned over and explained to the engineer.

In almost all jobs there are several ways of accomplishing the same result, but it is part of the engineer's work to determine the best and most efficient way. However, to assist the engineer as well as the construction forces, types of construction and kinds of material adopted as standards are used whenever possible. These are got up in standard circulars and standard prints. Each foreman is provided with a loose-leaf binder containing a complete set, so that when the engineer decides to make use of a certain standard he has only to indicate on his layout its number and the foreman will know exactly what is wanted.

The duties of the engineer are: (1) To make detailed drawings of the installation; (2) to make a detailed list of the kind and quantity of every item of material necessary for the job; (3) to make a detailed estimate of cost, and (4) when the job is completed to make or revise the permanent records.

For the substation connection job referred to, the engineer's first work was to determine the number and size of cables required. An annual survey made under heavy winter load conditions gives ampere loads and voltage conditions on each feeder section of the Chicago Rapid Transit system. This becomes a permanent record in the power supervisor's office and reference to it indicates the cable capacity necessary.

A field survey showed an underground duct line as the best method of carrying the cables from the substation to the right-of-way. With this determined, locations for manholes, grouping of cables in ducts and in laterals, location of laterals and disconnect switches were decided. On this job, second-hand lead-covered cable was to be used and the engineer had to check his required cable lengths carefully and tabulate them against lengths on hand to insure the minimum wastage.

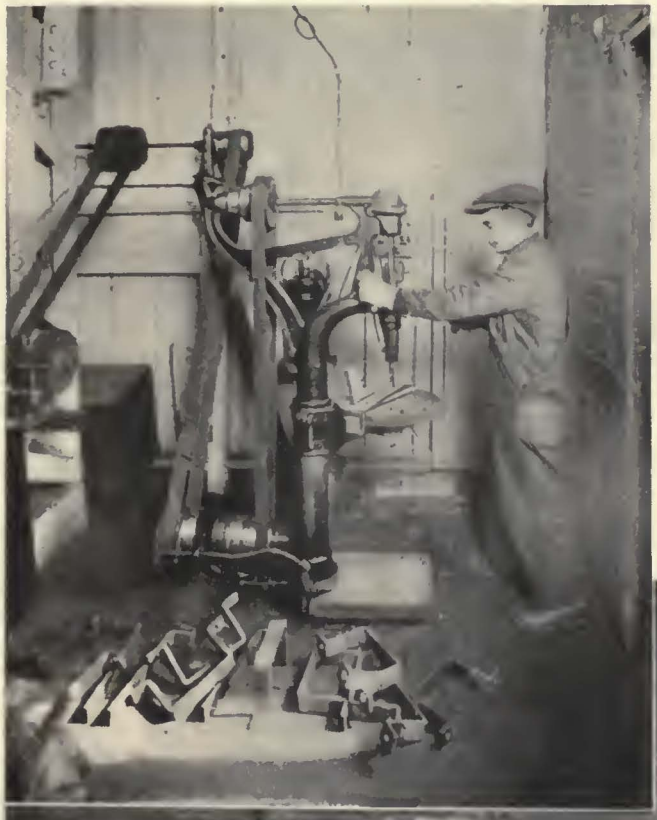
While a part of each construction job can be covered by standards, many items cannot, and it is the duty of the engineer to lay these out in detail and provide the proper material. For instance, in the job illustrated, while the switch boxes are standard, the method of mounting is not, and necessary iron brackets had to be designed to fit the location.

A small shop is operated by the department, to build small special items of this sort; standard items and large quantities of special items can be bought from commercial sources more cheaply than they can be made outside of the organization.

The layout completed, showing in detail what was proposed and where and how it was to be done, and every method and material used plainly indicated, the next step for the engineer is the preparation of the material sheet illustrated in Fig. 3, showing the quantity of each item, both special and standard, needed to do the work. This must cover everything necessary, even to bolts, nuts and washers, so as to prevent any delay to the construction forces from lack of proper and sufficient material.

Special authority must be obtained for each construction job and the cost estimate for this authority is a part of the engineer's work. These are shown in Figs. 4 and 5. The material sheet needs only to be priced from material costs on record in a card system in the office, or obtained through the purchasing department for special material. Labor cost estimates are made by reference to previous unit costs, carefully checked by comparing the work into component parts and by making independent estimates of each part. Adding the proper per cents for stores expense, engineering and contingencies a total cost is obtained. The care used in making these is such that most job costs come within a few per cent of the estimates. All planning and estimates made are then checked carefully and approved by the department head and authority for the work is requested.

The proper authority obtained, material sheets are gone over and compared with blanket orders, material not already on order is requisitioned, and items to be made in the department shop are requested by a shop order as shown in Fig. 6. Appropriate notes are made on the material sheet. Work to be done by contractors or other departments is arranged for. The material sheets are sent to the electrical materials man. Follow-up checks are made from week to week to insure



Above—Shop operated by the electrical department to build small special items
Below—Special brackets used for mounting are made in the blacksmith shop

The splicer's cart is a handy piece of equipment brought to the job .

In pulling overhead cables with a winch truck, it is necessary to anchor the cable reel

that all material will be in readiness when the schedule starting date arrives.

An interesting and necessary link in this department's organization is the electrical materials man, a stores department employee who devotes his entire time to handling material used by the electrical department and whose function is to furnish the necessary material delivered at the job, when and where needed. His duties include both the physical handling of this material and the clerical work necessary to account for it, as well as supervising the transportation necessary for its delivery.

The material sheet is received weeks, even months, before a job is scheduled to start. A reasonable length of time in advance he commences to gather together the material for a job. The smaller items are assembled in a material container, a box equipped with a standard lock to which each foreman has a key, and larger items are assembled in a bin, each of them as well as the containers being tagged with the job description and number. This assembly is simple, as all electrical material is kept in one storehouse, and its storing in steel cases with unit piling, each item identified by a lot number, makes it easy to find and count quantities. The items made in the department's own shop are also picked up and assembled with the balance of the material.

If repeated checks, as the commencement of the job approaches, show that certain items may not be received in time, it may be necessary to send after and pick up this material from local stocks on emergency orders, or to substitute obtainable items.

The material sheet shows the approximate date the material for each job is to be delivered, and the materials man plans to have it ready a few days in advance. In every case, however, the foreman advises by telephone the exact date when it is wanted and it is delivered only on receipt of this advice.

A truck has been found the cheapest and most efficient means of delivering practically all materials, and this company finds that one 1½-ton truck, intelligently handled, can ordinarily keep the entire force supplied with material. This requires consolidation of deliveries to different gangs working in the same area, and elimination of waste time. The truck is loaded in the late afternoon and is started out the next morning in time to arrive at the job when the construction force commences work. Even the smallest items of material are delivered by truck, the workmen being forbidden to come into the storehouse for any reason.

In delivering material, the truck driver takes with him two copies of the material sheet, one of which is signed by the receiving foreman, who retains the second copy of his list.

After each large order for material has been filled, or at intervals of one month or less, the stock of all items of standard material is checked against an indicated minimum quantity and orders are placed for all those which have fallen below the minimum. All the steps detailed herein have been taken before the construction force has even heard of the job. This force consists of a varying number of gangs, each in charge of a foreman, who reports directly to the electrical superintendent.

About a week before each job is scheduled to start the necessary information for the foreman is assembled. A numbered work order, illustrated in Fig. 7, is the actual authority for the construction. It refers to the job number, gives a brief description of the work, refers to the blueprint numbers of the details, indicates the auditor's charge number for the work, shows the measuring unit to be used by the foreman in making his report, and also shows the estimated man-hours for doing the job.

Six copies are made of the work order, one for each of the job foremen, electrical superintendent, electrical materials man, cost clerk, power supervisor and superintendent of maintenance of way, the latter to keep in touch with the department most interested in co-ordinating work with the electrical department.

Accompanying the foreman's copy of the work order are blueprints of all drawings pertaining to the job and copies of all material sheets. Since construction gangs have no headquarters other than on the job, correspondence with them is by U. S. mail to the foreman's

homes, and they use the same means to send their time slips and reports to the office.

Within the next few days the foreman takes several hours away from his current job and goes to the location of the next one to study it there and plan his procedure. On that visit the superintendent accompanies him and explains and settles any details not clear.

Arriving on the site of the new job with men, tools and material, the foreman is at once ready to commence work. The material must be checked and compared with the lists. No matter how carefully work has been laid out and material computed, as the work progresses different or additional material becomes necessary. This is obtained by a telephone order from the foreman to the materials man and is likewise delivered by truck within 24 hours. Changes in plans may become necessary, in which case the engineer goes out to the job and approves them before they proceed.

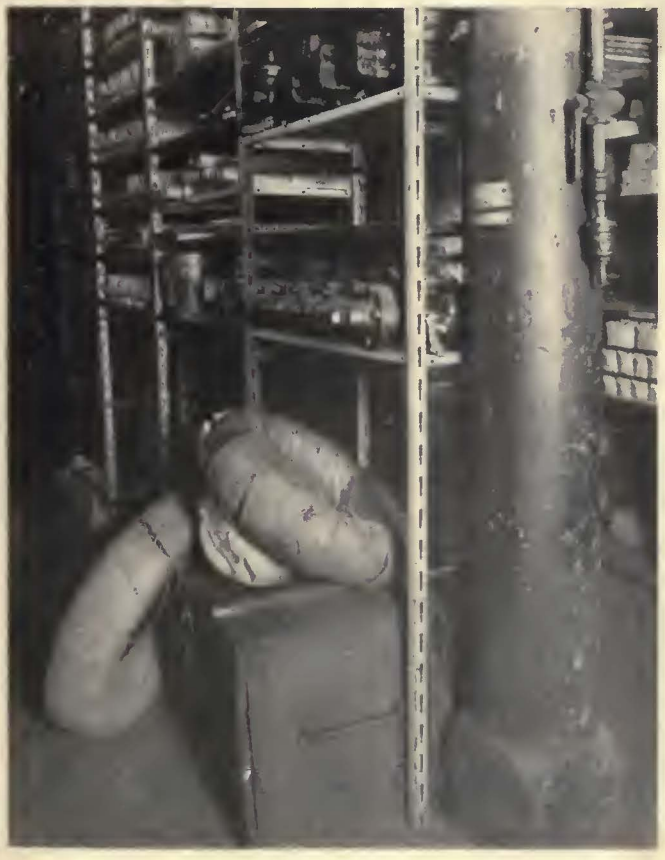
In the substation connection job used as an illustration more than 10,000 ft. of underground and overhead cable were to be installed, in sizes of 1,500,000 and 2,000,000 circ.-mil. Cable is pulled in with a power winch truck, which is ordered by the materials man when wanted. The special tools required for this work, such as cable grips, manhole guards, I-beam cable sheaves and steel pull line are sent out by the materials man from the tool storage room.

The splicing of the underground lead-covered cable is done by the cable splicer and helper, who are summoned by the construction gang foreman when he is ready. Splicing tools and equipment are contained in the cable splicer's cart which is brought to the job. When the splicing, training and racking are completed all cables are protected by wrapping with ¼-in. hemp rope over which a sand and cement mixture is plastered, a protection sufficient to confine the damage of a burnout to the one cable in which it originates. All cables are identified by tagging in each manhole, at the disconnect switches and in the substation with aluminum tags on which is stamped the individual cable number, such as "71 C," the "71" being the feeder section number and the letter the reference to the particular cable on that section.

The foreman is responsible for the performance of his gang. In the job illustrated the duct line ran under an alley. While cable pulling was in progress the foreman learned that paving of the alley would start within two days. Since this would have blocked his pulling completely, it was necessary to work fourteen hours a day for two days to get out of the way, and although this increased the cost by overtime work, the result was better than being completely blocked from work for a time.

In cutting over cables and making them alive, the power supervisor is consulted on each move, as he is the man directly responsible for the operation of the power system. The construction work completed, it is inspected by the superintendent, who then approves the work order. The foreman makes notes of the date of completion and the quantity of the measuring unit of material used, and returns the work order to the office. All surplus material and scrap are returned to the storehouse for credit and the gang moves on to its next job.

The duty of the cost clerk is to keep detailed costs of each job and so summarize them when work is completed that he can tell instantly how much the job costs in man-hours or money, total or per unit. This work also furnishes an accurate record of dates, material,



Small items are placed in a box and locked—all are tagged carefully

All electrical material is kept in a storehouse with steel shelves arranged for unit piling

special charges and credits. In fact, it becomes the highly condensed record of that job. The unit costs are further tabulated by groups for reference in estimating future jobs of like nature.

The cost system is a simple method of bookkeeping. An account sheet is opened for each work order. On this are entered the labor items as listed in the "Labor Distribution" sheet kept by the timekeeper, material charges, cartage charges, special charges and credits.

The job completed and the foreman's copy of the work order returned is the cue to the cost clerk to close up that account, price out his items, total and summarize them. These summaries are shown in Figs. 8, 9 and 10. The measuring unit shown on the work order is the appropriate one of a number of standard units each of which has a page in the condensed record of unit costs, and on this page, shown in Fig. 11, are entered the unit costs of this job for comparison against all jobs of a similar nature.

There remain to complete the job the making or revision of records by the engineer who handled it and the administrative details of completion such as notification to the auditor, general storekeeper and valuation engineer.

The entire scheme is nothing but an application of specialization, one man or a group of men to do each step in the work, and the whole so co-ordinated that each confines his work to his specialized portion. The advantages which result from this method of organization are several: Each job is given individual attention and occupies a very definite place in the year's program; all details of each job are settled before work is commenced; all work of similar character is done in a similar manner according to standards which have been found best; the gang foreman is provided with full instructions so there is no chance for guesswork by him; working efficiency is very high because the foreman and his men can devote their entire time to the actual construction, unhampered by the necessity to provide material, run errands or tend to other details. As a result all jobs move along faster, more jobs are handled during the year and the efficiency of the department is raised to a point that is hard to excel.

Truck Sands Bus Routes

BY A. M. LINDSAY
Superintendent of Rolling Stock Montreal Tramways, Montreal, Canada

MANY heavy grades which must be negotiated in Montreal make it necessary during the winter months, with an abundance of ice and snow, to take every precaution available for safety. The slippery conditions make it necessary to sand bus routes not only on the grades themselves but frequently, under very icy conditions, over the greater part of their length. To carry out this work quickly and economically, the Montreal Tramways built the sand truck illustrated.

The equipment for this sand truck came from discarded parts of bus equipment. An overhauled chassis was taken, and an engine and sand hopper were added. The sand hopper will hold 2½ tons of sand when filled. Under the forward part of this hopper there is room for two compartments, which are used for tools, shovels, etc. The interior sides of the hopper have a slope of 1 in 3 toward the rear end of the truck, which has the distributing valve. The inside is sheet metal.

Sand-spreading truck as used on bus routes by the Montreal Tramways

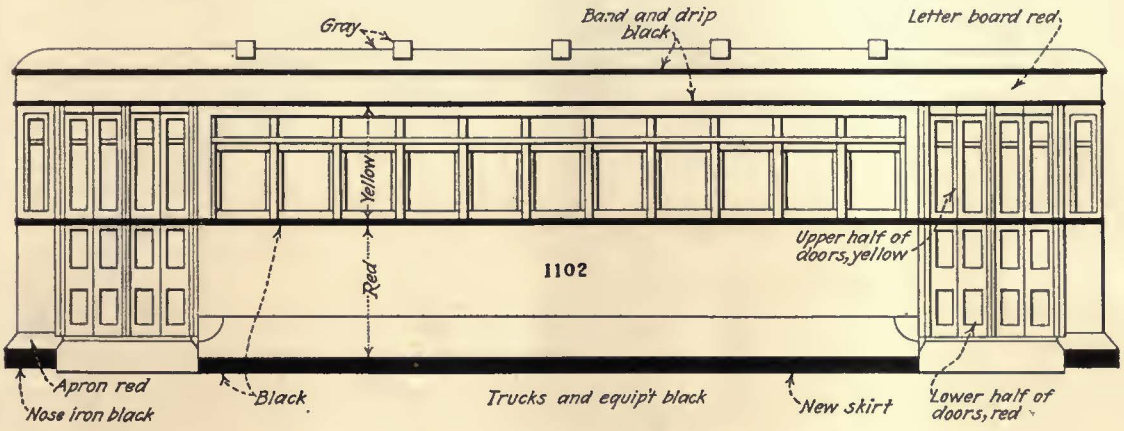
Sand is spread by a saw-steel disk which rotates in a horizontal plane at the end of an extension shaft. This shaft is inclosed completely and runs on ball bearings which are mounted in a steel pipe. An Evinrude Super-Elto outboard marine motor operates the sand-spreading mechanism. Sand or ashes is delivered from the controlling slide valve through a flexible hose to the spreading disk. The top of the disk is provided with eight small hardened steel radial ribs ¼ in. high. These have been found sufficient to give the distribution required.

The width of the road surface which is to be covered can be altered by adjusting the speed of the engine, the height of the radial ribs and the point of delivery on the disk of the sand supply. Cooling water for the Elto engine is drawn from the truck engine radiator and has been found to assist the circulation in the latter. To dampen the exhaust of the spreading engine a large muffler is provided, and to steady the engine under the unusually light load it is made to drive a rotary oil pump against a fixed pressure in the closed return pipe.

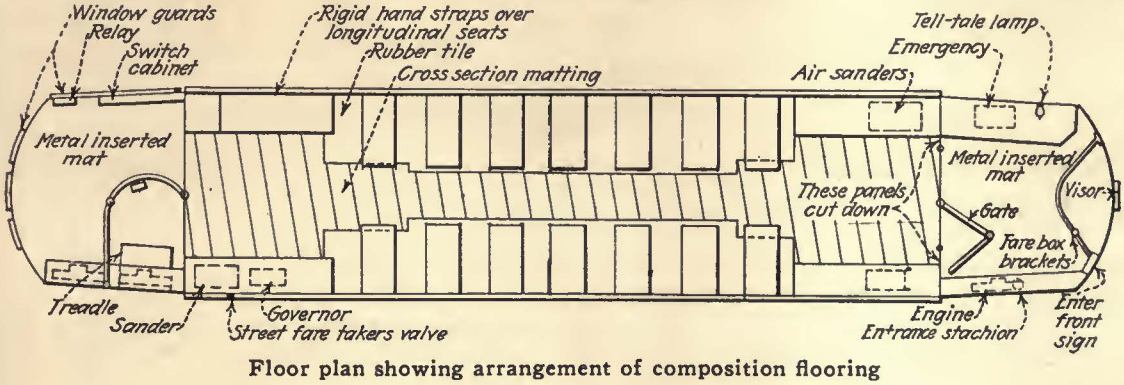
Remodeling, Repainting and Overhauling Methods in Kansas City

By R. S. Neal
Superintendent of Equipment Kansas City Public Service Company
Kansas City, Mo.

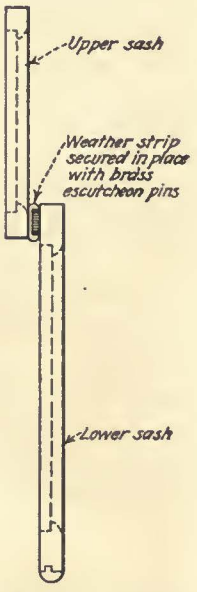
Rattan seats covered, rubber tiling laid over floor, skirts added to car body, visor over front vestibule center window, new paint scheme applied, weather stripping added to windows, complete overhauling for trucks



Color arrangement used for painting the cars



Floor plan showing arrangement of composition flooring



Weather stripping is installed between the upper and lower sash

EXTENSIVE remodeling and overhauling of equipment is now being carried out in the shops of the Kansas City Public Service Company. The program includes work on 45 cars. Folding doors are being installed at the front and treadle-operated doors at the rear. Safety air equipment is combined with the electrically operated rear doors. Seats which were previously covered with rattan are being overhauled and maroon Kemi-suede is placed over the rattan. Window latches, lifts and other car fittings are being nickel plated. A floor covering of rubber tiling is being laid and a metal wear-proof flexible matting added in the body of the car. In the vestibule a metal-rubber floor will be installed. Special skirts, Celotex lined, are being attached to the base of the car body to improve the appearance and decrease noises from motors and trucks. Lamp shades of a special type are being used in connection with car lighting changes. A swinging gate and a special metal visor are to be installed on the front vestibule. Cars will be painted inside and out, using a new paint scheme.

The work is being done on a twelve-car-a-week schedule, so that two cars are completed each day. The program for the work includes the placing of the cars in position in the erecting shop for overhauling. Trucks are removed and sent to the truck floor for general overhauling. Special attention is given to gears, bearings, gear cases and other parts so as to eliminate noise. Springs and side and center bearings are being checked up so as to maintain a standard step height.

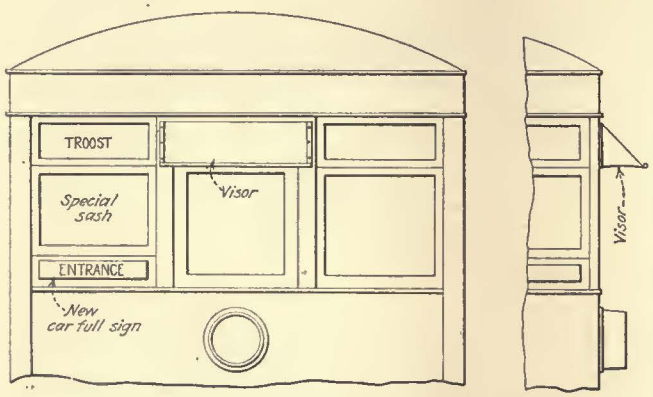
In connection with the body overhauling the lower right-hand front vestibule sash are removed and used for replacement and a special sash is installed in this position in conjunction with a Hunter "Enter-Front"

sign. Other sash are removed from the car, stenciled and then sent to the glazing bench in the mill. After repairs have been made they are sent to the paint room for cleaning and repainting. The sash are reinstalled in the car during the final trimming by the erecting department. Body curtains are removed and sent to the curtain bench for thorough cleaning and repairing. From there they go to the paint shop to be installed when cars are trimmed. Old type khaki motorman's curtains are removed and replaced by new pantasote curtains.

To reduce noise and also to provide greater warmth in the cars weather stripping is placed between the sash, as indicated in an accompanying illustration. All cars are being equipped with Faraday push buttons, and for this installation the pilasters are sent to the mill for reboring. Car roofs are inspected carefully, as it is found that about 25 per cent require recovering.

The practice of the railway is to use monel metal for heater resistors. Where this wire has already been installed in the heaters they are left on the seat frames, but if they are not so equipped they are removed and sent to the electric shop for this change. Seat frames are removed and the backs and cushions stripped from them. Frames are marked with position and car number and sent to the paint shop for painting, after which they are ready to be installed in the car when it is trimmed. Seat backs are sent to the erecting department and cushions are thoroughly dusted and cleaned. Spring plates on the longitudinal seats require considerable care, as many of them are broken. An accompanying sketch shows the method of reworking these plates. Cattle-hair felt ½ in. thick is installed over the rattan and over this a covering of maroon Kemi-suede is placed.

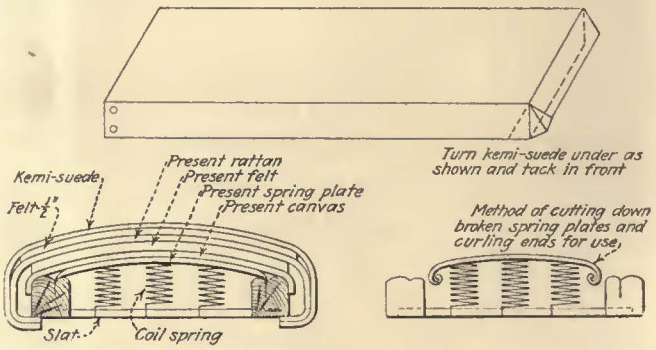
All car trim items such as sash locks, lifts, seat back corner castings, light sockets, etc., are removed, tagged with the car number and sent to the electric shop, where they are nickel plated, buffed and lacquered. Seat back corner castings are returned to the upholstering bench,



At the front end of the car a special window is installed for use with signs and a visor is placed over the front center window

where they are installed in the backs as they are upholstered. Other parts are sent to the paint shop. Body stanchions are removed and sent to the pipe bench to be cut to size for front-entrance use. Controllers are removed and pipes, valves, etc., installed for the use of new safety air equipment. The safety air adapters are installed on the heads of the controllers when these are overhauled.

Motorman's and conductor's railings are removed and sent to the pipe department for necessary repairs. Fare box brackets are added to the large post on the front railing. Also, when stripping the vestibule floor, the individual seat at the right-hand corner of the car is removed. Floor strips in the walkway, in the center of the car body floor, are removed and level floor laid in their place. This requires resurfacing of the trapdoors. If the floor under the seats is very rough, uneven or weak it is replaced. All floor is placed in shape to



Method used for upholstering seats and cutting down broken spring plates

make a good surface on which the composition flooring can be laid. An accompanying floor plan shows the arrangement.

The front door, door posts and operating mechanism are removed and all except the doors scrapped. The front door header is removed and sent to the mill for clearance cuts for the upper door shaft arms. This header is reinstalled in its original position. Four new doors equipped with safety rubber buffers are fitted. Front doors are operated by one door engine located on a steel base plate mounted in cabinets over the front door. Rear doors and shafts are removed from the cars and shafts are stripped from the doors and sent to the welding and machine shops for lengthening. Doors are sent to the mill for repairs and reworking. A door engine cabinet, practically the same as that used over the front doors, is installed over the rear doors, in which two door engines are mounted on base plates. The rear exit step is equipped to operate in connection with a treadle device which is installed in the vestibule floor just inside of the exit doors. The rear doors are electrically controlled and air operated.

After the overhauling work is completed the car is placed over a pit in the rear of the paint shop and the composition flooring is laid. At the same time body skirts are installed. They are made of No. 16 gage steel lined with Celotex and hinged to the car bodies. These skirts improve the appearance and decrease truck and motor noises. The metal visor which is installed over the center vestibule window is made of No. 20 black iron and is installed when the cars are trimmed.

Cars remain six days in the paint shop. The first day they are washed inside and out, scraped and sanded. The second day they are primed and puttied on the outside and the ceiling and hoods painted on the inside. The third day they are sanded and touched up on the outside and the first coat of enamel for the inside and outside is put on. The fourth day the second coat of enamel is applied both inside and outside. The fifth day the outside is blocked up for numbers and striped. The inside is touched up and switches and numbers are put on. The next day the car is trimmed for service. An accompanying diagram shows the painting scheme used.

Track pavement on Whitney Avenue, New Haven, laid with granite block stretchers forming the flangeways

Extensive Annual Track Reconstruction Done by Connecticut Company

Way maintenance is co-ordinated with municipal paving program. T-rail is standard. Flangeways are formed by granite blocks set in rich concrete. Pavement between rails has extremely low crown

By M. M. Johnston
Division Engineer Connecticut Company, New Haven

BELIEVING that careful maintenance of the permanent way is an essential of good electric railway service, the Connecticut Company has adopted a policy of extensive annual track reconstruction. During the past six years 133 miles of track has been rebuilt, a yearly average of slightly more than 22 miles. Last year 21.33 miles of city track and 9.73 miles of interurban track were reconstructed, or slightly more than 31 miles in all. This was the largest amount done in any one year of the company's history. The total mileage reconstructed by the Connecticut Company in 1926 was second only to that of the Chicago Surface Lines, the largest urban electric railway in the world.

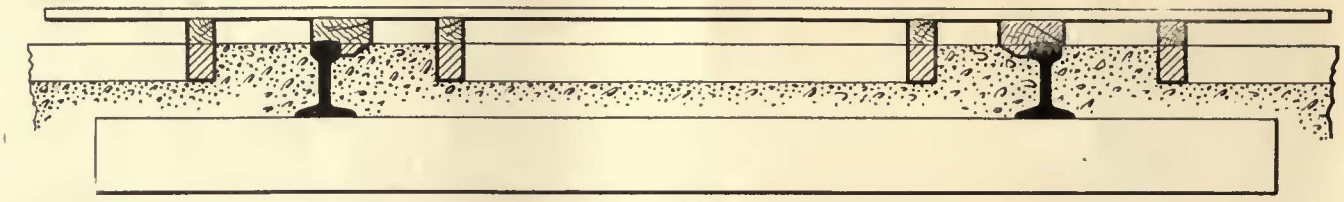
MILEAGE OF TRACK REBUILT BY THE CONNECTICUT COMPANY, BY YEARS

Year	City	Interurban	Total
1921	12.81	5.02	17.83
1922	27.73	2.91	30.64
1923	17.89	2.19	20.08
1924	14.59	5.04	19.63
1925	11.17	2.83	14.00
1926	21.33	9.73	31.06
Total	105.52	27.72	133.24
Average	17.59	4.62	22.21

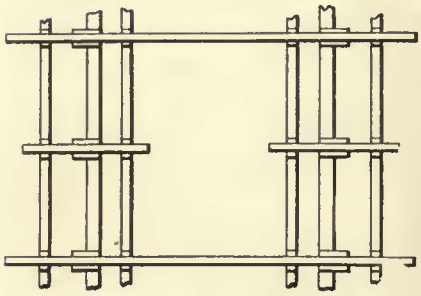
The track rebuilt by the Connecticut Company has varied somewhat from year to year, as shown in the accompanying table.

Under the laws of Connecticut an electric railway is required to pave only 8 in. on each side of the rail. However, if trackwork is done separately from general paving, the entire cost of removing and relaying the pavement in the track area must be borne by the railway. Where there is double track, this sometimes means paying for a strip of pavement 19 ft. in width. For this reason the Connecticut Company makes every effort to co-ordinate its track reconstruction with the paving programs of the various municipalities through which its lines run.

When a paving project is proposed the railway investigates the age and condition of its track in the street and decides whether or not it will last the life of the



Template used for shaping flangeways



Sketch Showing Plan of Form

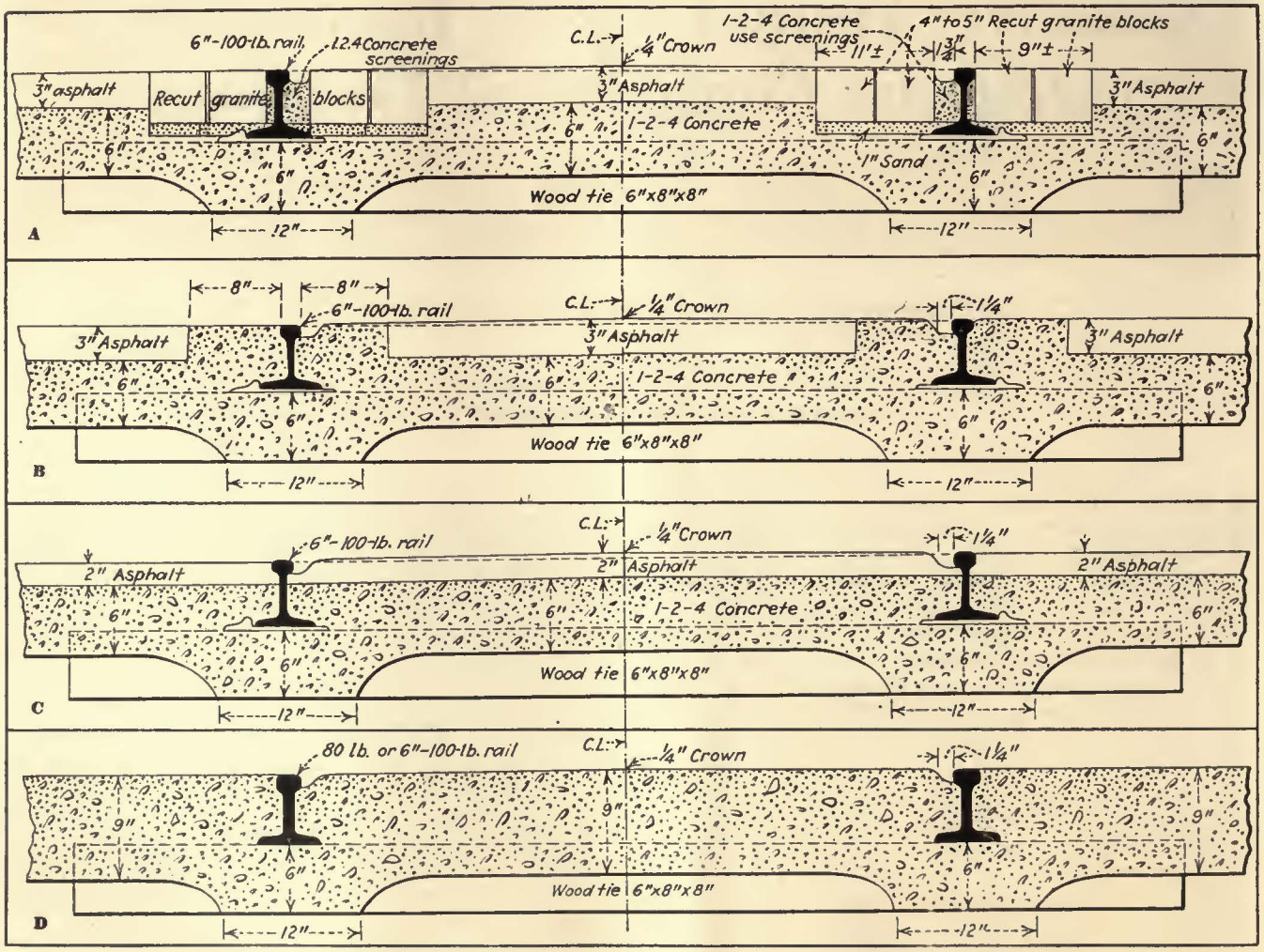
new paving. If it is thought that the existing structure will last that length of time joints are inspected, tightened and welded, defective ties are replaced and the track put in thoroughly good operating condition. When it is believed that the old track will not last the life of the new paving the entire structure is renewed.

Methods of track construction vary somewhat on the different divisions of the Connecticut Company. Those used on the New Haven division are typical of the general practice on the company's large city divisions. At Hartford, however, the soil conditions require a special type of construction.

In track reconstruction the first step after the removal of the old material is to roll the sub-grade. This can be done, of course, only when the old ties are replaced. Whenever new rail is used all old ties are removed and new ones laid. If the old rail is put back only questionable ties are renewed.

Chestnut or oak ties 6 in. x 8 in. x 8 ft. are used in the present standard city track on the New Haven division. Last year the ratio was approximately 70 per cent chestnut ties and 30 per cent oak. They are obtained from Virginia and Pennsylvania as well as locally to some extent. Average cost at the present time is about $1.10 per tie. Treated ties are not used by the Connecticut Company as experience has shown that untreated ties in permanent pavement will last as long in the sandy soil of this region as does the rail. At Hartford steel ties are used thoroughly tamped with crushed stone supported on a special concrete mattress designed to suit the unusually difficult soil conditions.

Tie plates with an inward cant of 1 in 20 to increase



Standard types of low-crown pavement used by the Connecticut Company

(A) Asphalt with granite block stretchers. (B) Asphalt with concrete flangeways. (C) Asphalt with shaped flangeways. (D) Concrete with shaped flangeways.

the area of wheel contact on the rail are used with new rail. A feature of these plates is the staggered notching of the spike holes. An article on this subject was published in ELECTRIC RAILWAY JOURNAL April 5, 1924, page 537.

Rail used on the city divisions is standard 6-in., 100-lb. A.R.A. section except in the Hartford division, where grooved girder rail is used on account of franchise provisions. Both thermit and seam welded joints are used. The cost is approximately the same, about $6.50 per joint. Base plates are used with seam welded joints, as told in the article already referred to. Thermit welded joints are unsupported. In paved track no expansion joints are provided except at special work.

Pavement used with the standard city construction is of five types: (a) Asphalt with granite stretchers on each side of the rail, (b) asphalt with a concrete strip on each side of the rail, (c) solid asphalt laid up to the rail, (d) solid concrete laid up to the rail, (e) solid granite block laid up to the rail. Because of the narrowness of the strip the cost does not vary greatly except in the cost of the granite block construction that averages about $2.35 per foot of single track, this cost representing four strips 8 in. in width. An article dealing with certain features of this construction was published in the ELECTRIC RAILWAY JOURNAL Jan. 31, 1925, on page 194.

When granite blocks are used to form a flangeway, as in structures (a) and (e) of the preceding paragraph, they are set in a dry mixture consisting of one part cement and two parts sand. The blocks are thoroughly rammed home. Between the block and the gage side of the rail a 1-2-3 mixture of concrete using very fine stone is placed. This mixture is thoroughly rammed between the block and the web of the rail and is plastered with a wet mixture consisting of one part sand and two parts of cement. Finally the whole strip is sprayed with water from a hose, which sets up the sand and cement cushion under the blocks and prepares them for grouting.

Sometimes the granite blocks are grouted all the way to the top, and at other times only half way up, depending on the amount of vehicular traffic using the street. Unless this is extremely severe, the grouting is carried only half way and the remaining space is filled in with pitch and gravel. From the railway viewpoint this method is considered preferable as it tends to seal up the track structure better and maintains the bond between rail and pavement.

When asphalt or concrete is used without granite block stretchers the flangeway is made by shaping this material. It is tamped under a special curved template shown in an accompanying sketch. This work is done in 12-ft. sections. A considerable amount of pavement has been laid in this manner and has given satisfactory service.

Only a ¼-in. crown is given to the pavement between rails. Drainage depends largely on the longitudinal grade. At low points, and elsewhere as needed, track drains are installed. These are of cast iron shaped to fit the flat crown. Approaches to these drains are paved with granite block for 3 ft. on each side regardless of the general street paving.

During three years experience no trouble has been encountered with dirt or ice in these flangeways. Automobiles trying to turn out of tracks do not slew or skid. There is less wear on the pavement on account of less impact caused by vehicles crossing the tracks at right angles. There is also less wear because the flangeway is too narrow to permit wheels to drop down between rails. The low crown design has proved popular with the public in general because it has made the pavement smoother in the track area.

Asphalt paving with 8-in. concrete strip on each side of rail. Flangeway is made by means of template shown on preceding page

Granite blocks are used for pavement 3 ft. each side of track drains regardless of how remainder of street is paved

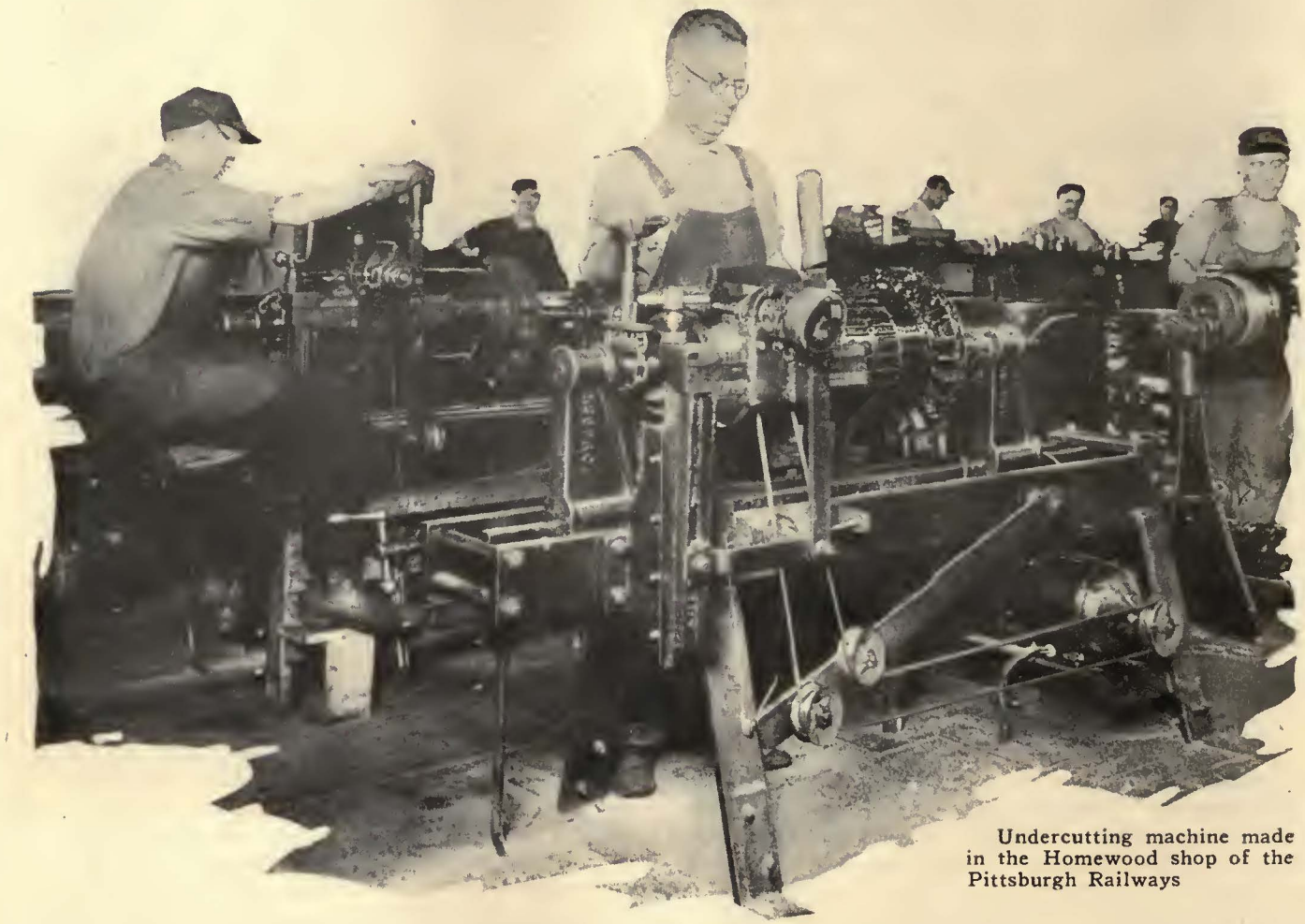
Data on Painting Car Roofs

THE time between paintings of car roofs was found to vary between six to eighteen months on several Southern railways. New Orleans paints once in eighteen months, Atlanta, Knoxville, Memphis and Birmingham paint once a year and Mobile paints twice a year. Dallas is using Gilsonite paint and has tried Valdura and Asphalt paints. The life of canvas roofs was found to vary up to a maximum of ten years.

Turning and Slotting of Commutators*

Modern railway motors are slotted. Mica should be removed carefully from the sides of the slot or the beneficial results from slotting will be lost. Depth of slots should be from 3/64 in. to 5/64 in.

By Jesse M. Zimmerman
Renewal Parts Engineer Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

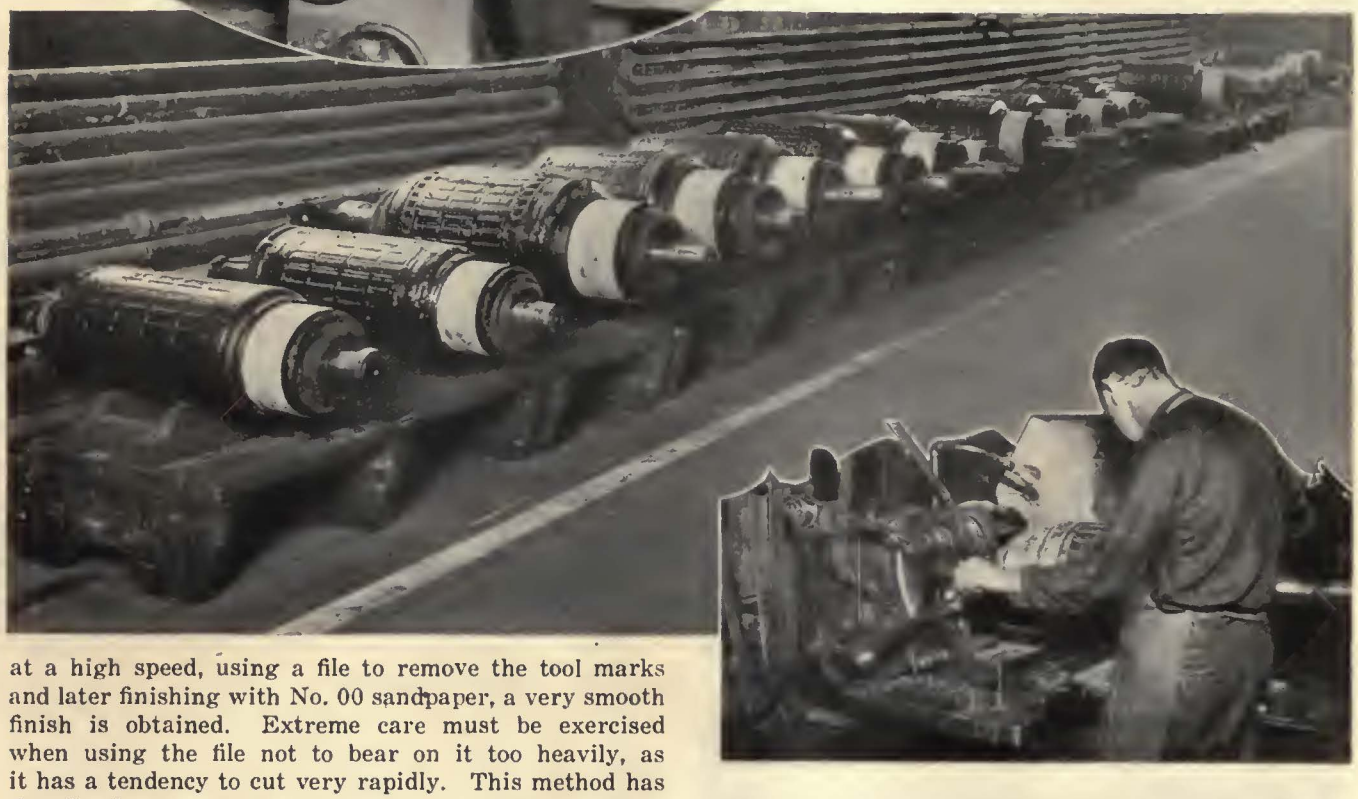


Undercutting machine made in the Homewood shop of the Pittsburgh Railways

DIFFERENCES of opinion will always exist regarding the resurfacing of the commutator face by grinding or by turning. Each method has its advantages as well as its disadvantages. The greatest advantage of turning the commutator face is that the time required is very short. The kind of tool to use is not important and each machinist has his favorite tool for each different line of work. However, a diamond pointed tool slightly cupped at the top and set so that it will have sufficient clearance between its side and the commutator face will give very satisfactory results. The cutting edge of the tool should be located slightly above the center line of the armature. One can always feel that the commutator will have a smooth finish if the chips of copper curl up while machining. During the machining the commutator should run at its maximum operating speed. If the speed is too slow the tool will cut the copper deeper than the mica. In order to remove as little copper as necessary the cut should be made very light.

The final finish given the commutator is usually removal of the tool marks by No. 00 sandpaper. This should be done after the undercutting operation. Some repairmen have found that by running the commutator

*This is the eighth of a series of articles on commutators for railway motors. The others were: Choosing Materials for Railway Motor Commutators, published Aug. 21, 1926; Important Considerations in Replacing Commutator Bars, published Oct. 23, 1926; Accurate Machining of the V's of Assembled Commutators Is Essential, published Nov. 20, 1926; Mica V-rings and Bushings Have Important Functions in Commutators, published Dec. 18, 1926; Methods and Equipment for Efficient Assembling of Commutators, published Jan. 15, 1927; Soldering of Railway Motor Commutators, published Feb. 19, 1927, and Preventing Flashovers Is an Important Part of Commutator Maintenance, published March 19, 1927.



At left, undercutting a commutator with a motor-driven saw at the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Company

Center view, protecting commutators while the armatures are in storage in Homewood shop of the Pittsburgh Railways

At bottom, undercutting commutators with a power-driven saw mounted on a lathe head

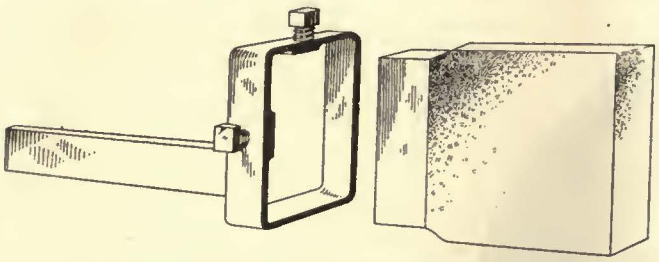
at a high speed, using a file to remove the tool marks and later finishing with No. 00 sandpaper, a very smooth finish is obtained. Extreme care must be exercised when using the file not to bear on it too heavily, as it has a tendency to cut very rapidly. This method has the disadvantage of removing too much copper from certain spots, making the commutator surface uneven. Both the sandpaper and the file have a tendency to cut the copper deeper than the mica.

The commutator face may be ground with a special carborundum stone which fits in the tool post of the lathe. It will remove a minimum amount of copper in resurfacing because the cuts made by the stone are very shallow. The last cut will produce a polish without need for file or sandpaper and give a true, smooth surface. The disadvantage of the grinding method is the length of time required. Some operators take a rough machine cut across the commutator surface when it is badly cupped and then use a carborundum stone for finishing. Other railway operators object to the use of the carborundum because the grit from the stone imbeds itself in the copper, causing the brushes to wear rapidly. Careful inspection of the commutator face will show whether this is so.

If the commutator is properly undercut and brushes of the correct grade are used it will soon take a natural polish if the brush surface has an average finish.

A clean undercut commutator reduces the burning of the copper bars, increases the life of the brushes and practically eliminates flashing because it prevents high mica, which is caused by the copper wearing the more rapidly so that the brushes will ride on the mica strips. This causes a burning action between the copper and the brush, which wears away the contact surface. If the burning action continues grooves will be burned completely around the commutator. When the mica is high at one part of the commutator only this burning action will eventually cause a flat spot, which will grow until it will be necessary to resurface and undercut the commutator.

Undercutting is done after the armature has been soldered and banded and the commutator face and neck resurfaced. It should never be done before the commutator has been soldered, as the undercut slot is liable to fill up with solder. Four essentials should be followed when undercutting a commutator. First, it is important that none of the mica remains in the slot. This can be prevented by using a saw which is at least 0.005 in. larger than the mica strip. After the undercutting a heavy hack saw blade should be drawn through



Lathe tool holder and carborundum stone for grinding commutators

each slot to remove any mica which may remain in it. In order to undercut the entire face of the commutator without cutting into the neck the saw must be as small as possible, yet it must be large enough to undercut the commutator to the proper depth.

Commutators should be undercut with a high-speed carbon saw operating at approximately 2,000 r.p.m. This saw should be drawn toward the operator so that he can guide it when starting to cut. It should revolve so that the teeth will strike the bottom of the slot first. This will leave a clean slot on the brush surface.

An undercut commutator should operate from one heavy inspection period to the next. The maximum and minimum depth should be $\frac{3}{32}$ in. and $\frac{1}{32}$ in. respectively. However, the depth can be increased or decreased according to conditions. Should the armature be removed for minor motor repairs the commutator should be inspected carefully and if the mica is getting flush with the copper it should be undercut.

Undercutting is done by either a motor-driven or a belt-driven saw. Where only a few armatures are to be undercut a special knife or a hack saw is sometimes used, but this method is inefficient and slow. On the other hand, where many armatures are to be slotted the undercutting is usually done on a special machine.

An efficient undercutting outfit made in the shops of the Pittsburgh Railways is shown in the accompanying illlustration. This machine was made from an old lathe, the saw being belt driven from a ¼-hp. motor. After the commutator has been undercut, in order to polish the brush surface with sandpaper the armature is rotated by placing a belt around the armature connecting it directly to the motor.

Armatures are rotated by belt for polishing the commutator face after undercutting in the shops of the Pittsburgh Railways

Some operators have had good success with an undercutting outfit clamped to the tailstock of the lathe. The portable electric-driven outfits are popular in some of the smaller shops and give good results. The main objection to this type is the difficulty in guiding the saw. When making or purchasing an undercutting machine it is essential that the rotating spindle be supported by a bearing as close to the saw as possible. Any type of stationary undercutting outfit should have a hood and a suction hose to carry off the mica dust.

After the commutator has been undercut the bars have very sharp edges. If left, these will cause arcing and pitting. Once started, arcs between the bars will tend to concentrate on these edges, and may result in a flash. Eventually the bars will be pitted badly. It is important that these sharp edges be rounded off, which can be done by drawing a small three-cornered file through the slot.

After the commutator has been given its final finish, it should be protected from dirt, oil and moisture while the armature is in storage. The Pittsburgh Railways has adopted the scheme of covering the commutator face with several turns of wrapping paper.

Unnecessary Signal Lights Retard Traffic

HAPHAZARD installation of automatic signal lights not only delays traffic but may actually increase the congestion and danger at street and highway intersections, according to a report compiled by the Albert Russel Erskine Bureau for Street Traffic Research. It is stated by Miller McClintock, director of the bureau, that "automatic stop and go signals are unquestionably an effective means of controlling traffic, and their effectiveness has been proved by many installations that have speeded traffic and reduced accidents in Los Angeles and Chicago, but it should always be borne in mind that traffic signals stop traffic as well as move it, and that wherever a device of this kind is installed it immediately places an automatic limit on the time the intersecting streets may be used. In general, the time along one street is reduced 50 per cent—the signal giving alternate right of way to the streets controlled. Unless the alternate movement is necessitated by a real congestion at the intersection which reduces the opportunity for movement to a point below that permitted by the signal, it is apparent that the control device can have no other effect than to retard traffic flow.

"Stop and go signals should rarely, if ever, be installed for purely safety purposes. The primary purpose of the signal is to start and stop traffic to facilitate movement. Dangerous intersections where traffic conditions do not justify the maintenance of a stop and go signal can best be controlled by the installation of warning signs, and in some cases by the application of a through-stop street rule."

The danger of installing stop and go lights where they are not necessitated lies in the disregard for this type of regulation that grows when motorists are unnecessarily delayed. The willingness of the motoring public to give obedience to an unpoliced signal varies in ratio to the reasonableness of the control exercised.

Modernizing Work Car Equipment at Salt Lake City

At a Cost of $1,700 an Electric Locomotive of the Utah Power & Light Company Has Been Completely Revamped and Adapted to Present-Day Conditions

By F. D. Heiges
Office Engineer Utah Light & Transit Company, Salt Lake City

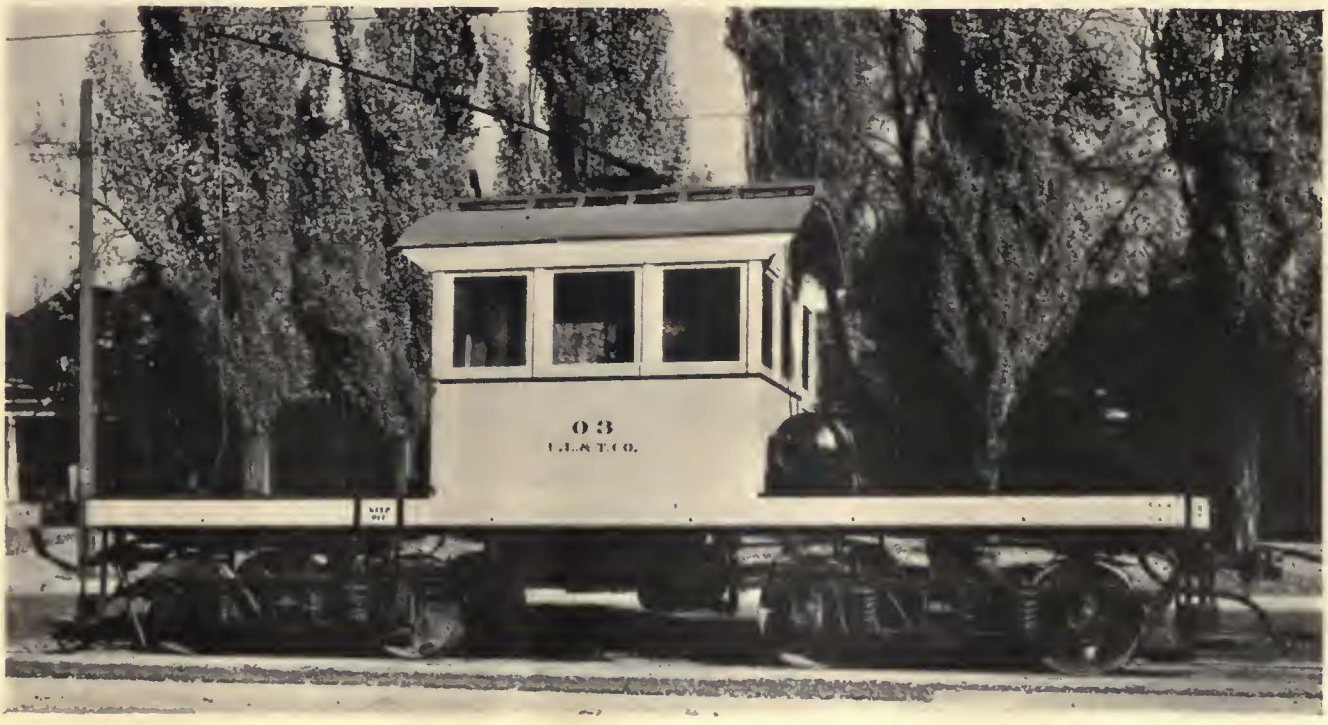
STRIKING is the contrast between the dilapidated appearance of an old work car battered by years of service and the neat and trim look of the same car fresh from the hands of capable workmen. A transformation of this kind was recently accomplished in the case of an electric locomotive of the Utah Light & Transit Company. Air compressors, trucks, drawbar and electric equipment on the rebuilt vehicle are those that were on the old one. The frame and the body are new. Accompanying illustrations show this car before and after modernization. Reconstruction resulted in a substantial saving to the company, and also had considerable advertising value in that the operation of an up-to-date efficient looking locomotive over the streets of Salt Lake City gives the people the impression that the company is endeavoring to furnish high-class service with the best possible equipment of every kind.

The old locomotive originated about 1909 by the installation of an obsolete street car body on a flat car and motorization of the trucks. Its color was black instead of the standard yellow of the company's other rolling stock.

After the old car had been completely dismantled the trucks were thoroughly overhauled, steam-cleaned and repainted. Upon these, in place of the old wooden frame, was constructed a steel frame 30x6 ft. in size consisting of two 8-in. channels running lengthwise on the outside, four 8-in. steel I-beams running through the center, and two 10-in. arched channel bumper plates forming the ends. The extra height of the 10-in. bumper plates above the 8-in. I-beams permits a 2-in. floor of tongued and grooved wood to be fitted under the ends. Steel strips have been placed along both edges of the floor as a protection to the surface.

This locomotive was built in 1909 by placing an old body on a flat car and motorizing the trucks

A cab was built 8 ft. 6 in. square. This is 13 ft. shorter than the old cab, while the frame itself is 3 ft. shorter. The greater length and narrow width of the old cab hampered the view of the motorman. Having a smaller cab on a shorter frame and flush with it permits the operator to have a clear range of vision on all sides and there is less likelihood of accidents. The center height of the cab is 7½ ft., while the side height is 6½ ft. It is built of steel and wood lined. In all there are ten windows, three on each side and two on each end. All the windows are movable in the new cab, while in the old cab only the center windows were movable. Doors are located at the ends, diagonally opposite each other, with the controller located at the center window on one side. Five electric heaters main-



The same locomotive after being thoroughly overhauled. A new frame and a new cab were installed on the old running gear

tain a comfortable degree of warmth in the cab during cold weather.

This rebuilt locomotive is mounted on 33-in. wheels and is equipped with four Westinghouse 93 motors. The total weight is approximately 40,000 lb. All the wiring has been placed in conduits, another advantage over the old vehicle. The cab of the old locomotive was congested by the presence of air tank and compressor, while on the new locomotive the compressor is underneath the frame and the air tank is outside of the cab along the end wall.

The new body and the reconstruction work cost $1,700. Including the value of the old equipment used, the total valuation is about $8,500 for the vehicle. In utility it is believed to be the equivalent of an $11,000 car. Two locomotives were rebuilt in this way, effecting a saving estimated at $5,000.

The Readers' Forum

Difficulties in Wheel Removal Discussed

INDIANA, COLUMBUS & EASTERN TRACTION COMPANY
SPRINGFIELD, OHIO, April 4, 1927.

To the Editor:

I have read with considerable interest the article "Wheels Removed and Pressed on Economically," on page 331 of the Feb. 19 issue of ELECTRIC RAILWAY JOURNAL. Just to make it more interesting, I wish to criticise the practice of the Wilkes-Barre & Hazleton Railway, as I think it can be improved upon.

In the first place I do not approve of burning the wheels in order to remove them from axles. I note they have a 400-ton wheel press, and that 36-in. wheels are bored 7 in. and put on at 75 tons, which is standard practice. It is true that it will require probably twice this pressure to remove these wheels after they are worn out, due to the metals of wheel and axle settling into each other under continued pressure and vibration. We have found that a method of removal much cheaper and better than burning is to heat the wheels with a large coal-oil torch. This does not injure the wheels in the least, which is worthy of consideration for the reason that frequently wheels removed from axles are used again for some purpose.

The practice at the I., C. & E. shops is as follows: 100 tons is considered a maximum safe pressure for a 5-in x 9-in. axle. A pressure of 100 tons is first applied; if the wheel does not start, the flame from a torch is applied for about five minutes, and pressure is then again applied, letting the flame still play on the hub of the wheel. If the wheel does not start, a pressure of about 100 tons is kept on until it does start, which is rarely more than seven or eight minutes from the time of first applying the torch.

There is not the slightest danger of injury to case-hardened or heat-treated gears in this process, as the temperature of gear or hub rarely exceeds that of boiling water, or 212 deg. F., while with the cutting process there is some danger of injury to a gear and also to the surface of the axle and journal bearings unless protected thoroughly.

The second criticism I make is that the use of a thrust cylinder and mandrel in putting on wheels is cumbersome, slows up the work and is not at all necessary. If ends of axles are faced off square with the center line and the pressure faces on the wheel press are kept in good order there is no danger of springing an axle if allowable pressures are not exceeded.

F. J. FOOTE,
Superintendent Motor Power and Equipment.

Judging Maintenance by Car Failures

DES MOINES CITY RAILWAY
DES MOINES, IOWA, April 6, 1927.

To the Editor:

The discussion of car failures in ELECTRIC RAILWAY JOURNAL has been very interesting. This is important, first from the point of judging the degree of maintenance and second from the transportation standpoint. The mechanical and transportation departments must be in perfect accord or the car failures per 1,000 miles cannot be kept at a low point. Car failures cause the car riders much discomfort, as no one likes to change to another car during the short ride downtown even in good weather, not to mention in bad weather, when troubles generally happen.

It is only by frequent and thorough overhauling of the equipment and a strict method of inspection that the mechanical department can deliver the service it should. In addition, all car failures must be gone into carefully and steps taken to prevent future ones of the same nature.

Cars on this property are overhauled on a 100,000-mile basis, including painting. They are inspected on a 1,200-mile basis, except the brakes, which are given attention every 600 miles. Oiling of armature and axle bearings is taken care of at every 1,200-mile inspection, while journal bearings and gears are lubricated every 4,800 miles.

There seem to be many different ways on the various properties of classifying a car failure. If we find it necessary to pull a car off before its run has been completed, it is considered a car failure, of which a certain number are chargeable to equipment and a certain number are not chargeable to equipment. Every item is chargeable to equipment except broken glass and collisions.

Although the pull-in of many cars can be prevented by having a man repair cars on the road, we do not believe this to be a satisfactory practice on account of delays and discomfort to passengers while the man is making the repairs. About the only road work we do is to replace burned out lamps. C. R. MCMAHON,
Superintendent of Equipment.

Cast Bars Not Drop Forged

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
WILKINSBURG, PA., April 1, 1927.

To the Editor:

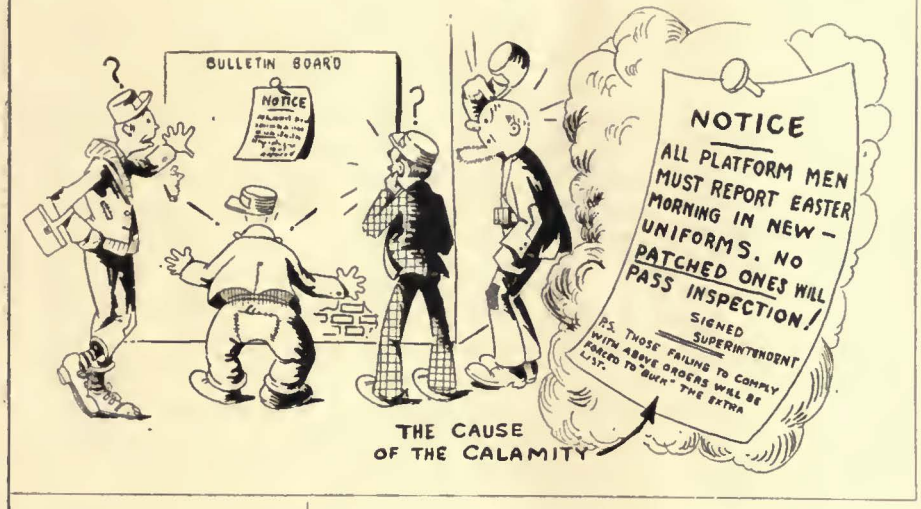
In my article in ELECTRIC RAILWAY JOURNAL for Oct. 23, 1926, one sentence read:

"The Brinell hardness number for cast copper bars which are later 'drop forged' or 'bumped' is from 50 to 55."

The use of the word "drop forged" was somewhat ambiguous. It was not my intention to convey the impression that "drop forged" bars are cast, but it was my intention to state that the Brinell hardness number for cast copper bars which are later "bumped" is from 50 to 55, by the word "bumped" meaning what is sometimes termed "cold pressed bars."

JESSE M. ZIMMERMAN

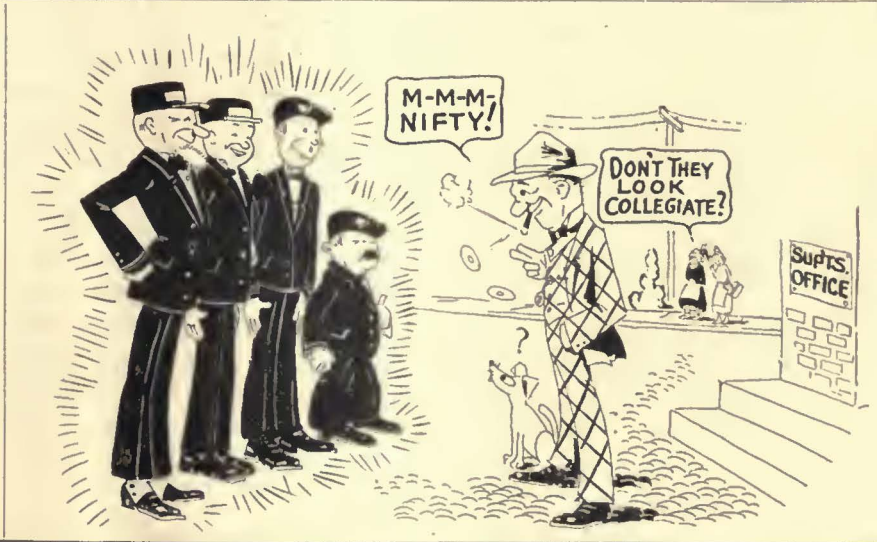
Adventures of Old Man Trouble *on the* Hicksville Railway



The Annual Easter Inspection— Would Not a Weekly Inspection Be Better?

Neat platform men are a continual advertisement that the electric railway is a live, vivid part of the community's life. Car operators are in daily contact with the railway's customers. Their neat appearance should be a part of the clean, tidy condition of the cars.

ELECTRIC RAILWAY JOURNAL will be glad to furnish press proofs of this page free of charge for posting on bulletin boards and will supply electrotypes of this series at cost for use in company publications.



J. M. Zimmerman and E. L. Proctor, Westinghouse Electric & Manufacturing Company

Fifteen Cash Prizes Offered to

WITH a desire to stimulate the improvement of railway maintenance methods and to assist in spreading information regarding practices and equipment that are proving of value, ELECTRIC RAILWAY JOURNAL will award three capital prizes of $200, $100 and $50 for the three best maintenance ideas submitted before Aug. 1, 1927. In addition twelve monthly prizes of $25—one each month beginning with the May 21, 1927, issue—will be given. The articles submitted for the capital prizes will be published in the maintenance data sheet section of the issue of ELECTRIC RAILWAY JOURNAL devoted to maintenance and construction. A minimum of $5 will be paid for each article submitted in this competition which is accepted for publication.

The purpose of the competition is to arouse interest among maintenance men in the development and adoption of improved methods for performing routine work, or new methods or fixtures that save labor, time and money for the electric railways.

The prizes will be awarded primarily on the value of the idea presented and its adaptability to the maintenance work of electric railways generally. The form of presentation will be judged only as to the clearness with which the method or device is described and illustrated, and the extent to which information is given which will be needed by other properties interested in using the idea. Fine writing is not necessary. It is the intention to make the prizes available to men engaged in practical maintenance work. Therefore all that is necessary is a concise and clear statement that will be in a form to help other maintenance men. At least one photograph, drawing or sketch is required.

Rules for the Competition

THE competition will be judged and the prizes awarded by a committee consisting of men in the industry intimately associated with the line, rolling stock, and way departments, whose affiliations particularly fit them to pass on the subjects covered in the maintenance data section, and the editor of ELECTRIC RAILWAY JOURNAL. The names of the judges will be published later. All decisions of the judges in making awards or in interpreting the conditions of the contest will be accepted as final. The articles submitted will be judged in accordance with the following conditions:

1 Any employee or official of an operating electric railway or electric railway bus subsidiary may compete for the prizes.

2 Each contestant may submit any number of items he desires, each of which will be judged separately. An individual may win several of the prizes. One item may win both a capital prize and a monthly prize.

3 The author does not necessarily have to be the originator of the idea, but it must be adopted and be in use on the property with which he is connected. The idea submitted may have originated on another property or may have been furnished by a manufacturer. No device or method a description of which, to the knowledge of the contestant or the judges, has been previously published will be eligible for this competition.

4 The competition is not limited to those who originated or developed the idea or apparatus described. Any employee, with the approval of the department head concerned, may submit a maintenance practice or device used on his property. More than one article covering the same device or method will not be accepted, however.

5 Where the management of a railway has a practice of requiring approval of articles sent out for publication such approval must accompany the manuscript. If written approval does not accompany the manuscript it will be assumed that such approval is unnecessary.

Maintenance Men

6 An article may be submitted by several persons or by a department, and need not be written by the person in whose name it is submitted. The prize will be awarded to the individuals or department whose name appears on the manuscript, and can be distributed among the winners on any basis they may desire. Should there be a tie for any prize the full amount will be awarded for each of the articles involved in the tie.

7 Articles may describe any maintenance practice or device used by any department of a railway such as the maintenance of rolling stock, buses, shop equipment or methods and equipment for overhead line repairs, power distribution and power generation devices, signal work, track and way maintenance, etc.

8 Due to the limited space available in the maintenance data pages, articles submitted for these prizes should be preferably 100 to 200 words in length and should be accompanied by one illustration. Brevity consistent with a proper presentation of necessary information will be given weight in judging articles. In no event should they be longer than 400 words with not more than two illustrations. Articles will be published as promptly as space permits.

9 In rating the various articles the committee will consider the primary value of the method or device as of highest importance. The committee will also consider its practicability, the advantages and economies that are set forth. In rating manuscripts for the capital prizes the committee will also consider the clearness and completeness with which the idea is presented in the original manuscript.

10 All articles must be in the English language and be mailed to the editor of ELECTRIC RAILWAY JOURNAL, Tenth Avenue and 36th Street, New York City. To be eligible for the capital prizes to be awarded the envelope must bear a postmark dated before Aug. 1, 1927. Envelope and manuscript should be marked "Maintenance Competition." Any number of items may be sent in the same envelope. Photographs or sketches should accompany manuscript and be attached thereto. Drawings or sketches may be in pencil, or blue prints will be accepted. Photographs should be protected against damage in mailing. Each item submitted should bear the name or names of the individual or individuals for whom it is submitted and to whom awards are to be made. Articles will be published under the names of individuals or department appearing on the manuscripts. Photographs, sketches and manuscripts should be so marked that should they become separated they can be identified readily.

11 The original manuscripts and illustrations will be turned over to the committee of judges to determine which will receive the capital prizes. These may, however, be published before or after capital prizes are awarded. Monthly prizes will be judged by the committee after the articles are published in the maintenance data section, the best items being selected each month from those appearing in the issue in the month devoted to maintenance and construction.

12 The announcement of the winner each month will be made in the issue devoted to maintenance and construction (the third issue each month) following the one containing the item.

13 Any material submitted may be published at any time after its receipt that the editors of ELECTRIC RAILWAY JOURNAL decide.

14 The winners of the capital prizes—for the best idea $200, for the next best $100, and for the third best $50, will be announced in the annual convention number of ELECTRIC RAILWAY JOURNAL to be published in September, 1927.

15 All articles submitted will become the property of ELECTRIC RAILWAY JOURNAL and no manuscripts will be returned.

More Comments on Annual Maintenance Issue of March 19

A. E. HAAK, general superintendent the Gray Line Motor Tours, Colorado Springs, Col., writes:

The Maintenance Number of ELECTRIC RAILWAY JOURNAL for March 19 is certainly very interesting. One of the outstanding items in the issue is the review of improved equipment for maintenance operation. It certainly will help the shop forces. We are passing the number to all of our departments and we are sure that they will be benefited greatly by reading all the items covering maintenance suggestions.

H. R. MEYER, renewal parts section Westinghouse Electric & Manufacturing Company, says:

I wish to compliment you on the new maintenance data section which appeared in your Annual Maintenance Number. It will be of unquestionable help in getting before all railway men the things which have been accomplished in an engineering way or from a maintenance standpoint. In a previous issue there was an article by Mr. Williams of the Department of Street Railways, City of Detroit, calling attention to the need for a real good method of correlating engineering information and putting it in such form that it would be of use to electric railway men. It seems to me that the new department which you have started in ELECTRIC RAILWAY JOURNAL will do more toward taking care of this situation than anything that has been done so far.

G. H. STIER, superintendent of rolling stock and buildings, Philadelphia Rapid Transit Company, says in part:

We feel that the step which you have taken in establishing a special maintenance notebook section is an interesting one. The material which you propose to publish in this section will be of particular interest and benefit to all parties interested in the maintenance of electric railway equipment. Having the information presented in a form which will make it possible to bind the sheets together in compact form, while at the same time the copies of the JOURNAL will not be rendered unfit for binding purposes, seems a good plan.

KEITH CONNER of the Jamestown Street Railway, Jamestown, N. Y., says:

Fine! Expect to receive much valuable information through your new department.

C. R. MCMAHON, superintendent of equipment Des Moines City Railway, says:

There are so many good things in the March 19 issue that I hardly know which to mention first, but really I believe that your new section of maintenance data sheets will prove very popular with the readers. It surely will with me. I was interested greatly in the articles by various maintenance superintendents, especially the 100 per cent operation of Chicago surface lines, the article by J. S. McWhirter on car cleaning and the article by A. T. Clark of Baltimore on car painting. The section on improved equipment calls to our attention new devices which might otherwise escape our notice.

C. J. JONAS of the Cincinnati Street Railway writes:

I know of no better way to serve the maintenance men than the JOURNAL as it is now being conducted.

S. L. VAUGHAN, vice-president and general manager Grand Rapids, Grand Haven & Muskegon Railway, said:

I have looked over the March 19 issue very carefully and find some very interesting articles. I think your scheme of publishing monthly maintenance numbers is good.

Dick's Enemies Keep Active

And Provoke a Crisis

WHILE Dick Prescott, assistant shop superintendent of the Consolidated Railway & Light Company, was engrossed in the work of raising the company's maintenance standards and improving shop practices, those to whom progress is anathema and to whom energy and ability in others always loom as a threat to their own personal prestige became more and more uneasy.

Pete Welsher, shop inspector, saw in Dick's ability not only a definite obstacle to his own ambition but a positive menace to the privileges which he had built up for himself in the shop. He was amazed at the rapidity with which the young superintendent gained knowledge and experience. Being lazy himself, he realized that Dick was ready to pay a price in hard work and devotion to the job with which he was powerless to compete. There loomed before him constantly the fear of being shown up in his true light as a shirker and a loafer.

But what Pete lacked in energy he made up in cunning. He never lost an opportunity among the men of casting aspersions on Dick, but he was careful to do so by inference rather than direct statements. His position as inspector fell in well with these private ends. He nagged the men, found fault with the work, issued orders that were unfair, but always left the impression that he was merely carrying out Dick's instructions. Among his own small clique of cronies he talked continually of an imaginary flood of orders and regulations that were supposed to originate with the assistant superintendent. They, in turn, were quick to pour their own versions of disagreeable things to come into the ears of the worried and dissatisfied men.

That definite trouble would ultimately result was inevitable. Pete was wise enough to know that the carpenter shop would not be healthy for his scheming. Steve White, the foreman, was too alert and too close to his friend Dick. Besides, Dick had worked there as a carpenter's helper when he first came to the Consolidated, and most of the men liked him and were pleased at his rapid promotion. But in the truck shop slow old Bill Johnson was not aware of what was going on until it was too late.

One morning just after Dick had arrived at his office Bill Johnson came in with a worried look on his face.

"Hello, Bill," said Dick pleasantly, "what's on your mind?"

"I got some trouble down at the shop, Prescott; men won't go t'work."

Electric Railway Journal Maintenance Data Sheet

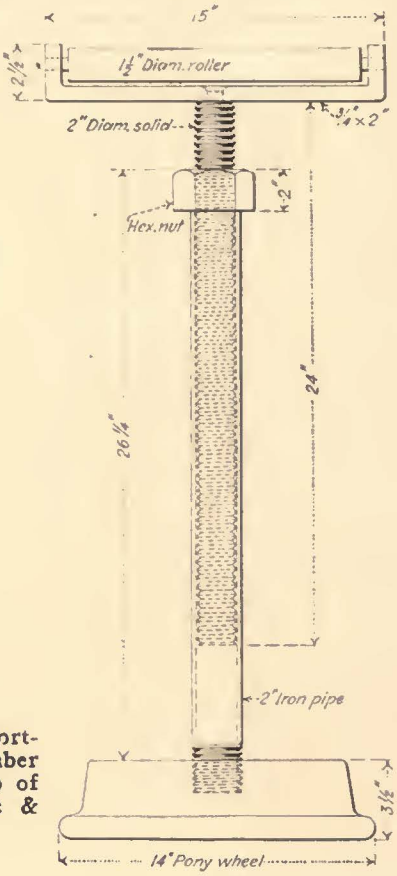
ROLLING STOCK—CARPENTER SHOP—1

Lumber Roller Supporting Stand

HANDLING of long pieces of lumber during the sawing, planing and milling process in the carpenter shop of the Virginia Electric & Power Company, Richmond, Va., has been simplified greatly by design and adoption of a portable roller supporting stand. It was designed and constructed in the shop under the supervision of the master mechanic, W. J. Hicks.

A piece of 2-in. pipe 26¼ in. long is screwed into the drilled and tapped hub of a 14-in. pony wheel. It projects approximately 24 in. above the face of the wheel. A round steel bar 24 in. long is threaded and installed inside of this pipe through a 2-in. hexagon nut. This nut supports the weight of the roller bracket, roller and rod and rests upon the end of the pipe. On top of this threaded rod is riveted a ¾x2-in. flat bracket designed to support a 1½-in. round roller 15 in. long over all.

This stand is very rugged and it can be transported easily to any part of the shop. It is free to revolve, is 25 in. high and can be adjusted to suit almost any condition by turning the 2-in. hexagon nut. Several of these stands have been built in the company's shop and have proved of great value, particularly in the carpenter department.



Roller stand for supporting long pieces of lumber in the carpenter shop of the Virginia Electric & Power Company

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL DIAGRAMS—1

Field Winding Diagrams for Westinghouse 101B Motor

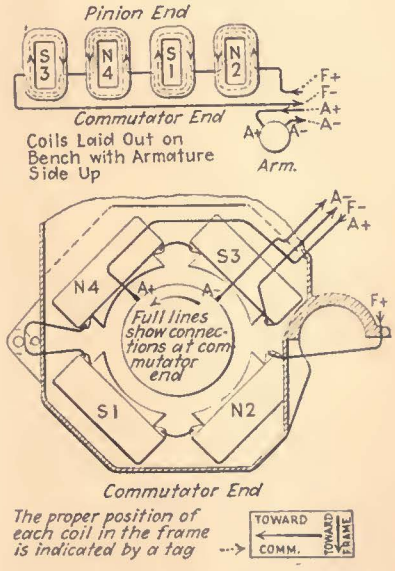
TO MAKE certain that the pole faces of a motor have proper sequence of polarity, it is essential that the coils be installed correctly. The accompanying diagrams are for the Westinghouse type 101B motor. The one on the left is for motors with leads on the axle side and the diagram on the right is for motors with the leads on the suspension side.

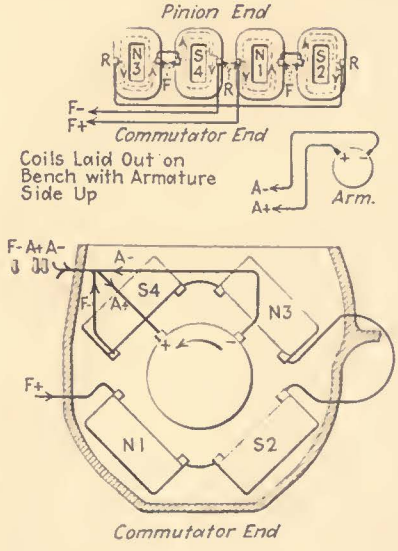
It is the practice of manufacturers to stamp the style number of main field coils on a tag attached to one side of the coil. The proper position of each coil in the frame is also indicated by a tag.

Polarity Test

In the accompanying diagrams
N = north pole.
S = south pole.

With a compass, check the polarity of coils laid out on a bench, also after assembling in the frame. Use a resistor between the trolley connection and coils to give about 5-amp. current, flowing as shown by arrows in the diagram.





Electric Railway Journal Maintenance Data Sheet

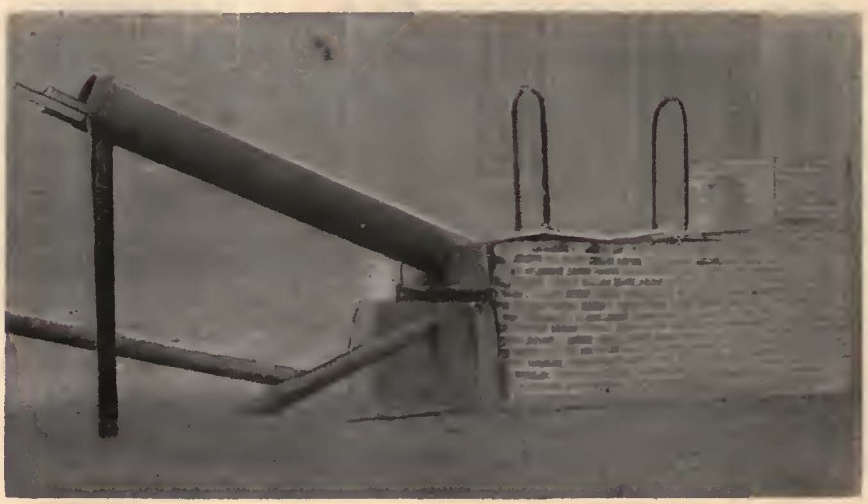
ROLLING STOCK—CARPENTER SHOP—2

Refuse Used to Generate Steam for Wood Bending

Wood bent after steaming

REFUSE which can be burned easily, such as sawdust, shavings and small pieces of wood and other material which has to be disposed of from the shop of the Reading Transit Company, Reading, Pa., is deposited in a specially constructed fire box, burned, and the heat utilized for the steaming of wood to permit of easy bending.

This fire box, which is made of brick, is about 8 ft. x 6 ft. and 4 ft. high. Extending from one end is a 12-in. galvanized iron pipe of sufficient height to create a suitable draft and imbedded in the chimney base is a 12-in. iron pipe projecting through the fire box at an angle of about 45 deg. This pipe is partially filled with water and the flames surrounding that portion in the fire box soon cause the water to boil. The wood to be steamed is placed inside of the steam pipe. The box has suitable hinged covers and stops.



Refuse fire box, chimney and steam pipe for steaming wood to bend

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL DIAGRAMS—2

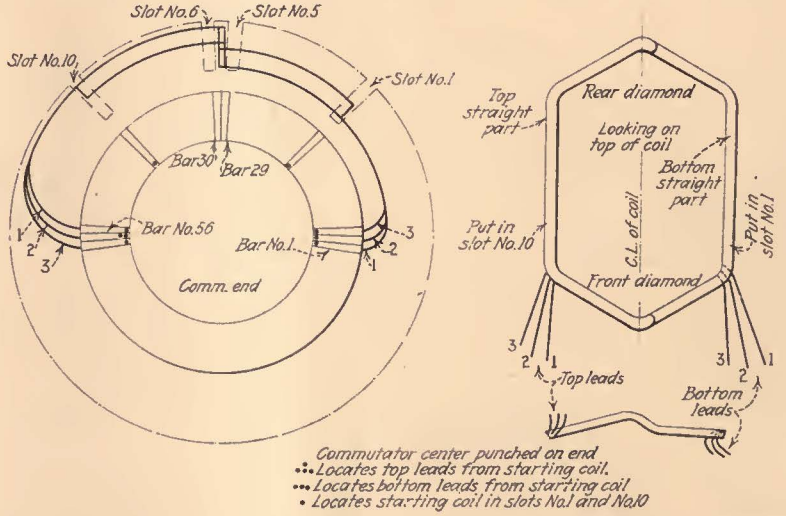
Armature Winding Diagram for Westinghouse 101B Motor

IT IS very important that the connections of armatures be made correctly when they are rewound. Many railways obtain their winding information from the armature itself as it comes in for repair. Mistakes are sometimes made where information is obtained in this manner. The following information is given out by the Westinghouse Electric & Manufacturing Company and can be relied upon as being correct for the type 101B motor.

1. The center line of the starting coil is on the center line of the tooth between armature slots 5 and 6 and on the center line of the mica between commutator bars Nos. 29 and 30.

2. Starting at bar No. 29 count back clockwise to bar No. 1 and in this bar place lead No. 1 from the bottom leads of the starting coil.

3. Count from bar No. 1 forward counter clockwise to bar No. 56 and in this bar put lead No. 1 from the top leads of the starting coil.



Winding Data

Number of armature slots..... 37
Number of commutator bars.....111
Coils lie in slots No. 1 and No. 10.
Leads connect to bars No. 1 and No. 56.

It is the practice of the manufacturer to center punch commutator bars on the end for convenience in rewinding. The accompanying diagram gives the center punch marks that are standard for this motor.

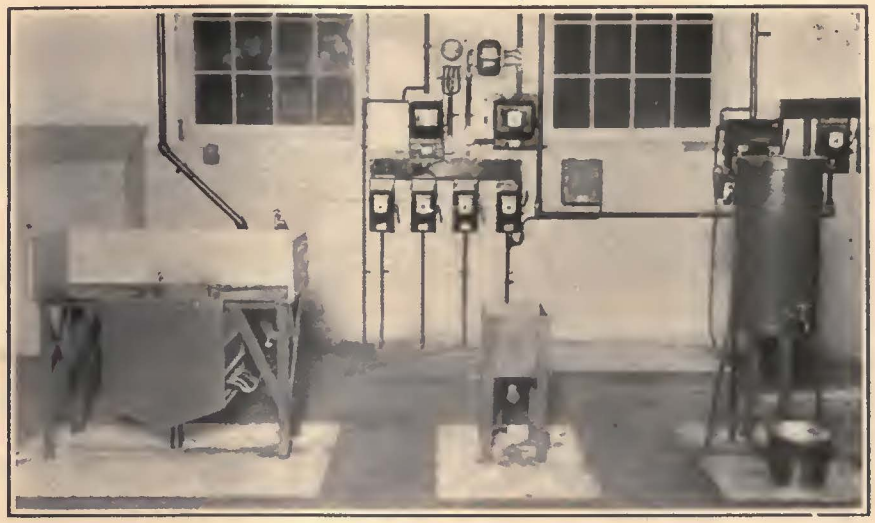
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—9

Electrically Heated Equipment for Shop Purposes

HEATING of pinions and lubricating oils used for car journals and motor bearings as well as heating a cleaning solution used for greasy metal car parts is being done effectively with some new equipment at Division 2 carhouse of the Los Angeles Railway, Los Angeles, Cal.

The tank at the left in the illustration, of 24 gal. capacity, is for heating the cleaning compound. It is made of sheet metal thoroughly insulated to retain heat. This class of cleaning was done formerly with gasoline or distillate. The new apparatus eliminates the fire risk and also does the work much more easily.



Equipment for electrically heating cleaning solutions, pinions and oils

The small tank shown in the center of the illustration is for heating pinions. This has a capacity sufficient to cover three pinions at once. After a pinion is immersed the boiling point temperature is maintained for one hour before it is removed. This tank is equipped with heating elements of the immersion type having a load capacity of 6 kw.

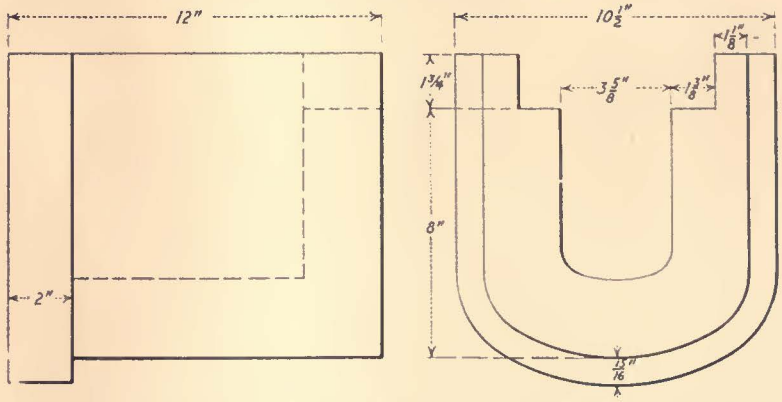
The round tank shown at the extreme right is used to heat oil for lubricating purposes. It is made of metal and has a heat-insulating compound between the inside and outside walls. The electric heating units are of the clamp-on type and are imbedded in the heat insulation. Heat is distributed uniformly to the inside tank, which has a capacity of about 10 gal. Thermostatic control makes it possible to keep the oil at the proper temperature regardless of weather conditions.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—11

Pinions Pressed On and Off by Wheel Press

PINIONS are being pressed on and off armature shafts cold in the shop of the Lynchburg Traction & Light Company, Lynchburg, Va., in a wheel press with the aid of a special horseshoe-shaped metal block, designed by Master Mechanic Cochran and built in the shop. This block has a strong collar projection to fit snugly a recess in the tailstock of the press, while an inside shoulder takes the pinion thrust when pressure is applied to the armature shaft during the removal.



Appearance of the horseshoe block used for pressing off pinions in a wheel press in Lynchburg, Va.

To press on a pinion the armature is suspended between the tailstock and the ram, with the commutator end of the shaft placed against the tailstock. The pinion is started on the shaft by hand. One end of a sleeve is placed against the face of the pinion and the other end against the ram. Gradual pressure forces the pinion onto the shaft, the sleeve equalizing the pressure on the pinion surface and eliminating the possibility of injury to the pinion nut threads.

To remove a pinion the armature is swung outside of the tailstock and the pinion inserted into the horseshoe-shaped block with its inside face resting against the shoulder. A copper-tipped steel bar is inserted between the ram and the armature shaft with the copper tip against the shaft. A gradual pressure presses the shaft from the pinion.

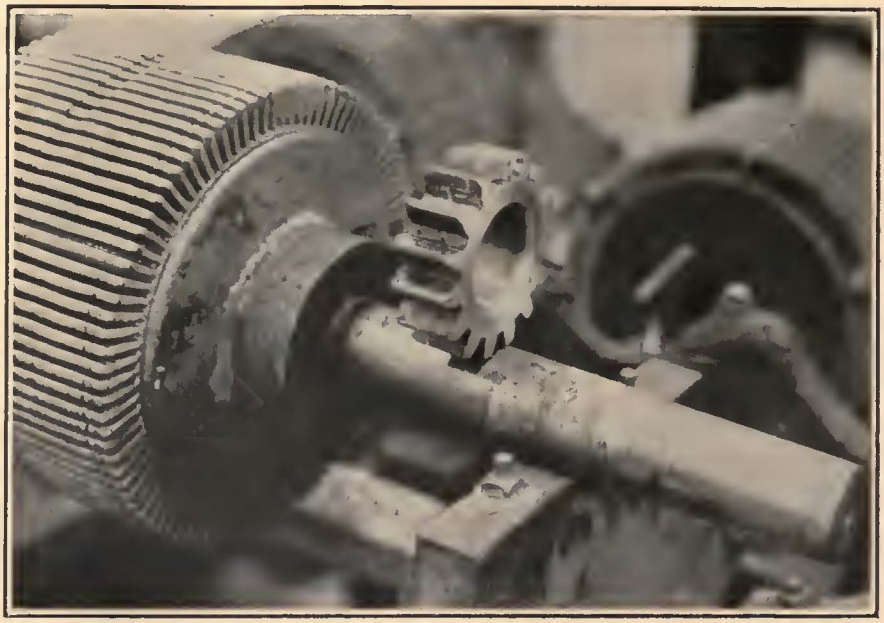
It is understood that with this method not a single pinion has become loose for the past five years.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—10

Armature Core Nuts Made from Pinion

ON THE GE-1,000 armatures used by the Market Street Railway, San Francisco, the core-retaining nut is replaced by one made from a discarded pinion. The original nut requires the use of a spanner wrench. With considerable usage the holes become worn to such an extent that the nut cannot be tightened properly. When this condition occurs the nut is scrapped and one made from a portion of a discarded pinion substituted. This new nut, with its many teeth, permits easy use of a pinion wrench, resulting in an exceptionally tight assembly of the armature core. Two such nuts may be made from one ordinary pinion. It is cut in halves on a power hack-saw. The bore is increased to that required on the threaded portion of the shaft and threads are then cut. The use of these nuts on armatures has proved very successful.



Armature assembly retaining nut is made from discarded pinion

Above is shown the type of nut made from half a pinion which replaces a standard retaining nut having holes for application of a spanner wrench.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—12

Stands for Storing Armatures Vertically

STANDS permitting vertical storage of armatures have been developed in the shop of the Wilkes-Barre Railway, Wilkes-Barre, Pa. The stand consists of a cast-iron wheel with a projecting hub, bored to fit the pinion end of the shaft. The circular portion of the base is about 10 in. in diameter and heavy ribs run from the outside flange to the hub. The construction makes a substantial base that is heavy enough so that there is no danger of an armature tipping over. Hubs are bored out to different diameters to fit the various sizes of armature shafts in use by the railway. Due to the adoption of these stands a larger number of armatures can be stored in a given floor space than with the horizontal stands formerly used, and the possibility of foreign particles getting into the windings has been minimized since by vertical storage any particles that might ordinarily be deposited on the armature core will fall off and the end section offers less surface for accumulation of dirt than does the horizontal surface.

Stand with armature in vertical position

More About Improved Equipment

for Electric Railway Maintenance

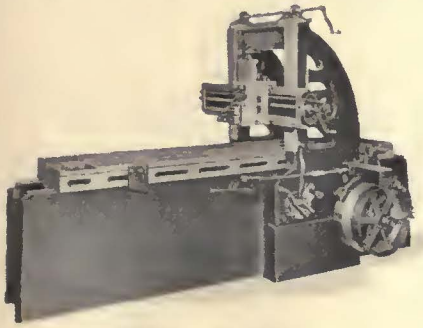
SIXTEEN pages devoted to short articles about improved equipment for maintenance work appeared in the annual maintenance issue of ELECTRIC RAILWAY JOURNAL dated March 19, 1927. Even this amount of space was insufficient to describe all the devices about which information was received. The following pages contain another installment and more will follow in subsequent issues.

Many favorable comments have been received from the readers of this paper as to the value of this section. By illustrating some of the latest tools that can be adapted to electric railway work, those responsible are able to visualize the shortcomings of the particular equipment that they are using and so provide for changes that will put maintenance work on a higher plane and enable it to be done with less cost to the company. The most efficient system is one that uses its cars the greatest proportion of the time. Modern machine tools speed up repairs and so make cars available for service sooner than could otherwise be expected.

Improved Whitcomb Second-Belt Drive Planer

REED-PRENTICE CORPORATION
Worcester, Mass.

SECOND-BELT drive as used in the planer shown is the result of more than 70 years of study in the design and manufacture of such machines. The bed, which is cast solid on top except where the driving pinion engages with the rack, is of heavy box section having a bearing full length on the floor. The table is also of box construction of unusual width and thickness and is braced at short intervals with ribs to guard against any

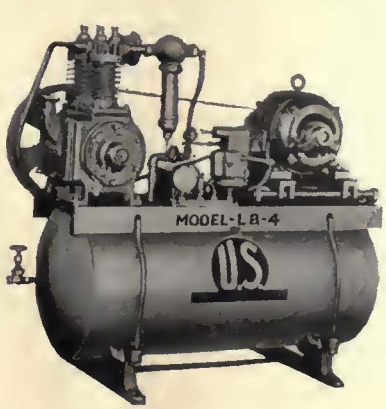


possibility of springing. Provision is made for lubricating the tracks of the bed by a simple oil leveling system, each track being fitted with a series of automatic oil rollers. The housings are of box form, bolted to the bed. By means of the second-belt drive a number of gears in the bed are eliminated. A belt-shifting mechanism shifts the moving belt quickly and noiselessly entirely off the tight pulley before starting to move the other on. The drive pulleys as well as the second-belt pulleys are made of a light-weight aluminum alloy which reduces their inertia and consequently the horse-power required. The cross-rail binder is constructed so that it can be locked to the housing by a simple movement of a lever without the use of wrenches or moving from the operating side of the planer. No wrenches are required for moving the shifter dogs. They are self-locking and are released by finger pressure upon a small lever. A two-speed countershaft, designed to meet the demand for more than one cutting speed, is furnished with the standard equipment. Two different types of motor drive can be used if desired, the plain overhead motor drive and the other belted. With the plain overhead drive a motor and countershaft are mounted on the top of the housing, with a belt from the countershaft pulleys to the main driving pulleys of the machine. The belted motor drive has a self-contained countershaft on the housings. This may be located either on the floor or at the rear of the planer or on a building wall.

Air Compressor Equipment

U. S. AIR COMPRESSOR COMPANY
Cleveland, Ohio

SPECIAL air compressor equipments for use in automobile repair shops and gas and oil stations have been developed by the U. S. Air Compressor Company. This equipment can be used for the inflation of tires, spraying springs with penetrating oil, cleaning motors, operating air lift, grease racks, gasoline pumps, spray painting under the fenders and in various other manners.



These machines are made in two sizes, the LB-4 and the LB-6. The LB-6 machine is a single-stage, air-cooled unit furnishing a tank pressure of 90 to 125 lb. and has a displacement of 16 cu.ft. of air per minute. The LB-4 machine is a two-stage, air-cooled unit furnishing a tank pressure of 165 to 200 lb. and has a displacement of 12 cu.ft. of air per minute. This constant tank pressure is maintained under all conditions by an automatic controller.

Power Squaring Shears

PECK, STOW & WILCOX COMPANY
Southington, Conn.

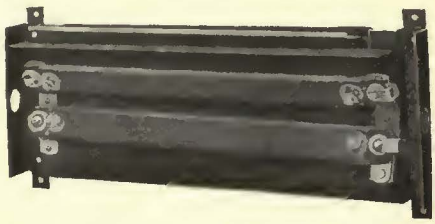
PEXTO power squaring shears are constructed with heavily braced housings designed to maintain the original alignment. The downward thrust is absorbed by a heavy ledge on the housing. These machines will resquare sheets which have been cut roughly in mill shears and cut sheets into strips, trim edges of sheets, cut squares, rectangular or other straight-sided blanks. The knives are of high-carbon crucible steel welded to a soft

backing. A feature is the manner in which the vertical adjustment of the upper knife bar can be made, so as to retain the nominal cutting length of the shears regardless of the amount the knives are ground. A spring pull-down actuates automatically the movement of the knife bar and serves to clamp the sheets while the cut is being made. The gears are cut from solid castings. A Johnson clutch is furnished with the machine shown and is lubricated internally by grease. All of the bearing surfaces are lubricated thoroughly by means of oil cups. Large dustproof bearings are provided with convenient adjustment for wear. The bed of the machine is designed so as to obtain a quick change of the bed knife in a standing position. Front, back and side gages are furnished. The machine illustrated weighs approximately 2,000 lb. and has a normal cutting length of 52 in.

Electric Heater

RAILWAY UTILITY COMPANY
Chicago, Ill.

HEATING elements of a nickel-chromium ribbon embedded in a refractory material under hydraulic pressure of 100 tons per lineal foot are



used in the heater shown. It is a two-unit horizontal type heater suitable for paint storage, oil rooms, drying and baking ovens. The embedded heating element is entirely closed in rust-resisting iron or when extreme conditions are to be met, in high temperature sheathing material, with no open ends or mica to break off and collect moisture. All units are fired in a furnace at a temperature of 1,500 deg. F. to vitrify the refractory material and to make it moisture-proof. Every unit is tested for insulation breakdown at 1,500 volts alternating current. Automatic control can be supplied with these heaters, if desired, but ordinarily the three heat switch is sufficient. The Chromalox strips are mounted in a black enameled perforated pressed steel case and are similar in appearance to those in electric heaters used for street car service. Separate Chromalox strips can be obtained for the heating of babbitting furnaces, glue pots, drying ovens, sand driers, etc. The mounting of these units is very simple. Holes are provided in the ends for fastening to a support made from steel angles or straps.

Silent Blower

BUFFALO FORGE COMPANY,
Buffalo, N. Y.

PERMANENT alignment of the gears of the Buffalo blower is assured by use of a one-piece cast iron gear case with removable cover. Frequent oiling also is unnecessary. The helical pinion on the fan shaft is a part of the steel shaft itself, making the part strong. The helical type of gear assumes almost noiseless operation. A simple adjustment on the end of the shaft provides the means for taking up wear on the main bearing. Adjustable bearings are used for the shaft end thrust. New Departure ball bearings are furnished throughout. The fan is of the volute type, made of cast iron in two pieces.

Armature Testing Equipment

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
East Pittsburgh, Pa.

PROVIDING a convenient method of testing railway armatures and one which will detect short circuits and grounds readily, the Westinghouse Electric & Manufacturing Company has placed on the market the armature testing outfit illustrated. This consists of a laminated iron core in which an alternating magnetic flux is set up by connecting the terminals of its exciting coil to a source of alternating current. The core is mounted on a wheeled stand which can be readily moved up to an

armature being repaired and on which tests are to be made. The upright framework has a windlass for raising or lowering the crosshead which supports the laminated core so that the latter can be shoved against the armature as it rests on the usual type of rewinding stand.

When either a direct-current or an alternating-current wave-wound (two-circuit) armature is placed against the face of the laminated core, which is shaped to fit an armature, an alternating flux passes through the armature iron. If the armature winding is correct the electromotive forces generated counterbalance each other and no current passes through the winding. A short-circuited or reversed coil will allow a local current to flow, generating a flux around the slot in which the coil lies.

This testing equipment is suitable only for use with wave-wound (two-circuit) armatures, as the equalizing connections on lap or multiple-wound armatures make the entire winding appear to be short circuited.

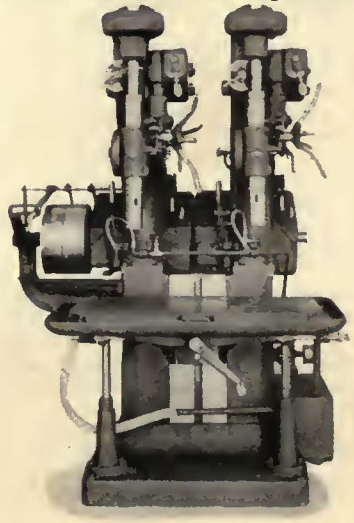
With the exciting coil energized, a piece of metal or a knife blade is passed around the commutator. This short circuits in succession each of the coils that have one side under the testing pole. If there are no faults in the winding a decided spark occurs as the knife blade leaves each of the bars. Absence of a spark between two bars indicates either a short circuit, an open circuit or a reversed coil in the winding.

A short-circuited or reversed coil will also have a local current induced in it which will generate a flux around the slot in which the coil lies. A local flux can be detected by moving a piece of sheet iron, held lightly, over the surface of the armature, so as to bridge from one tooth to the next successively. The local flux caused by a short circuit or reverse connection will attract the piece of iron when it bridges across the slot containing the defective coil. The sheet iron is thus made to vibrate. If no local flux is detected, the fault disclosed by the sparking test is due to an open circuit.

Two Spindle Box Column Gang Drill Press

BARNES DRILL COMPANY
814-830 Chestnut Street, Rockford, Ill.

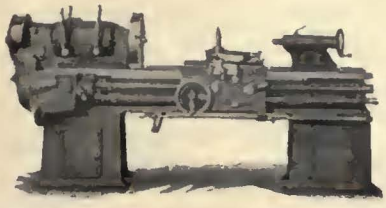
DRILLING and tapping can be done readily on the machine illustrated. All gears and their bearings are fully inclosed and are supplied automatically with a continuous flow of oil. There are eight geared speeds and eight geared feeds on each spindle, all of which can be operated independently of one another, and are under the instant control of the operator from the front of the machine. If desired, the gear thread leading feeds may be supplied with slip gears for different pitches for accurate tapping and threading. The transmission gears are cut from special chrome nickel steel, heat treated and tempered, giving high tensile strength. The machine will drive drills up to 1¾ in. through their working limits. If desired, a geared motor drive can be supplied. For the machine shown a 7½-hp. motor, 1,200 r.p.m., is recommended. For tapping, any and all spindles can be furnished with reversing friction clutch gears and automatic reversing mechanism. Spindles can be furnished with back gears, geared feed and automatic stop. This machine will drill a 1½-in. hole in steel at the rate of 3 in. per minute and in cast iron at the rate of 5 in. per minute.



Standard Geared Head Lathe

REED-PRENTICE CORPORATION
Worcester, Mass.

USE of an all-friction clutch headstock is said to make the geared head lathe shown very rapid in speed changing. The drive is direct from the main crankshaft or motor shaft, to a single pulley running on ball bearings. Start, stop and reverse of the spindle is obtained by a lever on the



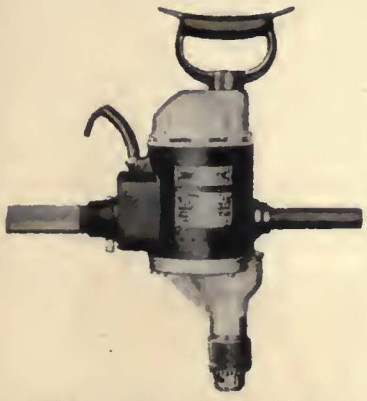
apron which operates a mechanism consisting of three bevel gears and a double friction clutch. The eight spindle speeds are selected by means of three levers on the front of the headstock. A quick-change gear box provides 44 rates of feed and 44 different threads of the most useful pitch. The spindle is made of high-grade steel with journals hardened and ground. Spindle bearings are made of high-grade bronze and are provided with an effective oiling system.

A carriage with rigid and wide bridge and of heavy design is furnished. An apron with a double support is rigidly bolted to the carriage. Lateral adjustment for taper turning is a feature. The standard equipment of the machine consists of a steady rest, large and small face plates, compound rest, regular tool post, quick change gear mechanism, thread-chasing dial and all necessary wrenches.

Universal Electric Drilling Machine

STANDARD ELECTRIC TOOL COMPANY
1938-46 W. Eighth Street, Cincinnati, Ohio

BALL BEARING design and a special plunger type switch are features of this ½-in. electric drill. This machine is equipped with a Universal motor interchangeable for both a.c. and



d.c. of the same voltage. It is fitted with a cord and plug, combination spade handle and breastplate as shown. A three-jaw geared chuck for straight shank drill bits up to ½ in. is also furnished. It is particularly convenient for car body work in electric railway shops where parts cannot be taken to a stationary drill press.

American Association News

Trolley Wire

MEMBERS of the joint committee on standardization of trolley wire met at association headquarters in New York on March 29 to continue the work on specifications for hard-drawn copper and bronze trolley wire.

There were present at this meeting H. J. Horn, W. R. Webster and C. D. Gray, representing the American Society for Testing Materials; W. H. Bassett, representing the A.S.T.M. and the A.E.R.E.A.; C. L. Hancock, J. W. Allen, H. S. Murphy, chairman, and G. C. Hecker, representing the A.E.R.E.A.

Practically the entire meeting was given over to a discussion of the bronze trolley wire specification, considering in detail the requirements for tensile strength and elongation and for the twist test. A number of suggestions were made for compromises on the requirements under discussion and several of these were favorably received. It is proposed to submit these suggestions to proper sub-committees of the two interested associations to obtain further discussion and a decision.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 20-22—American Society of Civil Engineers, spring meeting, Kenilworth Inn, Asheville, N. C.

April 26-29—Southwestern Public Service Association, convention, New Orleans, La.

April 27-29—American Welding Society, eighth annual meeting, Engineering Societies Building, New York City.

May 3-5—United States Chamber of Commerce, annual meeting, Washington, D. C.

May 6—American Electric Railway Association, Metropolitan Section, Engineering Societies Building, New York City, 8 p.m.

May 9—National Conference on City Planning, Washington, D. C.

May 31—June 1-2—Canadian Electric Railway Association, annual convention, Winnipeg, Man.

June 6-8—American Association of Engineers, annual convention, Tulsa, Okla.

June 19-23—International Street and Interurban Railway Association, annual conference, Copenhagen Denmark.

June 24-25—New York Electric Railway Association, annual meeting, Hotel Champlain, Bluff Point, N. Y.

June 29-30—Central Electric Railway Association, summer meeting, Book-Cadillac Hotel, Detroit, Mich.

July 27-29—Association of Equipment Men, Southern Properties, 12th semi-annual meeting, Atlanta, Ga.

Oct. 3-7—American Electric Railway Association, annual convention and exhibit, Public Auditorium, Cleveland, Ohio.

Traffic and Safety

CLASSIFICATION of accidents was discussed at a meeting of the joint committee on traffic and safety held at Pittsburgh, Pa., April 7. It was the opinion that the classification adopted by the association in 1926 after several years discussion and consideration was so drawn up as to be applicable to any company and could be modified to meet its individual requirements. The only improvement deemed desirable in that classification was some slight simplification. To accomplish this result it was recommended that items 7, 9 and 10 be combined into one item, boarding and alighting accidents. The question of further classification of accidents into the two divisions chargeable and non-chargeable was brought up. It was the general opinion that this would be a very difficult division to make. It was felt that the committee could not, this year, bring about any change in the classification of accidents, but that it should be brought before the convention with the idea that it might be changed next year or the one following.

In order that the general opinion of the industry might be determined as to this it was decided to appoint a subcommittee to draft a questionnaire including two questions relating to changes of classification of accidents and chargeable and non-chargeable accidents, the questionnaire to be sent out by association headquarters. S. W. Baldwin, E. J. Paige and R. W. Emerson were asked to draw up this draft and forward it to the executive secretary.

At the meeting held in New York in January a letter was read from W. H. Boyce asking that ideas for safety posters be submitted to Labert St. Clair. Six sketches were brought in by Mr. Emerson. With slight modifications they were approved. Mr. Emerson suggested that furnishing of such posters is more a function of the National Safety Council and that if the association undertakes such work it would probably be a duplication, even though a small proportion of the street railway companies in the United States are members of the council. However, he stated that at the meeting of the council executive committee to be held in the near future he would bring up the question of the purchase of posters by non-members of the council.

Further, in the matter of a study of traffic surveys of a number of cities C. H. Evenson reported that he had received reports from Atlanta, Washington, Baltimore, St. Louis, Chicago and Detroit and had had a summary made of them. He further suggested that a sub-committee make a further study of this summary, submitting a

report to all the members of the committee for study before the next general committee meeting. All members present concurring, Mr. Emerson, Mr. Paige and Mr. Evenson will act as this sub-committee. Mr. Evenson suggested that a point which should be stressed in the report of the committee was that of urging street railway managers to initiate action looking toward traffic regulation, using the question of safety to the general public as the means of bringing this question before the authorities and the public at large.

Since it is desired to have all reports submitted to the executive committee of the association not later than July 1, it was suggested that a general meeting of the committee be held about June 1, the exact date to be fixed by the co-chairman, the meeting to be held in New York. Members present were C. H. Evenson, chairman; H. K. Bennett, co-chairman; A. J. Fink, R. W. Emerson, E. C. Spring, J. P. Ingle, J. A. Stoll, S. W. Baldwin, E. J. Paige, Samuel Riddle, sponsor, and W. H. Boyce, sponsor.

W. & S. Special Committee No. 4

CHAIRMAN BAKER of special way and structures committee No. 4 on track ballast and drainage of the Engineering Association called a meeting of his committee in Chicago on March 9 at which there were present C. L. Hawkins, J. H. Haylow, E. J. Archambault and S. Clay Baker.

The progress made by the committee was reviewed and discussed. It was finally agreed that a questionnaire should be sent out to obtain an up-to-date view on standard practice. This questionnaire will probably not go out to the entire membership but only to members of the way and structures committee.

Special Bulletins Available

Following is a list of special reports being prepared by the Bureau of Information and Service of the American Electric Railway Association:

Bulletin No. 133: Working Conditions of Electric Railway Trainmen. A tabulation showing the hours of labor, length and types of run, proportion of straight and swing runs, overtime rates, what constitutes overtime, extra compensation allowed for special types of work, labor turnover, etc., for over 250 operating companies.

Bulletin No. 134: Working Conditions of Bus Operators. This bulletin gives for bus operators substantially the same information as is given in Bulletin No. 133 for trainmen—namely, hours of labor, length and types of run, proportion of straight and swing runs, overtime rates, etc. This is the first bulletin which the association has ever prepared on the working conditions of bus men and includes information for 112 bus operations.

Bulletin No. 135: One-Man Car Operation. A new compilation of one-man car data containing a complete list of electric railways now operating one-man cars, showing the number of cars operated by each company, record and summary of all cases in which the legality or propriety of operating one-man cars has been attacked, statements of opinion by public regulatory bodies as to the merits of the one-man car. It also gives a comparison of the results of operation of one-man and two-man cars, including the comparative accident record of each. This bulletin brings up to date and supersedes the data contained in Bulletin No. 95: "Recent Developments in One-Man Car Operation."

Bulletin No. 136: Electric Railways Operating Motor Bus Lines. A new, revised list of more than 350 electric railways now operating motor buses, showing for each company the number of miles of bus route, number, type and seating capacity of buses, fare charged and transfer privileges to railway lines.

In addition to the above the following supplements have been prepared:

Supplement No. 19 to City and Interurban Fare Bulletins Nos. 41 and 42.
Supplement No. 1 to Bulletin No. 129: Wages of Trainmen.
Supplement No. 1 to Bulletin No. 130: Wages of Bus Men.
Cost of Living Studies (Bulletin No. 137).

Sub-Committee on Depreciation

ACTION to be taken by the American Electric Railway Association in connection with the forthcoming hearing on depreciation before the Interstate Commerce Commission on May 23 was discussed at a meeting of the sub-committee on depreciation held in Chicago on April 6 and 7. Those present at the meeting included the following: R. R. Bradley, Chicago; Thomas Conway, Jr., Philadelphia; J. H. Hanna, Washington, D. C.; Frank Karr, Los Angeles; L. R. Nash, Boston; J. A. Knowlton, Springfield, Ill.; B. E. Bramble, Chicago; F. W. Doolittle, New York; Richard Sachse, Los Angeles; S. M. Haskins, Los Angeles; W. H. Sawyer, East St. Louis, Ill.; R. S. Torgerson, Chicago; C. H. Allen, Chicago; A. W. Brady, Anderson, Ind.; Leo Loeb, New York; H. M. Sowle, New York; Charles Gordon, New York; F. A. Newton, New York; F. E. Stout, Chicago; C. D. Jackson, New York; P. J. Lucey, Chicago; B. W. Warren, Boston; C. L. S. Tingley, Philadelphia; C. E. Thompson, Chicago; A. S. Richey, Worcester, Mass.; B. F. Weadock, New York; Harry Reid, New York; L. S. Storrs, New York; C. D. Cass, Waterloo, Iowa.

One outstanding problem before the committee is the collection of the information necessary to show what would actually be the result of a depreciation order for electric railways by the Interstate Commerce Commission similar to that issued for steam railroads. Since the compilation of this data may prove difficult to some properties, a selected list of companies which are typical of various classes are to be specially urged to co-operate in supplying the needed information.

In general, the committee agreed that the retroactive feature of the steam road depreciation order and the arbitrary requirement of setting up a fixed reserve for depreciation each month regardless of business conditions would be particularly harmful to the electric railway industry. In representing the industry before the commission it is the intention of the committee to speak for the association, without waiving the right of individual properties to present their own cases. It was the expressed hope of the committee, however, that properties which expect to present their own cases during the hearing will notify the committee of their intention. Because of the short time available before the date set for the hearing a subcommittee consisting of Chairman J. H. Hanna, R. R. Bradley, Thomas Conway, Jr., and L. S. Storrs was appointed to seek a postponment of the hearing date from the commission.

News of Other Associations

Mr. Johnson Discusses Transportation

SPEAKING before the Birney Club of St. Louis on April 4 H. A. Johnson, general manager Chicago Rapid Transit Company, said that transportation needs of the country although greater than ever before are being met more adequately than they have ever been since our early ancestors discovered the wheel as a method of transport, and expressed as the greatest need of the hour a more complete co-ordination of transportation agencies so that wasteful duplication of service may be eliminated; so that the steam railroad, the electric railway and the motor bus are each put to the use for which it is best adapted, both from standpoint of service to the public and economical operation.

We are only on the threshold of a properly co-ordinated system of transportation but we are making progress. There is a general tendency to absorption of small and unreliable transportation companies incapable of rendering good service by large and responsible companies. The task of co-ordinating our transportation agencies is one of such magnitude that it will require time and infinite work to bring it about, but it will be done and it rests with those whose life work is transportation to do it.

We are making progress in use of the motor coach. In 1921 there were only 21 electric railway companies operating 73 motor coaches with 35 miles of route; whereas in September, 1926, they operated 6,469 coaches over 14,907 miles of route. This increase is at a rate much faster than that at which independent lines have grown.

Mr. Johnson also said that it is significant that traffic in American cities in general is increasing more rapidly in the suburbs than in the city itself and that in every large city the commuting zone was extended with every improvement in transportation service. The only limit which the city worker recognizes in the distance between his home and his place of work is the time consumed in his daily travel.

Mr. Johnson, who has given considerable study to transportation problems both here and abroad, said that one of the greatest problems to be met in the development of comprehensive transportation plans for cities was the difficulty of getting enabling legislation, because the attitude of the average man toward some new proposal which he does not completely understand is usually to vote "no."

The News of the Industry

New St. Louis Petition Provides for Flat Eight-Cent Fare

Receiver Rolla Wells of the United Railways, St. Louis, Mo., filed a petition on April 9 with the Missouri Public Service Commission at Jefferson City asking again for an increase in rates. The latest request is for a flat fare of 8 cents. The increase is on the basis of an estimated $75,000,000 valuation for the properties. A former application, pending before the commission for many months, sought a fare of 8 cents or two tokens for 15 cents. The company was able to charge that fare base between Feb. 7 and Feb. 28 under the protection of a temporary restraining order issued by the federal court.

In the new petition it is set forth that during the brief period in which the higher rate of fare was in effect the company collected $48,420 more than for a similar period in 1926. The petition further recites that the original request for higher fares filed with the commission on June 4, 1926, was based on a physical valuation of the road's properties of $51,781,348. The petition said:

> The fare prayed for in the application filed June 4, 1926, would not, in the light of experience with that rate of fare and in view of the fact that the number of revenue passengers has been steadily falling off during the three months of 1927, produce sufficient revenue to pay operating costs, taxes and depreciation and yield a fair return on the present value of the property devoted to public use.
>
> An increase in the rate of adult fare to 8 cents cash and two for 15 cents would yield only about $870,000 additional revenue annually, which would represent a net income available for returns of only $75,000,000, and only 5.77 per cent on the Public Service Commission's 1919 valuation plus additions and betterments.
>
> To provide sufficient revenue to yield at least a part of a fair return on the present value of the property it will be necessary to increase the adult fares to 8 cents, which will, in the opinion of the petitioners, predicated upon the experience of 7½-cent fares, produce no more than $2,000,000 additional revenue during the year of 1927, compared with 1926, and represent an annual return of only 6 per cent on the present value of the properties and less than 8 per cent on the commission's 1919 valuation.

An audit completed recently by the Missouri Public Service Commission disclosed that the railway suffered a net loss of $225,000 during 1925 and the first ten months of 1926. The commission will hear the company's petition on April 22.

Injunction Action by Duluth Street Railway Upheld

In a decision by Justice Holmes the United States Supreme Court April 11 affirmed the ruling of the lower court which had granted an injunction to the Duluth Street Railway, Duluth, Minn., in a fare controversy with the Railroad and Warehouse Commission of Minnesota.

The railway applied for higher fares and the state commission fixed its value for rate-making purposes, but entered an order that instead of granting permission to charge a straight 6-cent fare, as the company had sought, it might charge a 6-cent cash fare but should sell five tokens for 25 cents. The company immediately secured an injunction in the federal court.

The state commission appealed to the United States Supreme Court, on the ground, among others, that the procedure followed by the railway was erroneous in that the Minnesota State law provides a method of appeal from decisions of the Railroad and Warehouse Commission and that this remedy had not been exhausted, therefore the company could not rightfully apply to the federal courts for relief. The commission also pleaded that the action of the company was premature in that it sought an injunction before testing out the rates ordered by the commission.

The Supreme Court holds that the company had a right to choose the court to which it would appeal for relief and therefore that its action in asking an injunction of the federal district court was proper. The high court did not discuss the question of whether the suit was premature, and it permits the decision of the district court in enjoining the rates fixed by the state commission to stand.

Few Indiana Utility Measures Become Law

Following adjournment of the Indiana Legislature and the signing by the Governor of bills he favors, only three bills pertaining directly to public utilities and how they shall be regulated succeeded in becoming laws.

Senate bill No. 178 gives any one the right to appeal to circuit or superior court from any ruling of the Indiana Public Service Commission. The appeal shall be taken thirty days after the ruling is made.

Senate bill No. 171 amends the public service commission act of 1913 by adding a provision that, if the commission finds, on inquiry, that salaries paid by utilities are excessive or that more persons are employed than necessary, or that any unjustified expense is being incurred, the commission shall designate such items and not take them into account in fixing rates.

Senate bill No. 124 amends the utilities act of 1915 by omitting from it the proviso which required a report to be made to the Public Service Commission and its approval obtained before the earnings of a municipal plant that had accumulated a sinking fund sufficient to pay its debt could be turned into the general fund.

A joint resolution was passed requesting the Congress to enact legislation denying jurisdiction to federal courts to hear utility rate cases until the legal remedies offered by the state courts are exhausted.

Columbia Carries On Without Car Service

Operation of street cars in Columbia, S. C., suspended on March 11, has not yet been resumed. The matter of suspension of service may find its way into the courts of the state. On petition of a citizen, the South Carolina Railroad Commission ordered the Columbia Railway, Gas & Electric Company to show cause why it had suspended operation without permission. The railway failed to show cause, whereupon the commission ordered it to resume operations within a stipulated time or else pay a fine. Then the company filed an appeal for further hearing before the commission, this appeal serving to stay the execution of the "pay a fine or resume service" order, and at the same time asked that it be permitted to discontinue the service permanently.

The Railroad Commission, giving as its opinion that "the unregulated unrestricted system of 'jitney' transportation has utterly destroyed the railway system in Columbia," handed down an order permitting permanent discontinuance of service and at the same time revoked the order to pay a fine or resume service. Now the question has arisen of the right of the commission to grant permission to suspend service and the matter may get into the courts on that angle. As is shown by the order, the 10-cent "jitneys" continue to be a most disturbing factor in the transportation problems of the city. They offer keen competition to buses operated on a regular schedule and over a definite route. The jitneys, operated without route or schedule, carry passengers at the same rate as the buses and take them direct to their door or office.

Another Move by City In Rochester Railway Valuation

The long-pending suit of the city of Rochester for a new valuation of the lines of the New York State Railways in Rochester came to the fore again with announcement by Corporation Counsel Platt that, on behalf of the city, he would ask court permission to inspect the books of the railway under which the valuation under the service-at-cost contract was fixed.

The move is considered preliminary to establishing whether the appraisers fixed the valuation according to regular procedure. The railway has denied the city the right to inspect its books and a court order is now sought. When the case will actually come to trial is still uncertain. The litigation, in which the city is striving to obtain a lower valuation for the service-at-cost contract in the hope of gaining a fare reduction, has been hanging fire three years.

One-Man Car Bill Killed in Pennsylvania

Legislation against the one-man car in Pennsylvania is dead for this session. The House has killed the one-man car bill. There was very little public support for the bill and the wonder was that the measure got as far as it did. Newspaper comment, particularly in Philadelphia and Pittsburgh, was decidedly against the measure. The extent of the appreciation by the newspapers of the value of the one-man car was, perhaps, nowhere better expressed than by the Pittsburgh *Gazette-Times*. That paper said:

> Substantial improvement of electric railway service in populous places and reduction of the rates of fare apparently depend entirely on lowering the costs of transportation. The one-man car is less expensive to operate than the two-man car. A greater number of cars on a route without increase of the wage account is possible where the newer system is in use. This opens up a prospect not unpleasing to car riders.

Franchise Acceptance Formalities Being Concluded in Kansas City

The Kansas City Public Service Company, Kansas City, Mo., during the week ended April 2, completed its formal acceptance of the terms of the new railway franchise awarded to it by the city officials on March 21. The form of the acceptance document was approved by the City Council, and it was mailed to Chicago on March 21 to the First Trust & Savings Bank, corporate trustees under the new mortgage on the local properties.

Under the provisions of the franchise ordinance as passed, the public service company had twenty days in which to accept or reject the franchise. The acceptance now awaits only the signature of William G. Woolfolk, president of the Kansas City Public Service Company, before being filed with the City Council. The ordinance, according to Powell C. Groner, chief counsel for the company, would become effective on April 10. The new fare schedule will then be filed with the State Public Service Commission as required by law. It is pointed out, however, that the commission has ruled that the new fare schedules will not become effective until 30 days after approval by commission, unless good reason is shown for putting them into effect earlier.

Six Cents and Other Requests Asked in London

A 6-cent fare with five tickets for a quarter for a period of two years is requested by the London Street Railway, London, Ont. This petition is part of a proposal to the city which states that at the end of the two-year period the railway would arrange to revise the fares as necessity might dictate with leave to appeal to the Ontario Railway & Municipal Board by either party.

The proposals include an exclusive perpetual franchise with all controversial clauses, including the use of one-man cars, to be referable to the board. The company agrees to pay the cost of track foundations but believes the city should assume obligations for surface paving. A clause provides for the purchase of the railway and bus lines by the city on six months notice, the value of the system to be decided by arbitration. The company also seeks exemption from all taxation except the school tax. If an agreement is reached the company will spend $300,000 within five years on general improvements.

The temporary agreement which authorized the London Street Railway to charge a 5-cent fare expired on April 1. The railway is now really operating under the old agreement whereby it is compelled to sell seven unlimited and nine limited tickets for a quarter.

Investigation of International Accounts

William R. Pooley of the New York Public Service Commission has reserved decision on the application of the municipal authorities of Buffalo, N. Y., for permission to examine the books of the International Railway, for certain figures to be used in opposition to the company's request for a 10-cent fare in Buffalo. Henry W. Killeen, of counsel for the International, says the application is a mere device for delaying the proceedings or for seeking information to be used in the United States District Court litigation.

Testifying before the commission, John J. Schmunk, vice-president of Mitten Management, Inc., in charge of accounts, said that the amount of half-fares collected is far below the amount estimated by the commission's experts when fixing the 8-cent fare which now is in effect in Buffalo.

Dr. Milo R. Maltbie, acting for the city, will oppose the 10-cent fare request of the International.

Electrification and Allied Projects Cost $55,500,000

Beautification of Chicago's downtown lake front through electrification of its suburban divisions, lowering of track levels in Grant Park, erection of a new suburban terminal at Randolph Street, and completion of the vast Markham freight yards on the south side of the city and similar undertakings in the last six years, represents a total investment by the Illinois Central Railroad to date of more than $55,500,000, according to a recent statement by L. A. Downs, president. During the current year, he said, an additional $4,600,000 will be spent in continuance of this work. Electric operation of all Illinois Central suburban trains in Chicago was begun last August in compliance with the terms of an ordinance for the development of the city's lake front.

Plans for the construction of another monumental new Union station by the Illinois Central on the site of the present Central station at Roosevelt Road and Michigan Avenue, have been retarded by the lack of definite decision as to terminal building by other railroads entering the city from the south. The Illinois Central hopes to induce the lines now using the Dearborn, La Salle and Grand Central terminals to join with it in the centralized terminal project to cost about $20,000,000.

Fearful of Future Fares in San Francisco

A controversy has arisen over the effect on fares of a proposed bond issue election early next year for extensions of the Municipal Railway, San Francisco. One faction declares that an 8-cent fare, superseding the present 5-cent rate, will be the ultimate outcome. City officials deny this indignantly.

Adolph Uhl, manager of the City Efficiency League, declared that the extensions under the proposed $3,500,000 bond issue will produce only $444,000 revenue a year, and that there will be a total deficit of $393,000 on the lines before the bond redemption is added, and that when this redemption is finally added the deficit will total $520,000 a year.

"This means an 8-cent fare," was Mr. Uhl's deduction.

Nelson Eckart, assistant city engineer, retorted in this fashion:

> Including bond redemption the first year is ridiculous. As every one knows, bond redemption doesn't begin until the fifth year. To say that the line into the Sunset district will produce only $130,000 yearly is also ridiculous. The B line into Richmond district, which is comparable to the Sunset line, took in $308,000 in 1915, its first year, and $520,000 last year.
>
> The Sunset line will not only take in considerably more than $130,000 the first year, but its receipts will increase even faster than those of the B line did.
>
> If San Francisco is to grow it must have transportation. The railroad bond issue will give transportation to districts which are partially built and which need only transportation to become densely settled.
>
> But even if the lines proposed all lost money the first year they would be worth building.

In addition to extensions on five lines it is proposed to erect a car repair shop and a garage. Purchase of twenty buses for use in the Sunset and Potrero sections also is recommended.

The recommendations involve the building of 11.54 miles of track at a cost of $1,382,000, acquisition of 47 new cars at a cost of $799,000, purchase of $150,000 worth of buses and expenditure of $1,660,000 for land and auxiliary establishments.

The city engineer recommends that no further extensions be approved until 1929, when franchises for 126 miles of track of the Market Street and California Street Railway systems expire.

St. Louis Expert Will Report on New York Subways

Charles Edward Smith, St. Louis, Mo., has been engaged by the city of New York to study the subway lines and the possible consolidation of them with the existing rapid transit systems. He is now in New York City to remain four or five months. Mr. Smith, who is well known in the West as engineering counsel to public utilities, is head of a firm of consulting engineers, with offices in St. Louis, and for some time has been conducting a survey on the development of the rapid transit system for that city. He has had wide experience in railroad construction, in municipal developments and in government service. His appointment was authorized by the Board of Estimate and Apportionment a month ago. An appropriation of $25,000 was made in connection with the appointment.

Fare Issues

Dr. Delox F. Wilcox, traction expert, has been assisting the city of Los Angeles, Cal., in opposing higher fares for the Los Angeles Railway. The City Council authorized his services on March 28. The increase sought by the Los Angeles Railway is from 5 to 7 cents. The city is scheduled to start presentation of its case on May 17 before the State Railroad Commission.

Meanwhile the Pacific Electric Railway fare case is again before the Railroad Commission following a hearing on April 5. A compromise was effected recently between attorneys representing the Pacific Electric Railway and Los Angeles and the neighboring cities whereby Glendale and Burbank will accept a temporary schedule of reduced single and round-trip fares and a 20 per cent increase in the price of commutation books. The Pacific Electric Railway is seeking a 7-cent local fare and a 20 per cent increase in the interurban rate. Supplemental to its application for a fare increase the railway filed an amended petition which sought as an experimental measure a general reduction in all interurban rates. This petition was referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 19, page 548.

Chattanooga Commission Receives Transit Plan

A transit plan prepared for the city of Chattanooga, Tenn., which would mean a considerable expenditure for the Tennessee Electric Power Company was passed recently to the City Commission. The plan was prepared by Harland Bartholomew, expert city planner.

B. C. Edgar, vice-president and general manager of the Tennessee Electric Power Company, said that his company would not approve the plan at the present time. One section, he explained, dealt with the proposed changes in present railway routes and the other with additional lines for the future development of the system. The report recommended the removal of all tracks from Broad to Chestnut Streets. This, Mr. Edgar declared, would not be satisfactory with the present width of Chestnut, but might later if the street were widened. He further called attention to a recommendation favoring removal of all tracks from the Walnut Street bridge. This change would not be favored by the company, he said, because it would entail a lot of expense and would not accomplish any improvement. In his opinion the recommendations in Mr. Bartholomew's plan would call for the expenditure of $1,662,000.

Confer on New Jersey Canal Bed

The desire of the Public Service Railway, Newark, N. J., to take over and operate the abandoned bed of the Morris Canal for rapid transit lines was expressed again by Thomas N. McCarter, president of the road, at the first of a series of conferences between representatives of the city and the Public Service Railway on the proposed use of this canal bed. Other conferees were John L. O'Toole, vice-president in charge of public relations; Corporation Counsel Congleton, acting director of the department of public affairs, and Chief Engineer Costello. If equitable terms can be worked out, Public Service will consider financing the subway construction. The company would prefer to operate the bed as an open-cut subway from Plane Street northwest to the city line, as originally proposed, the section from Plane Street to the new Pennsylvania Railroad to be covered. Mr. McCarter said, however, the corporation will be ready to go along on plans for covering the canal bed at other points if found advisable.

Worm-Drive Car Successful at Springfield, Mass., Test

New Unit There Operates Successfully in Trial Run Attended by Railway Men, Manufacturers and Others—Car Noiseless and Remarkably Smooth

IN THE presence of visiting railway executives, manufacturer's representatives, city and state officials and newspaper men, the experimental worm-drive car built for the Springfield Street Railway, Springfield, Mass., by the Wason Manufacturing Company was thoroughly tested on April 14 under various track conditions.

The car, described in detail in the ELECTRIC RAILWAY JOURNAL for March 26, exceeded in several respects the expectations of its designers. Construction was completed only a few hours before the demonstration run, but the unit operated perfectly in all of its details. Members of the American Electric Railway Engineering Association committee on noise reduction, headed by Chairman H. S. Williams, were present to ride the car during its demonstration run. Mr. Williams planned to make a series of noise tests of the new car in comparison with standard cars on the property.

CAR PERFORMS WELL IN SERVICE

The Timken worm-drive axles gave smooth and rapid acceleration. The Westinghouse motors, mounted longitudinally in the truck frame and driving the axles through Spicer universal joints and a short drive shaft, operated smoothly and handled grades and curves successfully. A remarkable smoothness and quietness around curves was attributable to the differential drive in the axles. Reduction of unsprung weight by mounting the motors in the truck frame instead of on the axles eliminated pounding over special work and reduced the usual shock and vibration of ordinary operation over special work to a mere metallic click. The electrically controlled automotive type brakes with diaphragms mounted on the axles and with internal expanding shoes inside brake drums bolted to the wheels made possible such high rates of deceleration that it is anticipated the brake diaphragms will need to be made smaller to reduce the braking power. The automotive type hand brake was found ample to slide the wheels on dry rail.

Good riding qualities of the radical truck design proved to be one of the outstanding features of the demonstration. Noise of operation was limited to the hum produced by the wheel flanges in grooved rail, the trolley wheel and motor armatures. Gear noise was absent and brakes were entirely silent. It is expected that even greater quietness will be obtained by the use of rubber pads on the wheel webs.

All those who witnessed the demonstration declared that only a service test long enough to determine the strength and wearing features of the design is necessary before the car can be considered successful. After the finishing touches of trimming and painting are completed, work that is expected to take about ten days, the car will be placed in regular operation in Springfield.

Rapid Transit Operating Agreement Talk in Philadelphia

Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, Philadelphia, Pa., is willing to enter into negotiations with the city for leasing the Frankford Elevated Railway and the Broad Street subway jointly.

This fact was made known by Mr. Mitten in a letter sent by him to Mayor Kendrick in reply to the Mayor's inquiry as to the best terms the P.R.T. could offer to the city for operation of the Frankford Elevated Railway after the expiration of the present lease.

Under the original Frankford L agreement, which was dated May 5, 1922, the term of the lease was fixed for five years, beginning Nov. 5, 1922, and expiring Nov. 4, 1927, with an option reserved to the city, but not to the company, to extend the term to July 1, 1957, by notifying the company to that effect not later than six months prior to the expiration of the five years term. That is, the city must notify the company of its intention by May 5, 1927, which is just about a month off. In order to decide what the city shall do in the matter Mayor Kendrick about a week ago wrote to Mr. Mitten, reminding him that May 5 is rapidly approaching, and requesting him to state the best terms under which the company would continue to operate the Frankford L in view of the fact that the proposed amended L lease had not received the approval of the commission.

There has been a decided opinion that the city should negotiate with the P.R.T. for an agreement that would embrace both the Frankford L and the Broad Street tube, which will soon be ready for operation. On the other hand, some persons are inclined to favor separate agreements for the two lines.

How One Manager of a Small City System Sees It

The Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., carries 10,000 persons about the city daily, and suddenly to cast aside the railway and substitute buses would be disaster. This statement was made by George Wells, superintendent of the lines, who stressed the need of every up-to-date city keeping its railway lines and augmenting them wherever necessary with buses. He was answering an inquiry from one of the local newspapers. His comments on the changing aspects of transportation were especially pertinent. He said in part:

When movies came, some people thought that actors would no longer be wanted. When victrolas were invented, many expected that singers and orchestras would not be in demand. When radios were invented, people asked if concert halls and public auditoriums were to be torn down.

As a matter of fact, actors are wanted everywhere—likewise public speakers and orchestras and bands. Telephones have not superseded the telegraph.

Since the advent of automobiles and buses, everyone is riding more. In the past year, more people traveled on steam roads, on trolley roads, in automobiles and buses than did the year before.

Buses are a new and useful means of transportation and electric railways are adopting them. They do not take the place of electric railways in the majority of cases, but supplement them.

Some electric railways have failed. Many bus lines have failed, and when railways have not paid it almost invariably follows that buses over the same routes do not pay unless the railway failed on account of poor management or tax burdens or both.

A well-established and well-regulated railway is essential to any city of any consequence, and just because a few towns of lesser importance have allowed their railway systems to slip away from them, it should not follow that a modern, prosperous and promising city like Poughkeepsie should think of giving up its up-to-date, well-established and well-organized railway system and replace it with buses that are still in the experimental stage. Is any modern and self-respecting city allowing such a thing to happen? Not any, that I know of. Many are adding buses but not giving up their trolley system. Many cities are even paying the railways where they have failed, in order to keep them going. Many have canceled paying debts, taxes, etc., in order to help their trolley companies get on their feet again. They will not allow the railways to go. Those who have are regretting it.

Electric railways are here to stay. They are beyond the experimental stage.

Buses are here to stay, but they are still in the experimental stage.

There are many failures of bus ventures all over the country, and it would be very unwise indiscriminately to abandon tracks for buses at this period of uncertainty.

This company carries 10,000 passengers daily. It is a great responsibility, but the service seldom fails. The system has been built up through many years of practice and large expenditures of money. Suddenly to abandon this system for a form of transportation where many more vehicles would be required to do the same work might bring disaster upon the community.

Railway Issue in Oakland's Mayoralty Fight

Oakland, Cal., is in the midst of a lively spring election campaign. Frank Colbourn, one of the arbiters who two years ago awarded employees of the Key System Transit Corporation a higher wage scale, is running for Mayor. His opponent is J. L. Davie. One of the issues of the campaign is the 7-cent fare, which Mr. Colbourn is accused of having made imperative for the company in consequence of the expense saddled on it by the wage advance. It is a minor issue, though, and is not attracting much attention.

Clothes don't make the man, but they help

A Fitting Process

"Hey, those trousers bag in the seat!"

"Make those sleeves a little longer!"

"No, I don't want cuffs on those pants!"

These and similar expressions came from the office of J. Frank Johnson, vice-president and general manager of the Community Traction Company recently, arousing the curosity of car company visitors.

A peep inside the room disclosed a dozen men in various stages of dishabille, some of them with less of clothing than the greased challenger of the Catalina Island swim, but lacking the beautiful symmetry of this challenger.

Some were on chairs trying on trousers. Others were pulling and hauling at stubborn trouser legs from less advantageous places on the floor of the office. Others tried on vests and coats.

Paunches that demanded the utmost skill of expert tailors for proper fitting, shoulders round and shoulders square, victims of obesity and malnutrition—a gathering of sufficient variety in shape and size to drive the ordinary tailor woozy—all were there being fitted.

Outside several scores of other men waited, listening to the buzz of chatter that came from Vice-President Johnson's room.

The occasion was the fitting of Community Traction motormen, conductors and bus drivers with the new olive drab whipcord uniforms which have been ordered for them. Superintendent Emery had charge of the job.

"We want to have 'em all fitted out so they can appear as a unit in the new uniforms in a few days," said Mr. Emery, puffing vigorously and perspiring. "But at the present rate of speed we will have 'em all ready to make their bow to the public soon. I cannot give a definite date. It all depends on the outcome of this fitting process. But it will be either the 10th or the 15th of this month," he said.

The new uniforms have the new army roll collar. Hats to match also have been provided and heads of the several hundred motormen, conductors and bus drivers are furnishing another interesting phase of the outfitting process.—*Toledo Blade.*

Hartford Loses Tax Suit to Connecticut Company

The city of Hartford, Conn., has lost its suit against the Connecticut Company to collect a yearly tax of 2 per cent of the gross fares. The railway paid this 2 per cent tax from 1894 to 1923, and the total for the period amounted to $677,000. Judge Newell Jennings in his finding said that the tax was illegal. The ancient ruling of the City Council of Hartford reads in the records as follows:

The directors shall pay into the city treasury each year 2 per cent of the annual gross receipts of fares as evidenced by such reports, until such time as the state law shall be so changed as to provide that taxes of street railways shall be paid locally instead of to the state, and in case of such change in the law, the company shall pay annually to the city any deficiency in the amount of the said taxes from the amount of the said 2 per cent on the receipts of the aforesaid.

The counsel for the railway contended that the levy was a tax and therefore illegal. The city contended the payments annually were for the privilege of electrifying lines in 1894 under the Tucker grant. To support the railway Judge Jennings stated: "I find as a fact, upon all evidence, that this levy was and is a tax."

Important New Subway Station Opened in New York

The New York Transit Commission, the Queensboro Chamber of Commerce and several civic organizations arranged an elaborate program to celebrate the opening of the Seventh Avenue (Times Square) station of the Queensboro subway on March 14. The new station, in conjunction with the Interborough Seventh Avenue line and the Times Square-Grand Central station shuttle line of the Interborough, consists of four levels. It is one of the most commodious subway stations in the world and will relieve the present congestion at Grand Central, where the former terminus of the Queensboro line is located. There is a Queensboro station at Fifth Avenue and 42d Street, but because of traffic conditions most of the passengers who use the Queensboro line board and leave trains at Grand Central. A considerable portion of this traffic transfers from the Seventh Avenue line of the Interborough and reaches Grand Central by shuttle. All of this traffic will be handled in the new four-level station at Seventh Avenue and 41st Street.

The entire extension of the Queensboro subway from Grand Central Station westward under 42d Street, to the rear of the Public Library, thence under 41st Street and west to Eighth Avenue, with the Seventh Avenue connection with the west side subway of the I.R.T., was constructed by the Powers-Kennedy Contracting Corporation. The contract price for the entire extension was $3,867,138. Of this, approximately $1,500,000 has been expended for the section from Fifth Avenue to Eighth Avenue, including the cost of the station and its equipment. Immediately after the exercises the Interborough put in effect a regular schedule, approved by the Transit Commission.

$300,000 Improvement Program for Beaver Valley

Probably in no other section does the paving question have so many ramifications as in the Beaver Valley, where the management of the Beaver Valley Traction Company, New Brighton, Pa., must deal with the official body of some 26 incorporated boroughs or towns, varying in size from 700 to 18,000 population and each one urging its particular program of street improvement, which invariably involves a portion of the lines. Here, as elsewhere, the company seeks relief from the paving burden which belongs to the horse car days when Dobbin did the damage. This is realized by many of the officials in the various towns and the many other favorable factors in the company's public relationship are rapidly breaking down all prejudice and the management sees, in the very near future, the elimination of the paving burden. In fact, a suitable contract, superseding a most unfavorable one, has already been made with one of the largest towns in the district.

In view of the possibility of being totally relieved of this burden a program for the rehabilitation of equipment and track has been devised. The purchase of six new cars leads the list. This will be followed with the rebuilding of several miles of track, replacing portions which were not kept up in the years past when dollars were scarce and revenues unequal to the equipment, labor and paving charges.

The change of public sentiment is perhaps best indicated by the fact that the company now has 15 miles of track on paved streets on which it has been relieved of all paving requirements.

In Ambridge, a town of 17,000 population, the street over which the lines are operated was improved. At the same time the company laid new track. This was under a franchise requiring that the town pay the cost of the paving and maintain it. The company is then to pay, if earned, a rental of $1,200 a year, after operating expenses, taxes and interest on bonded indebtedness have been deducted from revenues. Approximately $300,000 is to be spent on the improvements to be made.

News Notes

Brooklyn "L" Removal Bill Signed.—Governor Smith of New York has signed the Hearn bill as chapter 374 of the laws of 1927 authorizing the city of New York to acquire by condemnation the right to remove the elevated railroad structure from Fulton Street and other streets and avenues in the Borough of Brooklyn and to assess the cost and expense thereof upon property benefited thereby.

Will Make Survey of Other Lines.—An inspection tour of electric railways in the principal cities of the country is being made by eight men experienced in railway operation under the direction of J. M. Loftis, superintendent of transportation, and A. J. Fink, superintendent of traffic and schedules of the Pittsburgh Railways, Pittsburgh, Pa. By this study of other systems the Pittsburgh Railways expects to discover improvements and advances in transportation that can be adjusted to its own lines.

Transportation Plan Under Consideration.—Mayor Frank X. Schwab of Buffalo has asked members of the City Council to consider plans for a transportation policy in anticipation of the opening of the new Peace bridge, which spans the Niagara River between Buffalo and Fort Erie, Canada. The Mayor recommended a municipal bus line from the retail shopping zone of the city to the American approach of the new bridge, to be opened early this summer.

Rate-Fixing Bill Killed.—The Minnesota Legislature in St. Paul has killed in committee of general legislation a bill to fix 6 per cent as legal rate of earnings for electric railways. The rate fixed by the Railroad and Warehouse Commission is 7½ per cent. The bill was sponsored by Representative Frank Starkey, St. Paul, and was designed to amend the Brooks-Coleman act, which placed the rate fixing power with the commission.

New Route Book in Los Angeles.—A new booklet entitled "Seeing Los Angeles by Yellow Car and Bus" has been published by the Los Angeles Railway, Los Angeles, Cal. This booklet contains information on places of interest in Los Angeles and how to reach them by street car or bus. It also contains schedules of owl car service on the various lines. Copies of these booklets are being distributed among the divisions for the use of conductors.

Would Increase Token Rate.—The Illinois Power & Light Corporation has applied to the Illinois Commerce Commission for authority to change its fares in Peoria, Ill., from seven tokens for 50 cents to three tokens for 25 cents, with a continuation of the present 10-cent cash fare. The nickel permit fare will be dropped under the new schedule. The company says that since the present schedule, put in force in 1922, it has failed by $200,000 annually to meet a fair return on its investment.

Intercompany Transfers Issued.—Issue of 1-cent transfers between cars of the Capital Traction and the Washington Railway & Electric Companies at New Jersey and New York Avenue in Washington, D. C., was authorized on April 7 by the Public Utilities Commission. The intercompany transfers will be issued, however, only by northbound cars on New Jersey Avenue to eastbound cars on New York Avenue and by westbound cars on New York Avenue to southbound cars on New Jersey Avenue.

One Mayor Expresses Views on Paving Ruling.—At a meeting of city officials of the state of New York to be held at Niagara Falls on May 31 legislation to relieve electric railways of any of their tax burdens will be discussed. The railways seek to amend the paving law to require them to pave only 8 in. on each side of a rail instead of paying for the pavement between the rails and 2 ft. outside. Mayor Clarence J. Cook of Binghamton, N. Y., is quoted as saying he believed that taxes paid by the electric railways were low enough and that the paving imposition might be considered as part of rental.

Ten Cents in Port Chester.—The fare on the new bus line of the County Transportation Company, Inc., within the village of Port Chester, N. Y., is 10 cents. Books containing twenty tickets each will be sold for $1 to pupils under eighteen years of age attending public or private schools having similar grades. Free transfers are given between the bus lines as well as to cars of the New York & Stamford Railway. The order became effective on April 3.

Rebus Contest in Grand Rapids.—Still further to stimulate riding and to familiarize the people with the names of its new electric rail coaches and other cars, the Grand Rapids Railway, Grand Rapids, Mich., has put on a rebus contest, with $100 in cash prizes, 25 special prizes—74 prizes in all. *Trolley Topics*, published monthly by the Grand Rapids Railway, explains the terms of the contest, which began on April 1 and ends on April 30. Of the 76 electric rail coaches and street cars with names in Grand Rapids, 27 are represented in the rebus sketches which the railway presents in the form of a contest open to everybody except employees. All are urged to familiarize themselves with the street car names, study the sketches and solve the puzzles. Answers will be judged by a committee and correct answers and names will be announced as soon as possible after April 30.

Commission Without Right to Order Extension.—The Fresno Traction Company, Fresno, Cal., has never dedicated its property to the service of the "Fink-Smith" district of that city. This was the ruling of the California Railroad Commission on April 5. The commission also held that it was without jurisdiction to direct the company to make the desired extension under the previous ruling of the California Supreme Court in the suit of the Hollywood Chamber of Commerce. This ruling compelled the commission to order a railway to construct an extension of its line. The city of Fresno filed a complaint with the Railroad Commission against the Fresno Traction Company and asked the commission to require that company to extend its tracks into the so-called "Fink-Smith" district.

Traction Line Hauls Large Quantities of Coal.—In spite of the strike of the union coal miners in the southern Indiana field, the Evansville & Ohio Valley Traction Company and the Evansville, Suburban & Newburgh Traction Company, the last named company operating from Evansville to Boonville and Evansville, are hauling a large amount of coal. The non-union coal mines in the southern Indiana fields are being operated steadily and as a result the electric railways are taxed to capacity to haul the coal into Evansville, from which city it is shipped to other markets. The wagon mines also are being operated and coal from many of these mines is hauled several miles in wagon to the nearest switch on the Evansville, Suburban & Newburgh line. It seems likely that most of the coal mines in the "pocket" will be operated to capacity all summer.

Recent Bus Developments

Bus Law in Lansing Upheld

The city ordinance of Lansing, Mich., prescribing routes for interurban and suburban buses was upheld by the State Supreme Court on April 1 in deciding the case carried up by the Highway Motor Bus Company and other bus lines operating in the city of Lansing. The bus companies sought to restrain the city from enforcing the ordinance. They brought action against the city in the Ingham County Circuit Court, claiming the city had no right to force the buses to operate on certain streets in Lansing.

Judge Leland W. Carr of the Circuit Court upheld the ordinance and after an appeal of the plaintiffs the Supreme Court affirmed the decree of the Circuit Court.

Taxicab Operation in Cincinnati Under Control

The City Council of Cincinnati, Ohio, passed an emergency ordinance on March 16 requiring taxicab owners to carry insurance against personal and property damage. The policies for personal injuries to passengers must provide a $5,000 liability for a single personal injury and $10,000 for two or more persons for any one licensed vehicle. Damage to property must be covered by $1,000 insurance for one cab.

In the case of property damage the insurer has the option of limiting his total liability as follows:

For not more than two public vehicles	$2,000
For each vehicle in excess of two, not in excess of five	1,000
For each vehicle in excess of five, not in excess of ten	750
For each vehicle in excess of ten, not in excess of 25	500
For each vehicle in excess of 25, not in excess of 50	300
For each vehicle in excess of 50	200

Tax Subject Under Discussion in St. Louis

The St. Louis Bus Company, the bus auxiliary of the United Railways, St. Louis, Mo., paid taxes the past year of $155,306, or almost double that of the preceding year. The competing bus company, the People's Motorbus Company, for the last year paid the city $63,803 in a special tax on the basis of 3 per cent of gross receipts. In the previous year this tax totaled $66,909.

The legislative committee of the St. Louis Board of Aldermen on April 6 voted to shelve the bill to raise the special tax on bus companies from 3 per cent to 5 per cent of their gross receipts. Mayor Miller and Director of Streets and Sewers Brooks and Street Commissioner Joseph Slater had advocated the passage of the bill.

Mayor Miller, comparing the taxes paid by the People's Motorbus Company with those of the United Railways, contended that the 5 per cent tax bill would tend to equalize the taxation of these public utilities. Richard W. Meade, president and general manager of the People's Motorbus Company, answering Mayor Miller's contentions, presented to the aldermanic committee a memorandum on the comparative tax assessments of the United Railways and the People's Motorbus Company.

New York Board Still Marks Time on Bus Proposals

No solution of New York City's bus problem was reached on April 8 at a hearing before the Board of Estimate. Mayor Walker did announce his intention of moving for a vote on the award of bus franchises at the next meeting of the board on April 21. There was no indication, however, that he would be able to get the twelve votes in the board necessary to award the franchise for Manhattan, Brooklyn and Queens to the Equitable Coach Company, which he favors, or that the board would vote to award the franchises for the Bronx and Richmond.

Substitution an Issue in Tarrytown

No action was taken at the meeting at Tarrytown, N. Y., on April 11 on the matter of local transportation there. It was a joint conference between the boards of Tarrytown and Elmsford and the town of Greenbush, comprising the whole township, and among those who attended were Judges Duell, McDowell and Seely. President S. W. Huff of the Third Avenue Railway and counsel for that company explained the position of the railway in the matter. Railway officials favor the continuation of that service, but the cost to the company of improving the roadbed under the repaving program proposed by public officials would be more than $300,000. This is an expenditure the railway considers prohibitive. The present fare by trolley is 5 cents in the zone from White Plains to Elmsford and 5 cents from Elmsford to Tarrytown. The fare suggested by bus is 10 cents from White Plains to Elmsford and 15 cents from Elmsford to Tarrytown. The next meeting to consider the matter is subject to call by Supervisor Williard.

Indiana Service Seeks to Abandon Unprofitable Bus Lines

Authority to discontinue approximately 135 miles of intercity bus lines in northeastern Indiana is asked in a petition filed with the Indiana Public Service Commission by the Indiana Service Corporation, Fort Wayne. The lines over which the company proposes to abandon service are between Fort Wayne and Marion, 57 miles; Fort Wayne and Angola, 46 miles; Angola and Crooked Lake, 10 miles, and Angola and Coldwater, Mich., 22 miles. Interurban electric railway lines are operated by the same company between Fort Wayne and Marion and between Fort Wayne and Waterloo, near Angola.

In a statement accompanying the petition, Robert M. Feustel, president, said that the thirteen months ended Jan. 31, 1927, had shown a net operating loss of $19,411 on the Fort Wayne-Marion line. Income, he said, was $8,083, as against operating expenses totaling $27,494.

Blue Goose Fare Increased.—Fare on the Blue Goose Bus Line, operated between St. Louis, Mo., and Alton, Ill., by the Alton Railway, affiliated with the East St. Louis & Suburban Railway, has been increased from 65 cents to 90 cents for one way. The new rate became effective on April 10. The interurban fare on the cars of the St. Louis & Alton Railway will continue at 85 cents for one way or $1.50 for the round trip.

Bus Patronage Disappointing.—The Connecticut Company, which recently opened a new bus line between Newington Junction and Hartford, Conn., via West Hartford, has not carried the expected patronage. The Board of Selectmen of Newington is to take steps to advertise the advantages of the service offered by the railway. Schedules are to be printed and personal letters sent to the people, especially those who petitioned for the route.

Bus Service Starts.—The Washington, Baltimore & Annapolis Electric Railroad installed on April 1 a new, comfortable and de luxe coach service between Washington and Annapolis over the new National Defense Highway. Coaches leave Washington daily, including Sundays, at 9:30 a.m., 1:30 p.m. and 5:30 p.m. and leave Annapolis, including Sundays, at 8:30 a.m., 1 p.m. and 5 p.m. The one-way fare is $1.22 and the round-trip fare $2.32. Children under twelve years of age are carried at approximately half fare. Buses also serve intermediate points en route at proportionate fares. In Washington buses stop at all of the principal downtown hotels. This is in addition to the electric railway service that has been operated for years by the Naval Academy Junction Line.

Bus Service Replaces Railway.—The Northampton Street Railway discontinued its railway service between Northampton and Hatfield, Mass., at the close of business on April 13 and started bus operation in its place. This was the last link in the route from Northampton to Greenfield, formerly operated by the Connecticut Valley Street Railway. Tracks above North Hatfield are already removed and those from North Hatfield south to Northampton will be removed soon.

New Bus Project Made Known.—Plans have been announced by Mayor Frank X. Schwab of Buffalo, N. Y., for the establishment of another municipal bus line, although all previous attempts to operate municipal buses in Buffalo have resulted in failures. The latest idea of the chief official is to operate municipal buses in Kensington Avenue from Bailey Avenue to the easterly city line at a 5-cent fare with a 3-cent half-fare charge. The International Bus

Corporation, a subsidiary of the International Railway, and the Buffalo Motor Coach Company, Inc., have applications pending for the operation of buses in this section of the city where there are now no transportation facilities.

Eight Cents on Bus Line.—An 8-cent fare has been established between any two points in the city of Hudson, N. Y., on the bus line of the Eastern New York Transportation Corporation. Tokens, each good for a continuous trip between any two points, will be sold 17 for $1, but will not entitle the passenger to transfer to interurban cars of the Eastern New York Utilities Corporation, the parent company. Transfers to the interurban cars of the latter company will upon request be issued by operators of buses which connect with the cars and which buses are so marked. Valid single trip and commutation tickets, good on Eastern New York Utilities cars, will be accepted as part of a continuous trip. Tokens will not entitle passengers to transfers.

Double-deckers on Pleasant Sundays.—All single-deck coaches heretofore operated on the Morningside and Highland-Virginia Avenue lines of the Georgia Power Company, Atlanta, Ga., are to be replaced by double-deck coaches on all pleasant Sundays during the summer months. The schedules on Sundays are to be the same as the daily schedules. Both lines are operated through some of the most beautiful residential sections of the city.

Working Out Bus Schedule. — The Northland Transportation Company, Minneapolis, Minn., has bought the Mesaba Railway Coach Company, which serves communities between Aurora and Hibbing and has local runs in Virginia and Eveleth. The transaction is subject to the approval of the State Railroad and Warehouse Commission. The acquisition of this property gives the Northland company virtual monopoly of the transportation business on the range. The company already has a bus line running from Duluth north through Virginia and it is understood that buses on the line running east and west through Virginia will be scheduled to connect with buses on the north and south line out of Duluth. Abandonment of the electric line has been ordered by the federal court.

Railway Supplies Service; Bus Petition Denied.—The Public Service Commission has denied the petition of William A. Stone, doing business as the Silver Lake Park and White Plains Bus Line, for permission to operate a bus line in White Plains, N. Y. When this petition was filed the Silver Lake railway line was not in operation, as the receiver of the Westchester Street Railroad had discontinued service. The proposed bus line was intended to serve substantially the same section of White Plains as this branch of the railway. Subsequently, the Westchester Street Transportation Company, Inc., which succeeded the electric railway and is owned by it, resumed service and also obtained the consent of the city and the Public Service Commission to substitute buses for street cars. It was the opinion of the commission that the operation of a bus route in addition to the railway was not necessary.

Financial and Corporate

$58,157,236 Value at St. Louis

State Commission Allows $6,395,888 for Additions Made to United Railways Property Since Year 1919

The United Railways, St. Louis, Mo., earned a return of only 4.2 per cent on its properties during 1926, a report of auditors for the Missouri Public Service Commission filed at Jefferson City on April 2 shows.

The audit sustains the contention of Receiver Rolla Wells that the company operated at a loss during 1925 and 1926 after paying interest on bonded indebtedness. The net loss for 1925 was $172,247 and for the first ten months of 1926 the deficit was $52,730, the report shows.

As a result of the audit the new valuation of the railway's properties for rate-making purposes is $58,157,236, including $6,395,888 in additions since 1919, when the valuation was found to be $51,761,348.

The auditors found the amount available for return in the first ten months of 1926 was only $2,039,886 and on that basis estimated the total for the entire year at $2,447,864. This is only 4.2 per cent of the $58,157,236 valuation.

The audit was made to determine the net amount of expenditure for additions and betterments between Jan. 1, 1919, and Oct. 31, 1926, and to determine results of operations in 1926 up to Oct. 31.

The auditors were J. J. Murphy, chief accountant for the commission; H. W. Ross, accountant in charge, and George B. Coleman, A. L. Houlehan and H. B. Lysaght. The investigation revealed:

Average requirements for working capital, $2,109,105.

Gross operating revenues for 1925, $18,913,332; operating expenses, taxes, depreciation, $16,445,402; net, $2,467,929.

After adding non-operating income and deducting interest, discounts and miscellaneous the deficit for 1925 was $172,247.

For first ten months 1926 operating revenues were $15,671,311 and operating expenses, taxes and depreciation $13,631,424, leaving a net revenue of $2,039,886. After adding non-operating income and deducting interest, discounts and miscellaneous items the deficit for the ten months was $52,730.

The estimated amount available for return in 1926, based upon first ten months, was $2,477,864, compared with $2,467,929 in 1925.

The audit revealed the payments for personal injuries and property damage claims in the period April 12, 1919, to Oct. 31, 1926, were $8,000,000.

The credit balance in the depreciation reserve as of Oct. 31, 1926, was increased by almost $900,000 by the auditors in their adjustments, which showed credits of $1,004,356 and debits of $114,931.

The total estimated liability of the company for personal injuries and damage claims as of Oct. 31, 1926, was $1,549,840, while the balance in the reserve on that date was $645,629, a deficit of $904,210. The company has based its credits to this reserve at 6 per cent of gross receipts.

In their report the auditors expressed the opinion that a fixed percentage of gross revenues does not appear to be the best method for measuring the cost of injuries and damage claims since fares and gross revenues may go up or down without affecting traffic accidents. The report stated that "in our opinion 'cost per car-mile' is a more scientific method for measuring injuries and damages."

Receiver Wells filed his first petition for a higher fare some months ago. The city then demanded an audit of the company's books to determine whether an increase was warranted. From Feb. 5 to March 1 under a federal court injunction the company charged a fare of 8 cents, with two tokens for 15 cents, but this rate was later set aside by a special federal court of three judges.

The company now has an application for increased fares pending before the commission. A fare of 8 cents, with two tokens for 15 cents, has been asked. In view of the findings of the auditors for the commission it is very probable the company will be granted the increase.

The bringing of the company's valuation up to date is expected to speed up the negotiations between Mayor Miller and the reorganization committee on a new franchise for the railway under the service-at-cost plan.

$1,885,000 Boston "L" Issue Offered

A syndicate composed of Paine, Webber & Company, White, Weld & Company, Stone & Webster & Blodget, Inc., of New York, and the First National Corporation, Boston, offered for subscription on April 14 $1,885,000 of ten-year 5 per cent gold bonds of the Boston Elevated Railway, Boston, Mass. They were priced at 100¾ and interest to yield 4.90 per cent. The bankers stressed the point that the net earnings are about 2¾ times the rentals and interest charges.

$7,000,000 Cincinnati Street Railway Issue

A syndicate headed by the Guaranty Company, New York, and W. E. Hutton & Company offered publicly on April 11 $7,000,000 of first mortgage series A 5½ per cent gold bonds of the Cincinnati Street Railway, Cincinnati, Ohio, to mature April 15, 1952, at 100 and accured interest, to yield 5½ per cent. The issue has been authorized by the Director of Public Utilities of the city of Cincinnati and the Public Utilities Commission of Ohio, and the proceeds will be used to retire outstand-

ing $4,500,000 of 6 per cent notes, to reimburse the company for capital additions heretofore made and to provide funds for further additions and other corporate purposes.

The bonds will be a direct first lien on all fixed property and all equipment now owned by the company, except a part of the company's railway cars on which there is a prior lien represented by $711,400 outstanding equipment trust certificates.

Changes in Foshay Company Corporate Structure

Although the W. B. Foshay Company, Minneapolis, Minn., has sold its controlling interest in the Peoples Light & Power Corporation, its utility business will continue as in the past. The Foshay company now operates electric, gas and artificial ice properties in Nogales, Ariz., and Nogales, Mexico. valued at $1,600,000. It has under contract electric and gas properties which are in operation in Vermont, Kansas and Idaho.

The name of the W. B. Foshay Company's new public utility holding company will be Public Utilities Consolidated Corporation. This corporation will operate the Arizona company, which will be called Public Utilities Arizona Corporation. When public utility properties which are under contract in other states are taken into the holding company, they will be known as Public Utilities Vermont Corporation, Public Utilities Kansas Corporation and Public Utilities Idaho Corporation.

Readjustment in Grand Rapids

Voluntary Recasting of Financial Structure of Grand Rapids Railway Proposed—Financing Can Be Done Now Only Through First Mortgage Bonds—The Details

A PLAN of readjustment has been suggested for the Grand Rapids Railway, Grand Rapids, Mich., which contemplates the organization of a new company to take over the assets of the present company and the cancellation of all of its common stock, and extinguishment of $600,000 of its indebtedness through the issue of common stock of the new company, and the exchange of preferred stock on the basis of two shares of new company common stock for one share of present preferred stock, the depositors of which are also offered subscription rights. The plan also provides for the authorization of additional preferred stock by the new company to provide funds further to reduce existing indebtedness and for other corporate purposes.

It is explained that the changes suggested are deemed advisable at this time because of the large floating indebtedness of the old company and its lack of a medium for doing any financing other than through first mortgage bonds which cannot be issued and sold in sufficient amount or at advantageous prices in view of the company's present condition. The present floating debt position dates back to June 1, 1919, when three-year bonds amounting to $3,700,000 became due, which bonds were in turn issued to refund the long term 5 per cent bonds originally issued in 1900. The capital expenditure situation since June 1, 1919, is shown in the accompanying table.

CAPITAL EXPENDITURE SITUATION OF GRAND RAPIDS RAILWAY

Payments:		
Bonds maturing June 1, 1919		$3,700,000
Construction from June 1, 1919, to Dec. 31, 1926		1,411,892
Reacquirement of $229,000 first mortgage bonds of present issue through sinking fund, etc.		206,000
Total payments for capital purposes		$5,317,892
Receipts:		
$3,200,000 first mortgage bonds sold	$2,944,000	
Insurance moneys received on account of Hall Street carhouse property and cars destroyed by fire	368,395	
Provided out of earnings and reserves	559,298	3,871,693
Leaving net increase in debt junior to first mortgage bonds amounting to		$1,446,199
Now represented by:		
Gold debenture 7 per cent	$700,000	
Car trust notes	198,045	
Increased amount of paving assessments not due	69,977	
Increased amount of accounts payable	58,218	
Advances payable	245,458	
Bank loans	174,500	

The present outstanding first mortgage bonds require sinking fund payments of $80,000 annually and the car car trust notes become due about $8,000 a month or approximately $98,000 a year until their final maturity May 26, 1929. Thus these two items alone constitute a cash requirement of about $178,000 a year. It is believed the consummation of the plan will enable the company again to sell its first mortgage bonds at prices more nearly approaching par, and an agreement has been reached for the sale of $200,000 of first mortgage bonds upon the plan being declared operative, the proceeds to be applied to the retirement of all the car trust notes, thus ending the monthly drain on the cash resources on their account, which with saving of interest on the $600,000 debt canceled will reduce the annual cash outlay by about $140,000. The proceeds from the new preferred stock will be applied first to the liquidation of bank loans and thereafter to the liquidation of other indebtedness and thereby improve the current asset position and thus to that extent free the cash derived from earnings and make it available for payment of dividends, first on the new preferred stock and then on the new common stock.

The 100,000 shares of new common stock are to be issued in consideration of the extinguishment of $600,000 of present outstanding debt of the Grand Rapids Railway (i.e. cancellation of $245,000 advances payable and $355,000 gold debenture 7 per cent bonds), the cancellation of $2,000,000 par value of old common stock and the making to the holders of the old preferred stock of the exchange and subscription offers outlined in the plan. Assuming that all the holders of old preferred stock exchange and subscribe to the full amount of new preferred stock offered under the plan, there would result:

100,000	shares new common stock issued
40,000	shares new common stock to holders of 20,000 shares old preferred stock
60,000	shares new common stock representing consideration for extinguishment of $600,000 of debt
15,000	shares new common stock of which will be delivered if entire $300,000 new preferred stock offered under the plan is subscribed
45,000	shares remaining in hands of holders who cancelled the $600,000 of debt
15,000	shares of which will be reserved for delivery upon payment to them of $10 per share upon exercise of options expiring May 1, 1929, delivered to subscribers under the plan.

The earnings position of the new company, based upon all matters outlined in the plan as applied to the actual earnings for twelve months ended Feb. 28, 1927, will be:

Gross earnings		$1,774,748
Operating expenses and taxes:		
Operating expenses	1,091,267	
Taxes	153,671	
Total		$1,244,939
Gross income available for fixed charges, retirements and dividends		$ 529,809
Annual interest at 7 per cent on $3,171,000 mortgage bonds		221,970
Interest on $219,500 debentures		15,365
Interest on unpaid paving assessments		5,052
Total interest and other fixed charges		$ 242,387
Balance		$ 287,421
7 per cent on $300,000 preferred stock		21,000
Balance available for retirements and other purposes		$ 266,421

In September, 1922, an ordinance ratified by the voters granted the Grand Rapids Railway a 30-year franchise and provided a sliding scale of fares based on net return upon valuations agreed upon in the franchise. This franchise will be assumed by the new company. The original value placed upon the property was $5,500,000 as of Jan. 1, 1922, which with subsequent additions to Feb. 28, 1927, amounts to $6,043,234. The rates of fare now in effect, viz., 10 cents cash and six tickets for 50 cents, were instituted at the beginning of 1925, at which rates the property is entitled, according to the franchise terms, to earn a return of 7½ per cent on its value after deduction of operating expenses and taxes, and an amount equal to 3 per cent of the value of the property for retirement reserve. As of Feb. 28, 1927, the deficit in the automatic fare equalization account was $423,173; in other words, that is the amount that the property failed

to earn the return allowed under the franchise from its date to Feb. 28, 1927. It is estimated that if the full return allowed by the franchise is realized the earnings would be increased $98,912.

Deducting from $266,421 the balance of earnings previously indicated, 3 per cent of the present value of the property for retirement reserve, or $181,297 there would remain available $85,124, or 85 cents a share on the 100,000 shares of the new company common stock to be issued and outstanding. If the charge for retirement reserve were modified to 2 per cent or $120,864, an amount the management believes adequate in view of the present excellent condition of the property, the sum of $145,557 would be available for the 100,000 shares of common stock of the new company, to be issued and outstanding. This would mean a return on the stock at the rate of $1.45 per share.

Deal on for Newport Electric Corporation

Offer of $150 a share on option has been made for control of the Newport Gas Light Company by the Utilities Power & Light Corporation of Chicago. The Colonial Gas & Electric Light Company, which controls Newport Electric Corporation, is a subsidiary of Utilities Power & Light. No action either toward recommending or advising against sale has yet been taken by the directors. The Newport Electric Corporation operates 22 miles of electric railway and city and interurban bus service in which nineteen buses are used.

$159,000,000 in Boston "L" Against $25,000,000 in 1897

A chart prepared by the Boston Elevated Railway, Boston, Mass., shows some of the important facts regarding the Boston Elevated Railway in terms of increase from 1897.

At present the investment of about $159,000,000 in the property is roughly 530 per cent greater than that of 1897, which was somewhat more than $25,000,000. The investment has on the whole increased steadily, with a rapid increase in 1917-1918, and very slight increases in some years, such as 1912-1913, 1919-1921 and 1924-25. The average annual investment has been about $4,500,000.

Revenue passengers carried have about doubled, but since 1914 the annual total has remained fairly constant. Riding, however, has increased faster than the population.

The population is now a little more than 50 per cent greater than in 1897, and is still rising, although somewhat slowly at the present time.

The relation of riding and population is reflected in the revenue rides per capita, which in 1917 were 50 per cent greater than in 1897. The increase in fare which the trustees found necessary as soon as they took hold of the property resulted in some falling off. This loss has since been recovered in part. While the total of revenue passengers is about as great now as ever, the population increase lowers the ratio.

Eastern Massachusetts Does Well

Intensive Merchandising of Service Helps Road Operating in Suburban Boston Territory

The Eastern Massachusetts Street Railway, Boston, Mass., reports for 1926 an increase of $149,855 over 1925 in revenue from all sources, but the cost of operation before taxes, interest and rental charges was $182,484 greater than the previous year. In 1926 the company failed to earn operating expenses and depreciation (not including taxes and interest) by $62,207, compared with a loss of $82,823 in 1925.

Revenue from all sources in 1926 was $9,788,035, an increase over 1925 of $149,855. Expenses including depreciation, taxes, etc., in 1926, were $7,807,332, an increase over 1925 of $199,295. Gross income in 1926 was $1,980,703, a decrease from 1925 of $49,440. Interest and rentals, etc., in 1926 were $1,245,865, a decrease from 1925 of $45,955. Net income available for dividends in 1926 was $734,838, a decrease from 1925 of $3,485.

Dividend payments of $866,522 were made in 1926 as follows:

First preferred	$249,165
Sinking fund	1,929
Preferred B	179,868
Adjustment	435,560
Common	none

On the first preferred and sinking fund stocks payments of 3 per cent were made on Feb. 15 and Aug. 15. On preferred B, payments of 3 per cent were made on Feb. 1 and Aug. 1. On adjustment stock, payments of 2½ per cent were made on April 1 and Oct. 1.

Bonded obligations were retired and paid at maturity as follows: $131,000 Bay State equipment 6's due Aug. 1, 1926; $300,000 Eastern Mass. series A 6's, due Jan. 1, 1927; $115,000 Eastern Mass. series C 6's, due Feb. 1, 1926; $2,500 par sinking fund stock, series 7, due Feb. 1, 1926, paid and canceled.

The largest factor in the increased expenses was the additional burden imposed by a board of arbitration which not only granted the blue uniform, line, power and rolling stock and miscellaneous employees on increase of 1½ cents an hour but also established an eight-hour day and time and one-half for all overtime.

As compared with 1924 and 1925, when there were decreases of $993,343 and $449,395 respectively, an increase in 1926 of $136,501 in revenues is encouraging. This increase is attributed in a considerable measure to an advance in ticket fares which took effect on Oct. 1, and to weather conditions in November and December, the early snows and low temperature causing private automobile owners to store their machines and ride in street cars.

The percentage increase in riding for these two months was substantially the same throughout the system. Total passenger car miles operated in 1926 were 17,731,483.

Realizing that the principles of merchandising must be applied to the railway as in every other business, the company has pursued the policy of improving its cars by large expenditures for painting, various up-to-date devices and the installation of de luxe seating and lighting facilities and linoleum flooring. This program will be consistently followed. In this connection the company now operates between Brockton and Mattapan, Lowell and Everett terminal and Lawrence and Everett terminal high-speed cars of the very latest type at popular reduced rates of fare. Increased earnings are reported on all three of these de luxe lines.

In addition the company has recently purchased 50 new light-weight, high-speed cars embodying the new ideas of comfort and convenience. These are to take the place of cars worn out in the service. Delivery is expected during May and June. The new cars will be paid for from the depreciation reserve accumulated for that purpose.

As might be expected, in view of the arbitration award, the cost of car operation was $162,380 more than in 1925, overshadowing all other items of increased expense. Wage comparisons for 1926 and 1925 follow:

	1926	1925
Wages two-man car operators	$158,683	$154,241
Wages one-man car operators	1,527,011	1,468,430
Wages carhouse employees	177,466	165,183

The cost of snow fighting in 1926 was $141,845, compared with $54,693 in 1925. Approximately 70 per cent of this was paid in wages.

Other increases in expenses were:

Way and structures	$8,273
Law expenses	13,429
Rent of track	7,355
General wages and expenses	12,591
Pensions	2,215
Stationery and printing	1,717
Miscellaneous expenses	23,857

The claim department made a very creditable showing, the total expenditures for the year being $262,165, the smallest yearly amount since public control began and less by $32,495 than the previous year. Other decreased expenditures were for: equipment, $24,-

INCOME STATEMENT OF EASTERN MASSACHUSETTS STREET RAILWAY

	1926	1925
Street car revenue	$8,699,914	$8,563,413
Auto bus revenue	321,317	278,758
Express and other revenue	41,879	42,757
Rentals, advertising, etc.	198,051	205,713
From sale of power	272,527	†313,248
Interest and other income	254,347	234,291
Total revenue	$9,788,035	$9,638,180
Expenses:		
Way and structures	$1,229,616	$1,221,343
Equipment	1,230,046	1,254,192
Power	1,281,790	†1,277,787
Car operation	2,378,475	2,216,097
Injuries and damages	262,166	294,661
Insurance	73,810	84,895
Law expenses	40,255	26,826
Rent of tracks	80,167	72,812
General wages and expenses	235,724	223,133
Pensions	23,045	20,830
Group insurance	64,866	64,402
Stationery and printing	37,201	35,484
Stores and garage expenses	53,299	61,316
Miscellaneous expenses	68,210	44,353
Auto bus expenses	383,524	361,581
Total operating expenses	$7,442,194	$7,259,710
Total operating expenses and taxes	$7,807,332	$7,608,037
Gross income	1,980,703	2,030,143
Interest and rentals	1,245,865	1,291,820
Net income	$734,838	$738,323

Operating expenses include charges for depreciation amounting to $917,940 in 1926 and $898,254 in 1925. During 1926 $745,578 of the depreciation reserve was applied to reconstruction and amortization.

† Of the amount $313,248 in 1925—$304,930 was included in report for 1925 as a reduction to power expense; the difference, or $8,318 included with "rentals, advertising, etc."

146; insurance, $11,085; stores and garage expenses, $8,017.

The attitude of the trustees on the matter of bus operation is that where the company has rails and overhead construction in good condition and there is sufficient volume of business to warrant the continuance of electric cars, it would be unjust, not only to the owners of the property but to the riding public, to supplant street cars with buses. In densely populated areas the addition of a multiplicity of buses would throw an unwarranted burden upon communities whose principal highways are already overloaded with motor traffic. On the other hand, there are some small communities in which there are no peak loads and where the bus can be used to advantage and principally in the handling of this type of business the company operated in 1926 1,287,167 bus-miles, this being 207,451 more miles than in 1925. Wherever, in the territory served by the railway, the trustees know that there is only enough "pole to pole" transportation business for one responsible carrier, and there is a threat of bus competition they do not intend to be coerced or driven to establishing a duplicate and wasteful service. On this point the trustees say:

> Our duty to the car riders and the owners of this road is clear and we propose to perform it. Among those who would be first to condemn us if the fallacious reasoning of the advocates of paralleling street car lines with bus line were adopted and the inevitable higher fares and deteriorating service followed, would be these same, perhaps well-intentioned but misinformed, partisans of such an experiment.
>
> Wherever public convenience and necessity require service, this company, with permission from the proper authorities, will perform it, either with street cars or buses.

All of the bus lines operated in 1925 were continued in 1926. In addition bus operation was substituted for railway service between Rockland and Braintree and between Weymouth and Hingham, where the rails were worn out and rebuilding was out of the question because of its great cost and the comparatively small receipts of the route. Bus revenues for the entire system increased $42,559; expenses were $21,943 more than last year. The company now owns 65 buses and motor coaches, representing an investment of $458,608 and operates them in eighteen cities and towns.

It also runs an interstate route between Taunton and Providence, and during the summer months runs lines between Mattapan and Nantasket and Neponset and Nantasket. To aid in snow fighting on bus lines, seven caterpillar tractor snow plows were purchased during the year at a cost of $33,810. There are now 37 bus snow-fighting units on the system. During the summer months part of this equipment is available in connection with track and other types of construction.

Reference was made in the last annual report of the public trustees to the bill in equity brought by L. Sherman Adams, a stockholder, seeking to compel the public trustees to pay dividends claimed to have accrued on the common and adjustment shares of the company to Feb. 1, 1924. As stated in the last annual report, the master appointed by the Supreme Court to hear the evidence and find the facts filed his report on Jan. 29, 1926, after long hearings. The case was reserved upon the pleadings, the master's report and the exceptions of both parties for the consideration of the full bench of the Supreme Judicial Court. The case was argued March 18, 1926, and the opinion of the full bench of the Supreme Court was rendered on Oct. 2, 1926. In its opinion, the Supreme Court over-ruled the exceptions of the plaintiff and sustained thirteen out of fourteen exceptions of the defendants, and ordered a final decree to be entered dismissing the plaintiff's bill with costs.

The trustees point out that at no other period in the history of this company has the rolling stock throughout the system been in such good condition. They ascribe this as due to the systematic and intensive program of overhauling which was started several years ago. Every car in regular service has been through the repair shop, either at Chelsea or Brockton, painted inside and outside and thorough attention given to mechanical details. The results are apparent even to the casual observer. Twofold benefits are set down as having accrued from the establishment of this policy: the net cost of maintenance has been greatly reduced and the company also enjoys the advantage of doing business with well pleased customers.

In 1920, 14,336 crippled cars were taken out of service and pulled in the carhouses, this being at the rate of one defect for every 1,550 miles of operation. In 1926 only 685 crippled cars were pulled in, this being at the rate of one defect for very 27,110 miles of operation. In the Brockton-Mattapan, Lowell - Everett terminal, Lawrence-Everett terminal de luxe service, the rolling stock department outfitted nineteen cars at the cost of $1,500 a car.

Conferences Look Toward Sale of Hocker Line

Negotiations are under way for the sale of the Kansas City, Lawrence & Topeka Electric Railroad, a 12-mile interurban, known as the Hocker line, to the Kansas City Public Service Company, Kansas City, Mo. The line has been in receivership for the past eight years. It operates between Kansas City and Zarah, Kans., passing through Merriam and Shawnee where the chief patronage lay.

As a basis for the negotiation, W. K. Paul, superintendent of the line for the receiver, is preparing a complete report of the physical assets to be presented to officials of the Kansas City Public Service Company. It is known that Fred G. Buffe, vice-president of the Kansas City Public Service Company, made a survey of the Hocker line a year ago, prior to the termination of the receivership of his company.

The Kansas City, Lawrence & Topeka Electric Railroad was organized in 1907 by the late R. W. Hocker. All the stock of the company is held by the Hocker estate and by F. P. Dickson, president of the company. The original plan was to extend the line through to Topeka and a start toward this end was made in 1916 when the line, which ended at Shawnee, was extended to Sarah, a distance of 6 miles. The coming of the World War halted development.

Increase in Revenue in Boston.—For the month of January, 1927, the revenue of the Boston Elevated Railway, Boston, Mass., exceeded cost of service by $186,947 compared with an excessive revenue of $223,301 in January, 1926. The revenue passengers numbered 34,160,787, against 33,144,528 for January, 1926. In January of the current year 5,004,125 miles were operated, against 4,871,361 in January of the year preceding.

Jersey Issue Oversubscribed. — The offer of 30,000 shares of 6 per cent cumulative preferred stock of the Public Service Corporation of New Jersey, Newark, N. J., to customers of its subsidiary companies on April 1 has been oversubscribed. Subscriptions for 33,561 shares had been received from 6,818 persons at close of business on April 6. The average number of shares per subscription was less than five. This issue, sold in five working days, is a new record for the company.

Stock Issue for Improvements.—The Cleveland Railway, Cleveland, Ohio, has been authorized by the Ohio Utilities Commission to issue $2,904,600 in capital stock at $100 a share plus accrued interest. The additional money is to be used for extensions and improvements including the buying of buses and cars.

Investment Expert Discusses Chicago Issues.—Wm. Hughes Clarke, Chicago, dealer in investments bonds and stocks, has issued a circular in which he has reviewed earnings and other data covering the combined Chicago Surface Lines and the separate companies. He is also the author of articles contributed to the Feb. 26 and March 5 issues of the *Financial World* containing summaries covering the Chicago traction situation interesting to all who are concerned with electric railway operations and investments.

Oppose Abandonment.—Protests are being filed with the Public Service Commission to enjoin the Portland Electric Power Company from discontinuing 12 miles of interurban line between Montavilla Depot, Portland, Ore., and the town of Troutdale, Multnomah County. The company is applying for authority to discontinue the branch of service on the grounds that the operation of motor trucks and private automobiles has become so great that the railway can no longer operate with profit.

Authorized to Sell Land.—The Pacific Electric Railway has been authorized by the California Railroad Commission to sell to the Pacific Electric Land Company for the sum of $126,000 a number of parcels of land along its Newport Beach line, partly in the city of Long Beach, and partly in the city of Seal Beach, Orange County.

Union Street Railway Shows Deficit.—For the calendar year 1926 the Union Street Railway, New Bedford, Mass., reported a deficit of $1,748, after deducting dividends, which were equivalent to 6 per cent on the company's capitalization of $2,437,500. For 30 years previous the annual dividend had been 8 per cent. The profit and loss surplus as of Dec. 31, 1926, was $619,927. This company is the last with a 5-cent fare unit in Massachusetts; the railway now proposes a 10-cent fare.

Personal Items

Personnel Changes in Richmond

The election of William E. Wood to the presidency of the Virginia Electric & Power Company, Richmond, Va., to succeed Luke C. Bradley resulted in numerous advancements.

J. Franklin McLaughlin will be in charge of operations of the company with offices at Richmond.

Thomas P. Walker, who has previously been in charge of properties under Stone & Webster management in El Paso, Tex., will succeed Mr. McLaughlin as vice-president in charge of the Norfolk Division. T. Norman Jones, Jr., will become general manager of the Norfolk division. J. B. Hayes, formerly assistant to the president, will become general superintendent of transportation of the Norfolk division, reporting to the general manager of the Norfolk division. R. C. Hopkins succeeds Mr. Hayes as assistant to the president and to the vice-president in charge of operations.

Other changes include the following: Louis F. Riegel, heretofore sales manager for Richmond, will become general sales manager for the system, reporting to the vice-president in charge of operations. W. E. McCreery, sales manager of the Norfolk division, will hereafter report to the general sales manager. C. S. Stackpole, formerly of the sales department of the Norfolk division, will succeed Mr. Riegel as sales manager of the Richmond division and will report to the general sales manager. O. W. Morton, formerly assistant to the vice-president of the Norfolk division, will become sales manager for Norfolk, reporting to the sales manager of the Norfolk division. E. H. Hill, formerly assistant superintendent of the electric department of the Norfolk division, will succeed Mr. Morton as assistant to the vice-president of the Norfolk division. E. F. Turner will become superintendent at Fredericksburg, succeeding Mr. Venable.

W. L. Snodgrass Heads New Department in Fort Wayne

The Indiana Service Corporation, through Henry Bucher, manager of railways, recently announced that a separate department had been formed to handle all traffic matters. This new department was made necessary because the combined work of transportation and traffic matters, which has been handled by J. A. Greenland, had grown to a point where it was necessary to organize a new department.

The new department will be known as the traffic department. It will be under the direction of W. L. Snodgrass, with the title of superintendent of traffic. Mr. Snodgrass has had considerable experience in traffic matters and for some time past has been in charge of traffic solicitation for this company. Under the new arrangement he will move from LaFayette to Fort Wayne.

Mr. Greenland, superintendent of transportation, will continue to supervise all transportation matters.

N. T. Brown a Vice-President in Buffalo

Nelson T. Brown has been elected vice-president in charge of transportation of the International Railway, Buffalo, it was announced by Bernard J. Yungbluth, president of the corporation. Mr. Brown comes to Buffalo from Philadelphia, where he has been in charge of the bus division of the Philadelphia Rapid Transit Company for the last five years. He has been associated with railway interests in Philadelphia for 25 years. Mr. Brown has already assumed his new position in Buffalo.

F. M. Mills of Sioux Falls Honored

Frank M. Mills, president of the Sioux Falls Traction Company, Sioux Falls, S. D., celebrated his 96th birthday anniversary on April 4. He is said to be the oldest active electric railway executive in the United States. When a group of representatives of the Chamber of Commerce called to pay their respects and extend felicitations, he announced that he was confidently looking forward to his centennial year. Mr. Mills launched the Sioux Falls railway system more than twenty years ago. Much of the business is now handled by his son, Roger Mills, but the elder executive is daily at his desk.

Changes in Jersey

At a meeting on April 13 of the directors of the Public Service Corporation, operating the Public Service Railway, Newark, N. J., a few changes were announced. They are as follows:

Edward A. Armstrong, assistant general counsel, was appointed general counsel.

William B. Hartshorne was made assistant to the president.

Harry P. Chandler, recently appointed executive assistant, was made chairman of the welfare committee.

Arthur Bland Made Manager

Arthur Bland, who has been director of public relations for the Southern Ohio Public Service Company, with offices in Columbus, has been made manager of the company. He succeeds R. Z. Zimmermann, who is now associated with Day & Zimmermann, Philadelphia.

George J. Carney Joins McGraw-Hill Staff

George J. Carney, who has been assistant to the director of the Wisconsin Public Utilities Bureau since 1920, became an assistant editor of the *Electrical World* on April 1. His headquarters will be in Chicago for the present, and his editorial duties will involve general editorial assistance to F. R. Innes, the Western editor of the *Electrical World*. For the past six years Mr. Carney has been engaged in utility information bureau work in Wisconsin and has served as correspondent for the ELECTRIC RAILWAY JOURNAL, *Electrical World* and other McGraw-Hill publications. He has a wide acquaintance with utility men and utility conditions in the Chicago territory.

Mr. Carney was born in Milwaukee in 1898 and after completing his education served in the World War and participated in all the major engagements of the American forces. Business experience with the Pathé Exchange, Inc., and general newspaper work preceded his connection with the Wisconsin Public Utility Bureau.

Obituary

Albert M. Lynn

Albert M. Lynn, president of the West Penn Electric Company and a director of the American Water Works & Electric Company, died in New York City at the Roosevelt Hospital on April 8. For more than 30 years Mr. Lynn had been identified in important executive capacities with the public utility properties of the American Water Works & Electric Company. Subsidiary companies include the Monongahela West Penn Public Service Company and West Penn Railways.

The late president of the West Penn property entered the employ of the American Water Works & Guarantee Company, the predecessor of the American Water Works & Electric Company, on Feb. 1, 1893, and served for some years in the general offices at Pittsburgh. He then became manager of the company's water works plant at Chattanooga, Tenn., and later of that at Birmingham, Ala. For many years thereafter he was in charge of a large proportion of the company's water works properties. In 1917 Mr. Lynn was elected president of the West Penn Company and upon the organization of the West Penn Electric Company he became its president, in which capacity he was serving at the time of his death.

Mr. Lynn was born in Indianapolis on Oct. 12, 1875, moving with his family to Pittsburgh in 1889, where he attended public schools.

William T. Nary, a superintendent of the Berkshire Street Railway, North Adams, Mass., since 1892 and one of the oldest electric railway operating officials, in point of service, in that section of the country, died in his home in Adams on April 10. He entered the employ of the Hoosac Valley Street Railway in the late '80s as a conductor on a horse car running between Adams and North Adams. The Hoosac Valley company was one of the first to electrify its lines and Mr. Nary was instrumental in making the change. As superintendent of construction Mr. Nary supervised the construction of the Williamstown-North Adams line of the Berkshire Street Railway. He was 63 years old.

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

Committee Formed to Consider Cars for New York

A committee of engineers, to be headed by Col. William C. Lancaster, chief engineer of the New York Transit Commission, whose function it will be to ascertain whether a steel car of sufficiently light weight can be designed for operation on the elevated structure in New York City, was formed on April 3 at a conference held at the Transit Commission offices, attended by representatives of the Board of Transportation, the rapid transit railroads, various car construction companies, the Bethlehem Steel Company, the Westinghouse company and other organizations concerned with the subject. W. S. Menden and Frank Hedley, heads of the B.-M.T. and I.R.T. respectively, pledged their assistance in the Transit Commission's effort to ascertain whether such a car can be designed.

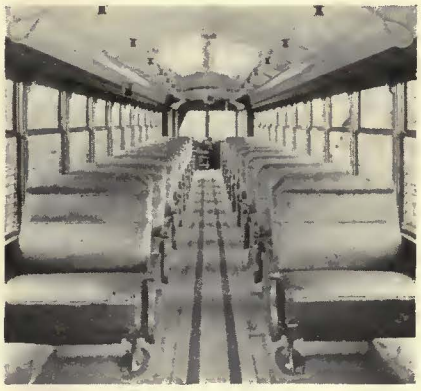
A.C.F. Sells Wire Wheel Business

The Wire Wheel Corporation of America has purchased the wire wheel business of the American Car & Foundry Motors Company, a subsidiary of the American Car & Foundry Company. The acquired business is in Detroit, and under the plan of acquisition a considerable portion of the plant equipment is to be moved to Buffalo, where the Wire Wheel Corporation is located.

The current output of Wire Wheel, will be increased from 20 to 25 per cent by the acquisition of the new concern. No present expansion of the business of the Wire Wheel Corporation is expected, he said, but that action may be necessitated later on account of increased business.

New Cars for Berkshire Railway Elicit Public's Praise

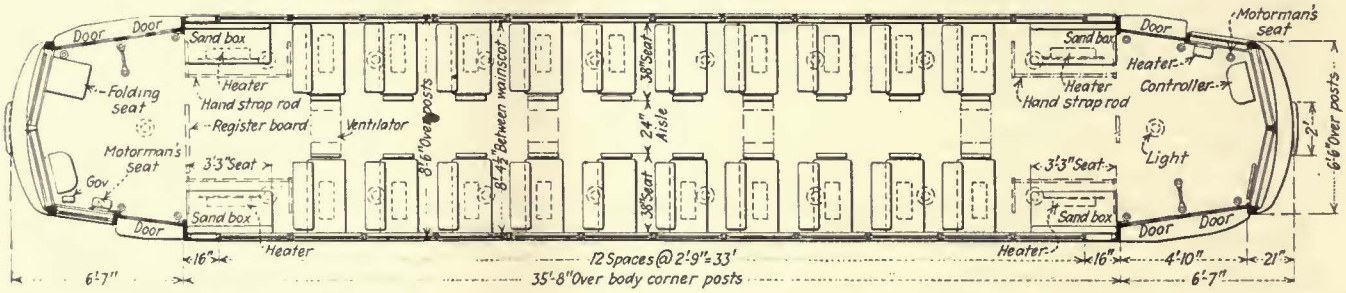
Citizens and the press of Pittsfield, Mass., have joined in praising the twelve new A.E.R.A. standard interurban double-truck safety cars recently delivered to the Berkshire Street Railway by the Osgood-Bradley Car Company, according to a recent statement from General Manager C. Q. Richmond. "We find," writes Mr. Richmond, "that the comments of the people riding and of the press have been entirely favorable and we are very sure that the placing of these cars on our lines has brought us increased business."



A glimpse of the riding comforts afforded by the twelve new Pittsfield cars, which were built by the Osgood-Bradley Car Company

Specifications for the cars, which were delivered late in November last year, are as follows:

Weights:	
Car body equipped	22,800 lb.
Trucks with motors	14,400 lb.
Total	37,200 lb.
Bolster centers, length	24 ft. 11 in.
Length over all	48 ft. 10 in.
Truck wheelbase	5 ft. 6 in.
Width over all	8 ft. 7⅝ in.
Height, rail to trolley base	11 ft. 3 in.
Body	Semi-steel
Interior trim	Mahogany
Headlining	Agasote
Roof	Arch
Air brakes	General Electric
Armature bearings	Plain
Axles	A.E.R.A. standard E-2
Bumpers	Anti-climber
Car signal system	Consolidated
Car trimmings	J. L. Howard & Co.
Center and side bearings	Osgood-Bradley
Compressors	General Electric CP-27B
Control	General Electric K-35-KK
Couplers	Osgood-Bradley
Curtain fixtures	Curtain Supply
Curtain material	Double-faced Pantasote
Destination signs	Hunter
Door-operating mechanism	National Pneumatic
Energy-saving device	Arthur
Fenders	Massachusetts standard
Finish	Enamel and varnish
Gears and pinions	General Electric
Hand brakes	Peacock
Heater equipment	Consolidated Car Heating
Headlights	General Electric
Journal bearings	A.E.R.A. standard
Journal boxes	Symington
Lightning arresters	General Electric
Motors	Four GE-265, inside hung
Registers	Ohmer
Safety devices	Safety Car Devices
Sanders	Osgood-Bradley
Sash fixtures	Curtain Supply
Seats	Heywood-Wakefield
Seating material	Leather
Slack adjuster	Osgood-Bradley
Springs	Fort Pitt and Railway Steel Spring
Step treads	Mason
Trolley retrievers	Earll
Trolley base	U. S. No. 20
Trolley wheels	General Electric
Trucks	Osgood-Bradley OBC-48-66-G
Ventilators	Garland C-3
Wheels	Steel Car Forge 26-in. diameter



Type of double-truck interurban car recently delivered to the Berkshire Street Railway, Pittsfield, Mass.

Bids for 100 Cars and Ten Buses for Detroit

The Department of Street Railways at Detroit, Mich., has been authorized and directed by the City Council to take bids upon 100 modern Peter Witt cars and ten single-deck, 30-passenger motor coaches for the purpose of making comparisons with the department's cost estimates for building cars of similar type. The new cars are required both to serve the longer lines that expansion into new territory brings and to replace equipment that is becoming obsolete.

Basing an estimate on a cost per car unit of $14,500 and a financing plan spread over a period of seven years with a down payment of 25 per cent and the balance bearing interest at 8 per cent, Del A Smith, general manager, cited that the cost per car would be approximately 7½ cents per mile. Taking into account the economic elements involved in these factors—seating capacity, weight per seat and cost of maintenance per year—the saving to the department would be 6.85 cents per mile, according to Mr. Smith, leaving a net cost to the department for this equipment of $182,000, or $1,820 a car.

In view of these facts and anticipating the availability of funds the commission requested permission for the taking of the bids for both the cars and buses. The bids for the cars, when received, will be compared with the department's own cost estimates for building a like type. It will be determined whether to acquire the rolling stock by purchase or to have it built by the department.

The purchase of new cars will mark a departure from the policy of Col. H. U. Wallace, former general manager, who planned to confine future purchases of rolling stock to buses. The present opinion of the management is that neither cars nor buses alone are sufficient for a complete, modern transportation system. The belief has been expressed by Mr. Smith that on certain lines buses are useful and necessary, but on other lines they can never take the place of rail transportation.

$500,000 for Improvements in Parkersburg

Improvements and addition to the railway and bus lines in and about Parkersburg, W. Va., totaling approximately $500,000 are planned by the Monongahela West Penn Public Service Company if relief from paving costs is granted by the Legislature, C. H. Hardesty, local manager of the company, and Capt. G. M. Alexander, president of the system, have stated. The company's plans call for improvement to be started as soon as the relief is secured, with the program carried to completion about 1930 or 1931.

New cars and buses to be purchased will cost more than $315,000. Some of the new cars will be used to replace present equipment; others to provide additional service on existing lines. Present plans call for the purchase of about eighteen cars immediately upon word of granting the relief. Nearly $140,000 will be spent on reconstructing trackage and more than $20,000 will be required to rebuild overhead trolleys and to renew block signals and telephones. Tracks will be rebuilt on the principal streets of the city. New overhead will be provided where needed and additional block signals and telephones will be installed.

Buses will be purchased for use in territory not served by the railway or territory where it develops that bus service is needed in accordance with a thorough study of the transportation situation in Parkersburg and its suburbs, made by the management and the company's engineers.

Copper Moving; Lead Weak

THE long-deferred buying movement in copper showed signs of materializing April 13, when a good tonnage was sold at 13 cents for Eastern deliveries. Zinc continues quiet at slightly lower prices, though the volume of sales was better than a week ago, according to *Engineering and Mining Journal*. Lead perhaps looks the weakest of any of the non-ferrous metals at the moment, business having been very poor lately. Tin has been a little lower for spot offerings, and consumers have bought somewhat more liberally for forward as well as prompt. Silver is back to 56¼ cents today after having been as high as 57⅛ cents. Antimony is distinctly stronger, being held at close to 15 cents.

Copper statistics which appeared April 13 showed a decline in refined stocks at the end of March from 105,020 to 102,637 tons and of blister from 272,219 to 260,225 tons, rather surprising in the case of blister. The rate of both domestic and export shipments improved by about 4 per cent over February. Refinery production rate decreased by close to 7 per cent and smelter production by almost 9 per cent. Mine production data are not yet available, but the indications are that the rate of mine production was cut at least 10 per cent in March. The favorable statistics stimulated demand on April 13, when more than 6,000 tons were sold, more than in some entire weeks recently. A large buying movement is overdue and may be getting under way. The foreign price was reduced on April 12 from 13.65 cents, c.i.f., to 13.50 cents. Export demand has been quiet.

Zinc has gradually weakened during the last seven days, dropping from 6⅞ cents, St. Louis, to 6.40 cents. In fact, some offers were made April 13 as low as 6⅜ cents. Business has been a little larger than last week, but is still below normal. The statistics are not particularly reassuring, showing practically the same rate of production in March as in February; shipments were also at about the same rate as in February. April production should be markedly less, owing to smelter curtailments in late March. At present prices it is felt zinc is scraping bottom, as ore is only $42 a ton. Below this, production is likely to be curtailed.

American Zinc Institute's statistics, in tons of 2,000 lb., follow:

Stock, March 1	32,938
Produced	56,546
Shipped	53,205
Stock, March 31	36,279
Shipped from plant for export	5,098
Retorts operating, March 31	83,208

ELECTRIC RAILWAY MATERIAL PRICES—April 15, 1927

Metals—New York

Copper, electrolytic, cents per lb.	12.775
Lead, cents per lb.	7.25
Nickel, cents per lb.	35.00
Zinc, cents per lb.	6.75
Tin, Straits, cents per lb.	67.87
Aluminum, 98 or 99 per cent, cents per lb.	26.005
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	61.00
General service	31.50

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$4.375
Somerset mine run, Boston	2.00
Pittsburgh mine run, Pittsburgh	2.175
Franklin, Ill., screenings, Chicago	2.50
Central, Ill., screenings, Chicago	2.00
Kansas screenings, Kansas City	2.50

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.90
Tie plates (flat type), cents per lb.	2.35
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.95
Steel bars, cents per lb.	1.90
Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	$1.45

Hardware—Pittsburgh

Wire nails, base per keg	2.55
Sheet iron (24 gage), cents per lb.	2.75
Sheet iron, galvanized (24 gage), cents per lb.	3.65
Galvanized barbed wire, cents per lb.	3.25
Galvanized wire, ordinary, cents per lb.	2.40

Waste—New York

Waste, wool, cents per lb.	12–18
Waste, cotton (100 lb. bale), cents per lb.:	
White	12–17.50
Colored	7–14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	10.90
White lead in oil (100 lb. keg), cents per lb.	14.50
Turpentine (bbl. lots), per gal.	$0 71
Putty, 100 lb. tins, cents per lb.	5.25–5.50

Wire—New York

Copper wire, cents per lb.	14.875
Rubber-covered wire, No. 14, per 1,000 ft.	$5.50
Weatherproof wire base, cents per lb.	16.75

Paving Materials

Paving stone, granite, 5 in. New York—Grade 1, per thousand	$130
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	51.00
Paving brick 3x8½x4 N.Y., per 1,000 in carload lots	45.00
Crushed stone, ½-in., carload lots, N. Y., per cu.yd.	1.94
Cement, Chicago consumers' net prices, without bags	2.05
Gravel, ½-in., cu.yd., f.o.b. N. Y.	1.75
Sand, cu.yd., f.o.b. N. Y.	1 00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.75
Light copper, cents per lb.	9.25
Heavy yellow brass, cents per lb.	6.75
Zinc, old scrap, cents per lb.	4.00
Lead, cents per lb. (heavy)	5.875
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	15.50
Rails (short), Chicago, gross ton	17.25
Rails, (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

Gradual recession in prices in the St. Louis district has been the feature of the domestic lead market during the week. As early as April 8 sales were made at 6.95 cents and on April 13 the leading interest reduced its price to that level, the price on the latter date going as low as 6.90 cents. American Smelting & Refining Company has maintained its price all week at 7.25 cents, and scattering sales at 7.20 cents were offset by others that brought a small premium.

Tin buying on the part of consumers has been in moderate volume for May and June, with some for prompt delivery. The price tendency has been generally downward in the domestic market, though a 30 shilling rise in London on April 13 stiffened prices here, prompt Straits being sold at 68 cents.

New Trackwork Underway in Minneapolis

Work began this week on the 1927 program of the Minneapolis Street Railway, Minneapolis, Minn., covering improvements and extensions to cost $654,900. Improvements started with an extension of the Kenwood-25th Street line at the east end across the new bridge over the Mississippi river, making a new connection with St. Paul at the Ford Motor Company plant, where the Randolph Street line of the St. Paul City Railway ends. Double track will be laid on 50th street from Penn Avenue South, making connection at Bryant Avenue with the Bryant-Johnson line, including double tracking the line from Xerxes avenue to Penn; single track from 50th to 54th Streets on Penn Avenue, etc.

A. C. Godward city planning engineer, has been authorized to complete survey of the cost of extending the Franklin Avenue line east to connect with the Rondo-Maria line of the St. Paul City Railway to make a fourth through interurban.

Rolling Stock

Southwest Missouri Railroad, Webb City, Mo., has placed an order with the American Car Company, St. Louis, Mo., for one 50-ft. double-end passenger motor car.

Portland Electric Power Company, Portland, Ore., will place in service about May 15 eight new 33-passenger buses, costing approximately $90,000, according to W. H. Lines, vice-president. The equipment will be operated over the Ross Island Bridge to serve the Mount Scott district. The buses are being provided in accordance with the company's new franchise which stipulates better service for the outlying districts.

Fitchburg & Leominster Street Railway, Fitchburg, Mass., is repeating the order placed last fall with the Wason Manufacturing Company for four light-weight motor passenger cars. The four cars originally ordered in October, 1926, and placed in service on Jan. 1, 1927, proved so satisfactory that an order for four more cars of the same type was placed in February, 1927, for delivery in April. Specifications follow:

Seating capacity	40
Total weight	26,000 lb.
Bolster centers, length	17 ft. 8 in.
Length over all	36 ft. 10 in.
Truck wheelbase	4 ft. 10 in.
Width over all	8 ft. 1 in.
Height, rail to trolley base	10 ft. 11 in.
Body	Steel
Interior trim	Mahogany
Headlining	¼-in. Agasote
Roof	Arch
Air brakes	General Electric
Fare boxes	Johnson
Headlights	Golden Glow, city type
Motors	General Electric 265, 35 hp., inside hung
Paint	Pratt & Lambert and Sherwin-Williams
Sanders	Air, Wason Company
Seats	J. G. Brill Company
Seating material	Leather
Trolley catches	Ohio Brass Company
Trolley base	Ohio Brass Company
Trolley wheels	Ohio Brass Company
Trucks	J. G. Brill Co. 177 Ex
Wheels	27-in. J. G. Brill Co. rolled steel

Trade Notes

O. M. Edwards Company, Syracuse, N. Y., announces the appointment of H. A. Cronmiller as Eastern representative of the company with offices at 412 Broadway, New York City. Mr. Cronmiller succeeds A. J. Hogan.

Canton Culvert & Silo Company, Canton, Ohio, has received an order from the government of Colombia, South America, for immediate shipment of 750 tons of "Acme" (Nestable) toncan iron corrugated culverts, to be used in highway construction in that country. This is believed to be the largest single order for corrugated culverts ever awarded to any corrugated culvert manufacturing company in the United States. It represents a shipment of 42 carloads.

General Electric Company announces the sale of the entire Sprague hoist business to the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. This includes the right to manufacture and sell Sprague electric hoists and winches as built and sold from 1903 to 1923 by the Sprague Electric Works of the General Electric Company and from 1923 to date by the General Electric Company.

L. B. Foster Company, distributor of steel rails and complete track equipment, has opened offices in the Illinois Merchants Bank Building, Chicago. Adequate warehouse and storage yard facilities have also been provided and plants for the housing of fabricating and reclaiming machinery are in process of erection, so that a complete service can be had, and material shipped, from this point. The Chicago office will be under the management of Reuben A. Foster, vice-president of the firm. The L. B. Foster Company has offices, plants and warehouses in Pittsburgh, Jersey City, Baltimore, Hamilton, Ohio, Roanoke, Virginia and Chicago.

Pittsburgh Testing Laboratory, New York, N. Y., announces the removal of its offices from 50 Church Street and its laboratory from 35 Sixth Avenue, to its new laboratory and offices at 72 Washington Street. The most improved types of accurate physical testing machines and chemical apparatus have been installed. The facilities have been greatly improved and the scope of service enlarged to serve better its clients. This company, with its main office in Pittsburgh, has branch offices in the principal cities of the United States and facilities for inspection and testing abroad.

John R. Hayward of Roanoke, Va., will on April 1 succeed Frank N. Grigg of Washington, D. C., as Southeastern railway sales manager of the Heywood-Wakefield Company. Mr. Grigg has represented the Heywood-Wakefield Company for many years and is now retiring because of his health.

R. H. Beaumont Company, Philadelphia, Pa., announces it has taken over the business of the American Manufacturing & Engineering Company, Kalamazoo, Mich. Products formerly manufactured by this company, including the American slack line cableway excavator, will now be manufactured by the R. H. Beaumont Company. The addition of the American slack line cableway excavator to the Beaumont line, which already includes the Beaumont LeClair cable drag scraper, completes a full line of equipment for the elevating and storing of sand, gravel, stone and kindred materials. The R. H. Beaumont Company will sell the complete system for this service, including the hoist.

New Advertising Literature

Sullivan Machinery Company, Chicago, Ill., has published new editions, enlarged and improved, of two of its bulletins on concrete breakers and on electric portable hoists. Second edition, 81-I, describes two types of tools, a 75-lb. or heavy-duty Buster and a 48-lb. light Buster. The bulletin is liberally illustrated to show different applications of concrete breakers. Second edition, 76-G, is a sixteen-page pamphlet describing Sullivan single and double drum, electric portable hoists. This also is liberally illustrated. Copies may be secured on application to the company at 122 South Michigan Avenue, Chicago.

J. G. Brill Company, Philadelphia, Pa., is mailing out an attractive folder giving operating statistics on cars furnished for the Warren & Jamestown Street Railway, Cumberland Traction Company, Lewistown & Reedsville Electric Railway and Milford & Oxford Street Railway. All the cars that are featured are of the light-weight modern type.

O. M. Edwards Company, Inc., Syracuse, N. Y., through its metal sash department is issuing a new folder describing the application of Edwards metal sash to modern bus bodies.

Carnegie Steel Company, Pittsburgh, Pa., has issued an attractive leather-bound book of 172 pages, giving dimensions and other information on Carnegie beam sections. The series of beams now placed on the market provide a series of shapes which combine sound engineering principles with practical improvements. The new beam sections are explained under the following captions: Contour Design, Web and Flange Ratio, Range of Sizes, Progressive Beam Designs and Improved Column Design.

Dependability

Modern cars are built using only equipment of proven dependability. That must be the reason why nearly all modern cars are equipped with

"PEACOCK" STAFFLESS BRAKES!

REG. U.S. PAT. OFF.

They are dependable brakes! There are many other reasons which make them especially desirable on modern cars. May we tell you about them? Or, let us send you a Peacock Staffless Brake to test. Try it out in fair competition with any other brakes. Slack off the brake until full piston travel is required to set brake; release air brakes; then try to set hand brake.

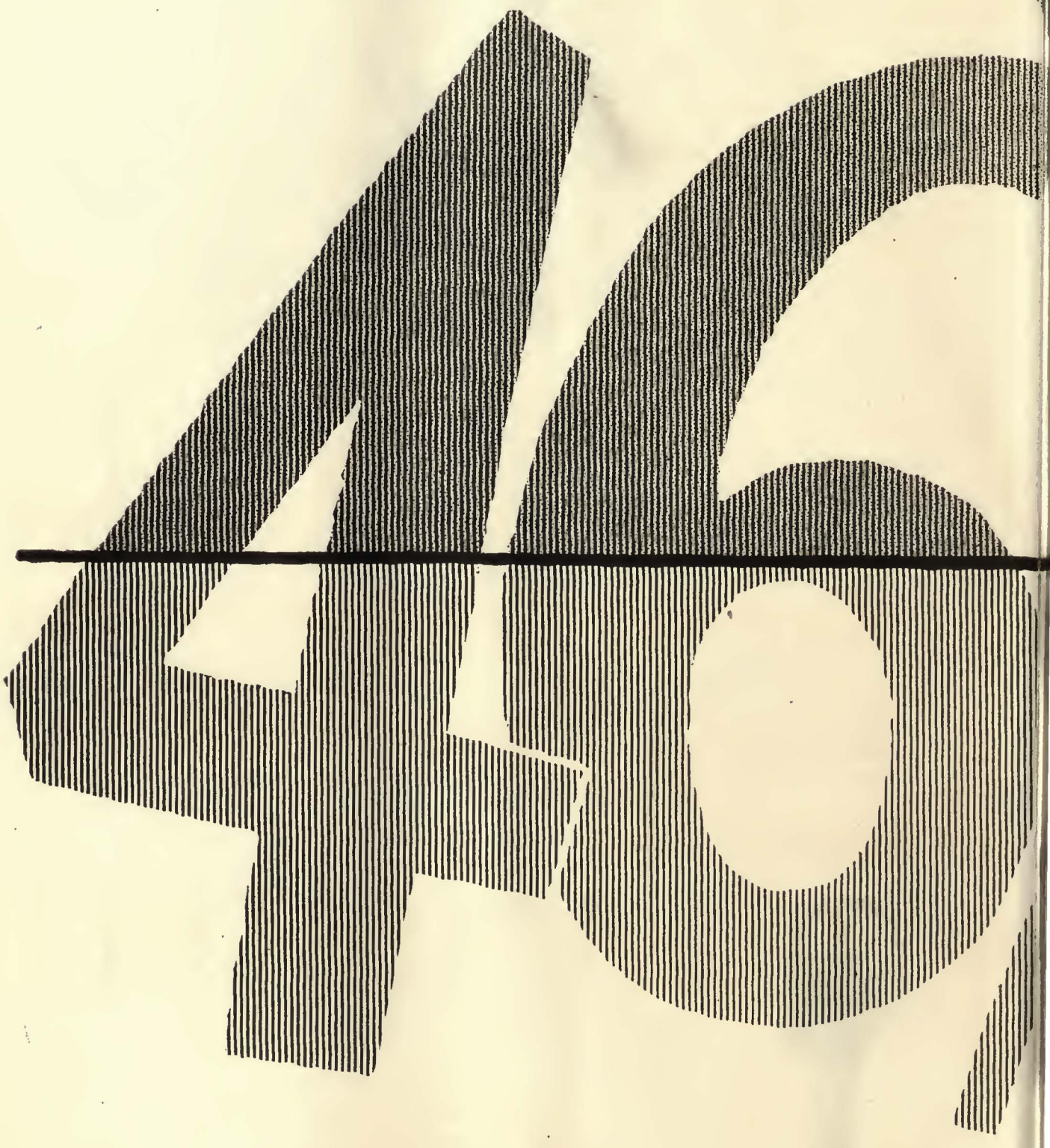
Will it hold?

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.



"Wonderful Service and Freedom from Failures"

Forty-one of the fifty buses operated by the Miami Beach Railway Company, Miami, Florida, are equipped with Goodyear Pneumatic Bus Tires, and the remainder are being put on Goodyears as fast as tire equipment needs replacing.

The road conditions over which the fleet operates are good, and exceptional mileages from the Goodyears in this service are the rule.

* * *

"Due to the exceptional low mileage costs we have obtained through the use of Goodyear Bus Tires, we are now equipping our entire fleet with Goodyears," writes Mr. A. L. Reynolds, Manager of the Miami Beach Railway Company.

"The wonderful service and freedom from tire failures en route has more than come up to our expectations on this type of tire.

"To any operator who wants to lower his tire expense per mile, we gladly recommend Goodyear Bus Tires."

* * *

Goodyear Pneumatic Bus Tires deliver a high standard of tire performance. They give high mileages, and they give them dependably, with a high percentage of freedom from trouble. They do this at a low cost per tire mile.

Made with the famous All-Weather Tread, Goodyear Pneumatic Bus Tires possess great tractive power and provide an extra measure of security under all conditions.

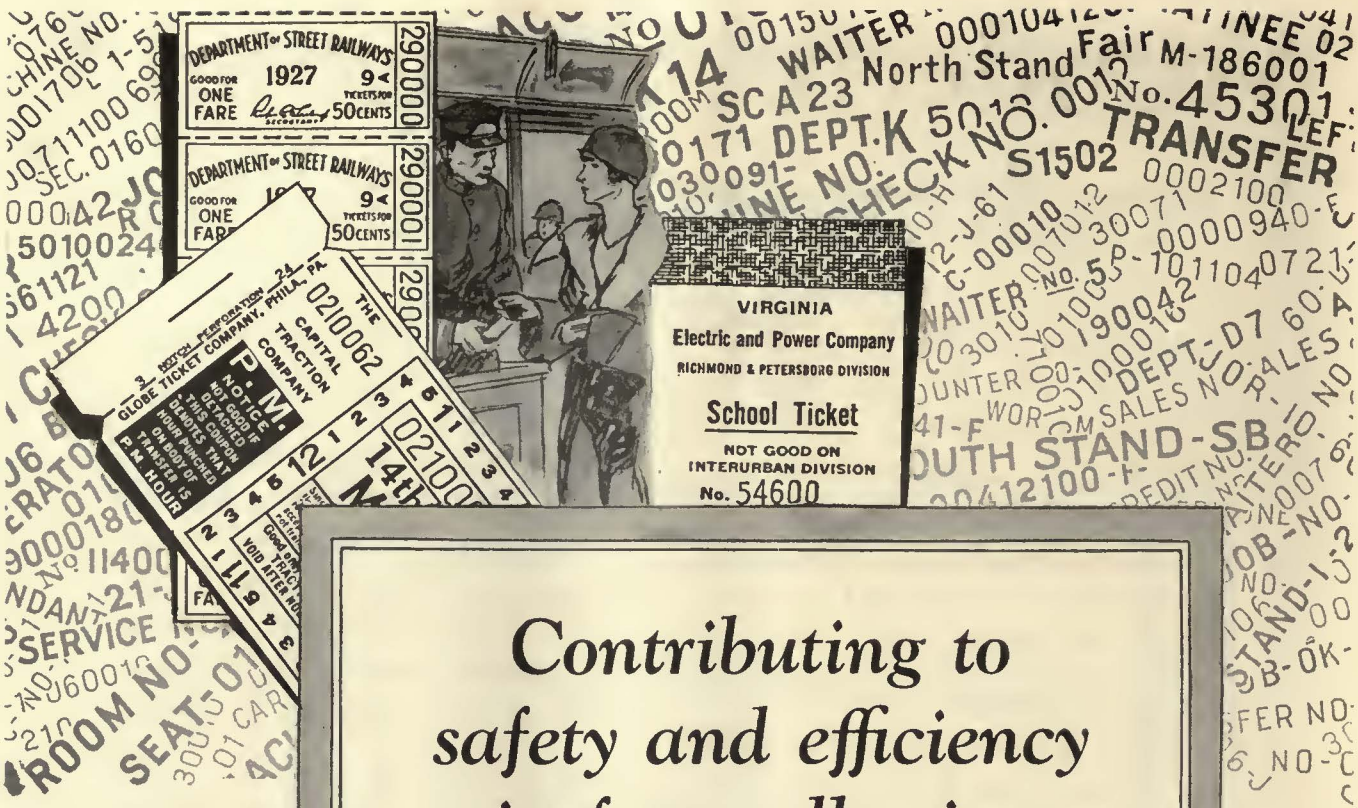
Made with SUPERTWIST, the extra-elastic, extra-durable cord fabric developed by Goodyear for Goodyear Tires, Goodyear Pneumatic Bus Tires give long, economical wear.

Only Goodyear Tires are made with the All-Weather Tread and with SUPERTWIST casings. Only Goodyear Tires, therefore, can give you the advantages of SUPERTWIST and the All-Weather Tread. Yet they cost you no more.

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

BUS TIRES

Made with SUPERTWIST



Contributing to safety and efficiency in fare-collecting

THE notched perforation and the P. M. Coupon Transfer—as used today by transportation companies throughout the country—were originated by Globe ticket specialists. The one saves time for conductors and passengers, the other saves thousands of dollars daily on transfers issued with a time limit.

These are but two examples of Globe leadership in the design and production of serially numbered fare tickets, cash fare receipts, transfers, etc.

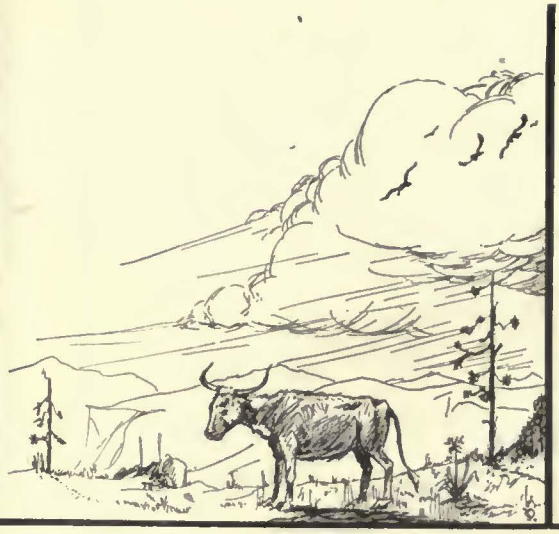
We specialize in the production of every type of numbered ticket for transportation companies. Our equipment and experience assure accuracy, quality and satisfactory service. Consult us about designs and estimates.

Specialists for half a century

Globe
TICKET COMPANY

112 North Twelfth Street
PHILADELPHIA

BALTIMORE CLEVELAND LOS ANGELES NEW YORK



Lower Maintenance Costs are SKIN DEEP!

This is the second of a series of "SKIN DEEP" advertisements on leather upholstery for electric railway cars and buses. The third will appear in an early issue.

The use of Cleveland Tanning Co. leather in the upholstery of your cars or buses *does* lower maintenance costs; by lasting longer and costing less per mile to use, by increasing the popularity of your line through attractive car or bus interiors, and by being much easier to keep clean and attractive.

Leather seats give more wear per dollar and present an appearance that invites passengers into your cars or buses. Maintenance costs tumble and profits rise.

Supplied as complete hides, or cut to any pattern; five famous grades: Hyaline Grains, Alpha Grains, Hand Buffs, Machine Buffs and Special Machine Buffs. Color and finish according to your specifications. We will be pleased to send you samples.

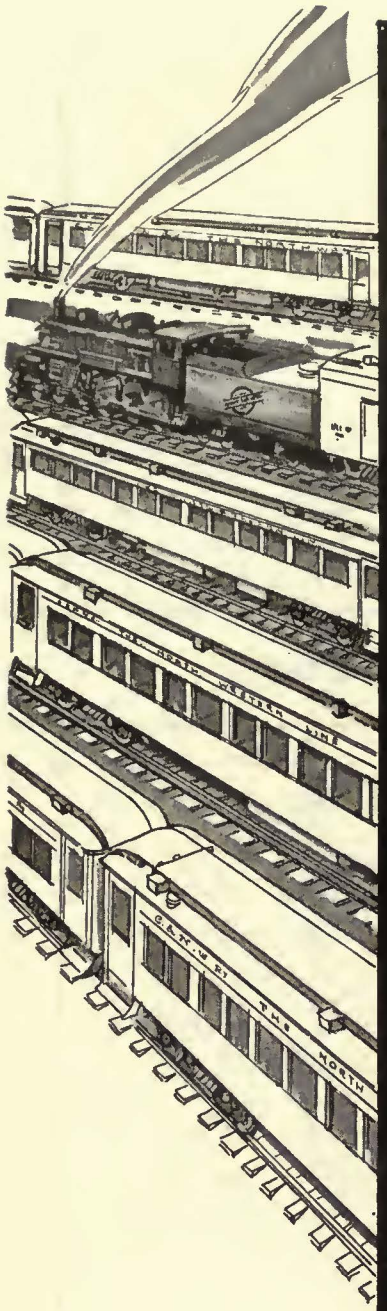
NOTHING TAKES THE PLACE OF LEATHER

HYALINE

The Cleveland Tanning Co.
Dennison Ave. and Jennings Rd., Cleveland, O.

Western Representatives:
Midgeley & Borrowdale
McCormick Bldg., Chicago

Eastern Representatives:
Sisson Supply Co.,
1845 Grand Central Terminal, New York



HYATT BEARINGS
for 120 more
Chicago & North Western Coaches

CHICAGO AND NORTH WESTERN LINE

... the Largest anti-friction journal order ever placed for suburban train service

Every year since 1923 the Chicago & North Western has been adding more and more Hyatt equipped rolling stock to its service and now, after four years of gratifying experience, has standardized on Hyatts for 120 new passenger coaches.

Uninterrupted bearing service through elimination of hot boxes — greater mileage at lower cost — smoother starts — quicker acceleration — worthwhile oil savings. All these Hyatt contributions have resulted in new measures of operating efficiency and economy.

All industry has depended largely on Hyatt's bearing building experience, its facilities and resources, during the last 36 years. You can inform yourself as to the exact advantages by consulting a Hyatt engineer.

HYATT ROLLER BEARING COMPANY

NEWARK DETROIT CHICAGO PITTSBURGH
WORCESTER PHILADELPHIA OAKLAND CLEVELAND

HYATT
ROLLER BEARINGS
PRODUCT OF GENERAL MOTORS

HYATT Roller Bearings are successfully operating on about 50 different railroads throughout the country. A Chicago, Milwaukee and St. Paul car with Hyatts in the journal boxes has reached the total of 300,000 miles to date.

Hyatt boxes fit A. R. A. standard pedestals.

Profit Earning Cars

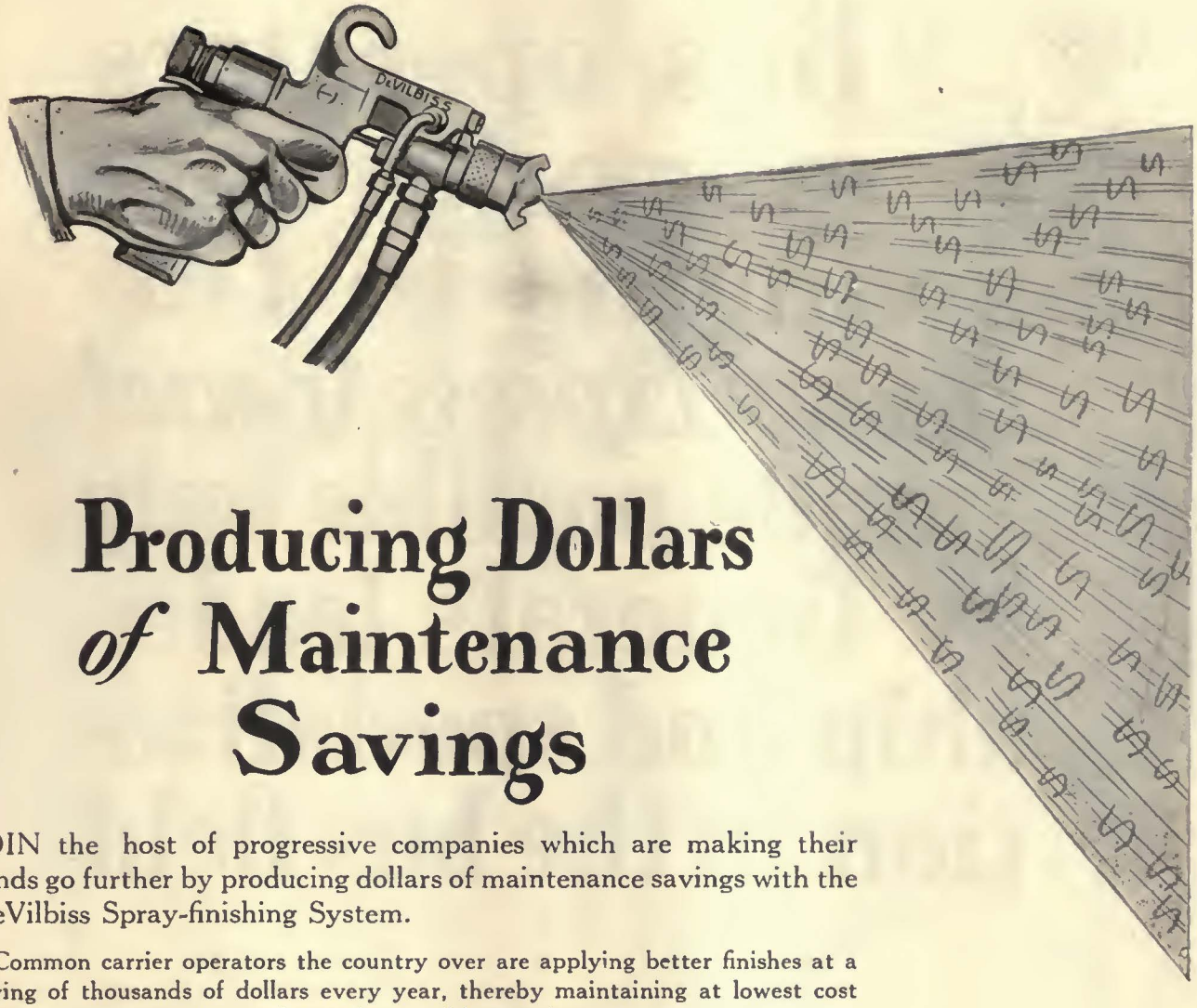
MODERN CARS, embodying every improvement in design and construction operate at less cost and attract increased patronage. Cummings Car and Coach Company have the necessary experience and facilities to render you helpful service in modernizing your equipment.

The Cummings Gas Electric Coach is a product of twenty years' experience in building fine rolling stock for electric railways, combined with the latest development in motive power for automotive vehicles.

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Mfg. Co.

111 W. Monroe St., CHICAGO



Producing Dollars *of* Maintenance Savings

JOIN the host of progressive companies which are making their funds go further by producing dollars of maintenance savings with the DeVilbiss Spray-finishing System.

Common carrier operators the country over are applying better finishes at a saving of thousands of dollars every year, thereby maintaining at lowest cost the passenger attracting qualities of car and bus equipment.

Dress up equipment and keep it dressed up. You'll attract more business and attract it at a fraction of your former cost.

Whether you use varnishes or lacquers, the same results are to be had with the DeVilbiss spray-finishing equipment. After the purchase, DeVilbiss equipment and service organization never quit working for you.

Let DeVilbiss engineers, with their long years of experience in a wide range of finishing and painting problems, work with you. They are well qualified to recommend the most efficient and economical equipment for your needs.

Full particulars will be gladly mailed to you. Address—

THE DeVILBISS CO. 272 Phillips Ave. TOLEDO, OHIO
New York — Philadelphia — Chicago — Detroit — San Francisco — Cleveland
Indianapolis — St. Louis — Milwaukee — Minneapolis — Windsor, Ontario

DeVilbiss
Spray-finishing System

For more than 35 years the name DeVILBISS has stood for practical, honest and dependable products

Give them
MORE FREQUENT SERVICE

Better headway

GRAHAM BROTHERS

SOLD BY DODGE BROTHERS

at lower costs

Graham Brothers 21-Passenger Motor Coaches make possible the frequent service that attracts patronage—that fosters the coach riding habit.

They ride—and ride again. When they feel confident of a safe, comfortable ride in a good-looking motor coach, ready when they are, your casual patrons become steady passengers.

Graham Brothers Motor Coaches are attractive. They are safe, comfortable, fast and dependable. Being of medium capacity they carry no excess weight of body or chassis and they haul fewer empty seats. They reduce waste transportation to the minimum.

Graham Brothers Motor Coaches are ruggedly built. They stand up—mile after mile, year after year. Operating and maintenance costs are low. Service is available always and everywhere—no waiting for repair parts, no delays.

Standard 21-Passenger street car type, complete, $3815
12-Passenger Parlor Coach, complete, $3750
16-Passenger Parlor Coach, complete, $3995
Prices f. o. b. Detroit

MOTOR COACHES
DEALERS EVERYWHERE

COMPLETE UNIT

Purchasers of Graham Brothers Motor Coaches get the complete unit—chassis and body—from one source. There is no division of responsibility.

The complete coach is built by Graham Brothers—assurance of fine materials and workmanship and correctness of design and engineering.

The complete coach is sold by Dodge Brothers Dealers—saving the purchaser time and money and eliminating the confusion attendant upon scattered buying.

The complete coach is serviced by Dodge Brothers Dealers—everywhere.

GRAHAM BROTHERS

EVANSVILLE – DETROIT – STOCKTON

A DIVISION OF DODGE BROTHERS, INC.

GRAHAM BROTHERS (CANADA) LIMITED, TORONTO, ONTARIO

Prepare for Profits

Spring is here, and summer is on the way. The bus operator's big season is at hand.

To get the greatest possible profits during the coming season, you must be sure the motor fuel you are using is the one which gives you the greatest mileage and the most efficient operation.

Now is the time to decide on your fuel. A few hours spent in making tests now may save you a good many dollars during the summer.

The Standard Oil Company (Indiana) invites you to test Red Crown Gasoline against any other motor fuel on the market. Compare the mileage you get from a measured gallon of Red Crown against the mileage given by any other gasoline. Compare the operation of the motor; the speed and smoothness of acceleration.

RED CROWN GASOLINE

equals or exceeds in every particular the Government specifications for good gasoline. It has a low initial boiling point to insure quick starting, a carefully graduated chain of intermediate fractions to give smooth and rapid acceleration, and sufficient heavy fractions for full power and long mileage. Red Crown will help you to make this season a profitable one.

STANDARD OIL COMPANY

(INDIANA)

General Offices: 910 S. Michigan Avenue CHICAGO, ILLINOIS

ILLINOIS
Chicago
Decatur
Joliet
Peoria
Quincy

INDIANA
Evansville
Indianapolis
South Bend

KANSAS
Wichita

IOWA
Davenport
Des Moines
Mason City
Sioux City

S. DAKOTA
Huron

MICHIGAN
Detroit
Grand Rapids
Saginaw

N. DAKOTA
Fargo
Minot

WISCONSIN
La Crosse
Milwaukee

MINNESOTA
Duluth
Mankato
Minneapolis

MISSOURI
Kansas City
St. Joseph
St. Louis

Thermit—
such perfect track!

HAVE you ever ridden on the cars of the Capitol Traction Company? Or noticed them passing by?

If so you've probably marveled at the smooth quiet way they roll along! The highest standard of track maintenance must be observed in the shadow of the Nation's Capitol.

It is interesting, therefore, to note that the Capitol Traction Company Thermit Welded the track constructed in 1926 on famous Pennsylvania Avenue directly in front of the Capitol grounds.

Decide on Thermit—when the Spring budget plans are made.

THERMIT

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO

This Isn't the Bridge of Sighs

It is the St. Petersburg Million Dollar Pier of beauty, light and economy. Its appearance and usefulness are enhanced by Elreco Tubular Steel Poles.

This architectural triumph was not to be spoiled by a mob of unsightly uneconomical wooden poles carrying a mess of wires.

Observe the trim appearance of the Elreco Poles, the Novalux Lighting Units and the wires strung unobtrusively at the top.

Such an ensemble of Elreco Steel Poles is naturally more economical to install and less expensive to maintain. With three or four companies using the same poles the cost to each is, of course, much less.

There are other advantages of Elreco Poles too numerous to mention in this limited space. Why not get all the information? It's yours for the asking. Then specify Elreco Tubular Steel Poles on your next job.

ELRECO POLES

The Electric Railway Equipment Co.

2900 Cormany Ave., Cincinnati, Ohio 30 Church St., New York

Interior View of One of Bethlehem Track Layout Buildings

Workmanship and Quality

Laying out and fitting of special layouts and trackwork for Electric Railways necessitates extreme accuracy.

All Trackwork is manufactured complete within the Bethlehem organization, thus permitting control over quality and workmanship. Special work jobs are assembled in large well lighted buildings especially equipped for such work—an exclusive Bethlehem feature.

Condensed List of Railway Equipment

Special Trackwork
Tee Rails
Girder Rails
Special Splice Bars for Welding
Machine Fitted Joints
Abbott and Center Rib Base Plates
Pole Line Material
Tie Rods
Bolts
Rolled Steel Wheels
Forged Axles

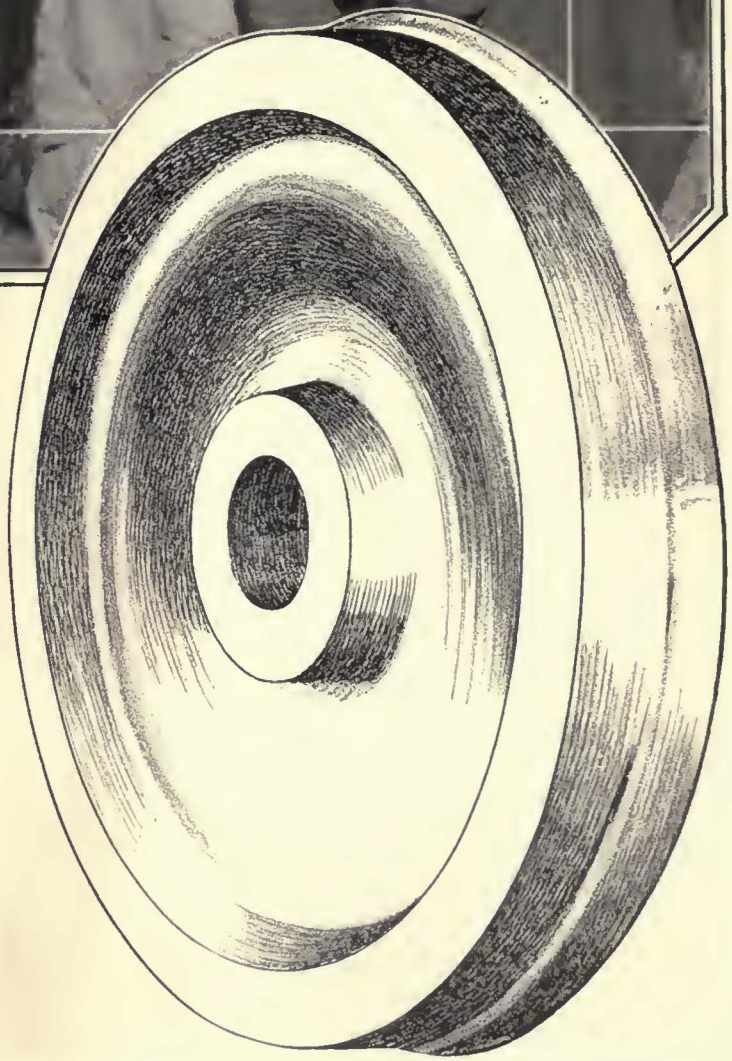
BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

DISTRICT OFFICES:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco Los Angeles Seattle Portland

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM



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

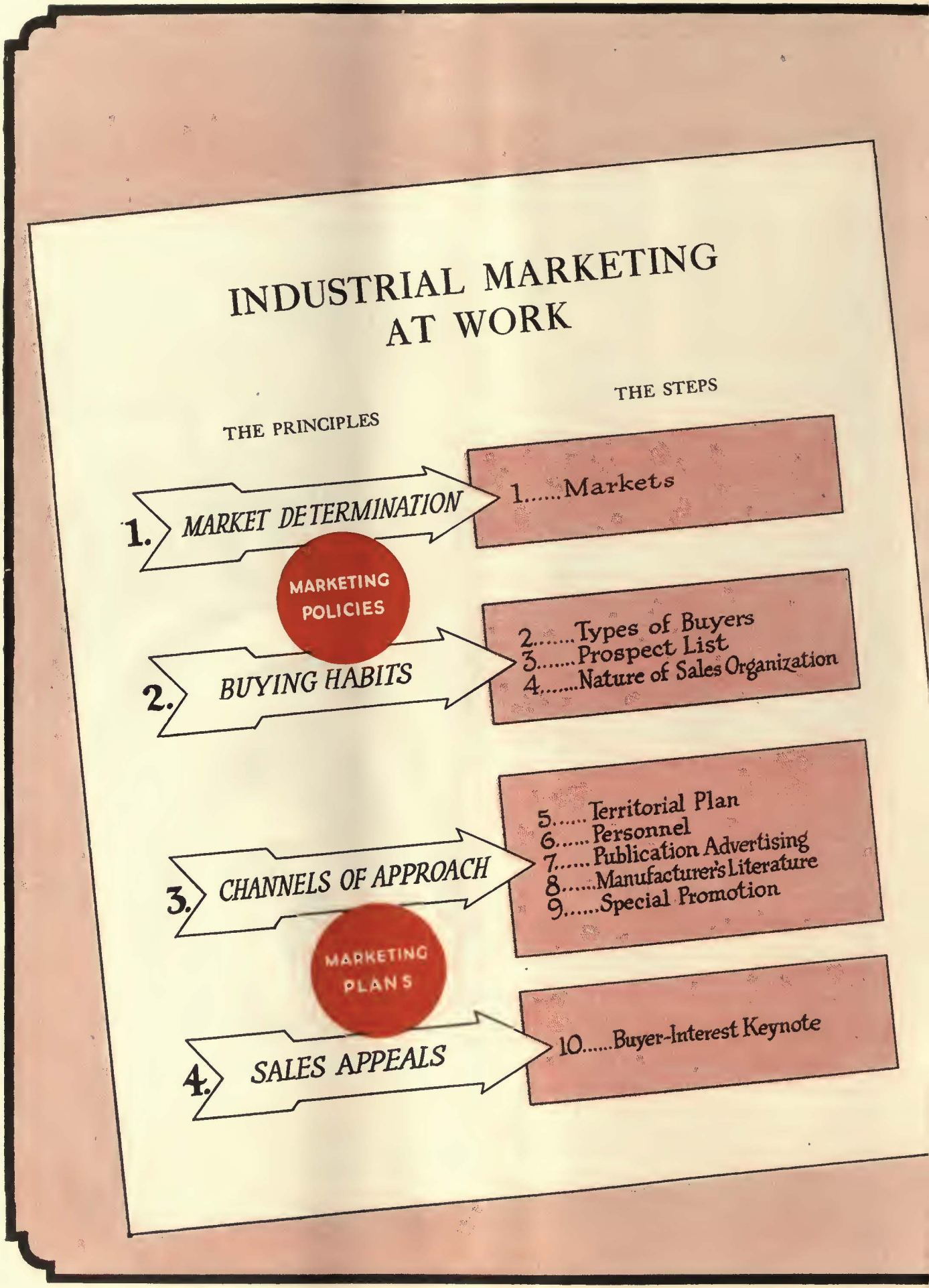
And so, in electric railway service, with its steep peak periods and the ever recurring emergencies that heavy traffic creates, the best wheel made is only good enough.

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

Our wheel specialists are at your command.

Illinois Steel Company

General Offices:
208 South La Salle Street
Chicago, Illinois


INDUSTRIAL MARKETING AT WORK
THE PRINCIPLES
THE STEPS
1. MARKET DETERMINATION
1.....Markets
MARKETING POLICIES
2. BUYING HABITS
2.....Types of Buyers
3.....Prospect List
4.....Nature of Sales Organization
3. CHANNELS OF APPROACH
5.....Territorial Plan
6.....Personnel
7.....Publication Advertising
8.....Manufacturer's Literature
9.....Special Promotion
MARKETING PLANS
4. SALES APPEALS
10.....Buyer-Interest Keynote

"Tool Steel" Gears Lead as Usual

The Southern Railway of England has had 356 American made gears in service for ten years. The accompanying illustrations show gears and pinions made by Tool Steel Gear and Pinion Co. of Cincinnati, Ohio after 595,000 miles.

It is significant to note that after an average of 595,000 miles per gear the maximum tooth wear was 0.008 inch and the majority showed only 0.002 inch to 0.005 inch wear.

These are the facts as brought out in a report by A. E. Roberts, Rolling Stock Engineer, Southern Railway, Wimbledon, England.

American Gears and Pinions Found Satisfactory in English Operation

RESULTS obtained with American gears and pinions as maintained in British shops indicate that they hold up well as compared with the British product, according to an article in this issue by A. E. Roberts. Likewise his story is a good message to American maintenance men as showing the value of the great care used to maintain bearings and accurate centers between gears and pinions. In this way the gears and pinions always mesh on the original pitch line.

British engineers have long maintained that it was necessary to manufacture gear and pinion teeth to very accurate dimensions. Mr. Roberts rather reluctantly admits that even though he is a Britisher he finds that the ten years' experience with 356 American made gears on the Southern Railway of England has proved that despite the somewhat less accurate dimensions the American product has proved most satisfactory in service. The careful checking of gear and pinion centers every 100,000 miles insures good alignment and allows the surfaces to wear to accurate dimensions and to take on a very high polish along the pitch line.

June 19, 1926 ELECTRIC RAILWA

High Standard of Bea Gives Long Gear Life

After an Average Service of 595,000 Miles per Gear, the Maximum Tooth Wear Found Was 0.008 In. and the Majority Showed Wear Between 0.002 In. and 0.005 In. on Electrified Lines of the Southern Railway, England

By A. E. Roberts
Rolling Stock Engineer Southern Railway, Wimbledon Park, England

Both the article above and the one at the left appeared in the June 19, 1926 issue of ELECTRIC RAILWAY JOURNAL.

able d... factured in ...

On the eastern se... sets of gears and pinio... been installed, and an int... service obtained from these will in the future. These British gears are of high-grade steel and of such high tensile strength that only manufacturers with the highest class of gear-cutting machinery could generate the teeth. The pinions are of a lower grade of steel, cut, heat-treated and ground after treatment. They are extremely accurate in all respects, the teeth being within 0.001 in. and the cumulative errors over five teeth being not more than 0.002 in.

Close-Up Views of American Gears and Pinions After Ten Years of Service
Figs 1 and 2 show gears and Figs 3 and 4 pinions after 595,000 miles

and seemed to have an endless life Conclusions indicate that while extreme accuracy may be desirable in gearing for stationary machinery, it is not necessary for electric railway work.

Some figures as to the service in which our gear... has been us...

Note! Since the above article was written an additional extension to the electrification was made and $72,000 more of "Tool Steel" gears and pinions have been ordered for new equipment.

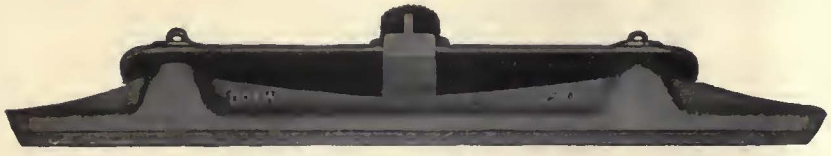
The Tool Steel Gear & Pinion Co.

Cincinnati, Ohio

DREW Equipment for Electric Railways

Drew Floating Bell Hanger
Positively eliminates loose ears because of tight lock between hanger and ear. Prevents rusted and worn threads. Assures better service with a saving.

No. 7520 Porcelain Strain Clevis
Used in large quantities by leading railway companies for great variety of overhead work. Practical. Convenient. Ample insulation. Strong enough for any overhead work.



Drew Spring Ear
Does away with destructive wear on trolley. Eliminates pounding on trolley wheel, base, hangers, trough structure. Insures smoother and quieter car operation.

Drew Overhead Line Material is always of the latest approved type. Built to a standard that has made Drew Products *first* among railway men, you can be sure that every article will give many years of good, hard service. Easy and quick to install. Economical to buy.

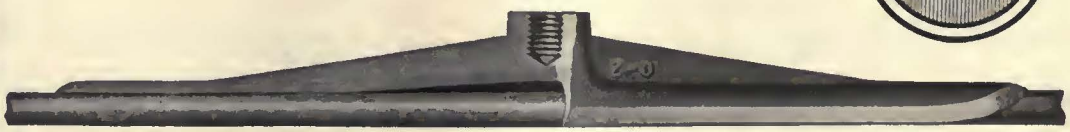
Whatever you need for electrical railway maintenance and installation work, you can know that Drew will deliver what you want, where you want it—when you want it. Drew service is quick, prompt, satisfactory.

Drew Products assure better service with a saving.

Descriptive material and prices on request.

Drew Safety Mirror
Greatly reduces boarding and alighting accidents. Quickly adjustable for different types of cars. Gives motorman clear view of steps. Cuts running time because motorman can always be ready for instant starting.

The Drew Electric & Mfg. Co.
Cleveland, Ohio



Drew Cushion Ear (Above). The merit of this ear is best recognized from its performance in actual service. Repeat orders over a period of years from large and small properties prove the claims we make for Cushion Ears. Longer life and complete protection for the trolley wire.

Type "L" Heavyweight or Type "R" (Lightweight) Spiling Ear or Spliter actually becomes a part of the wire in use, giving smooth under-run for the life of the wire. V shaped approach carries the current collector on and off with minimum jar or vibration. Prevents notching or rough spots.

[Heavyweight]

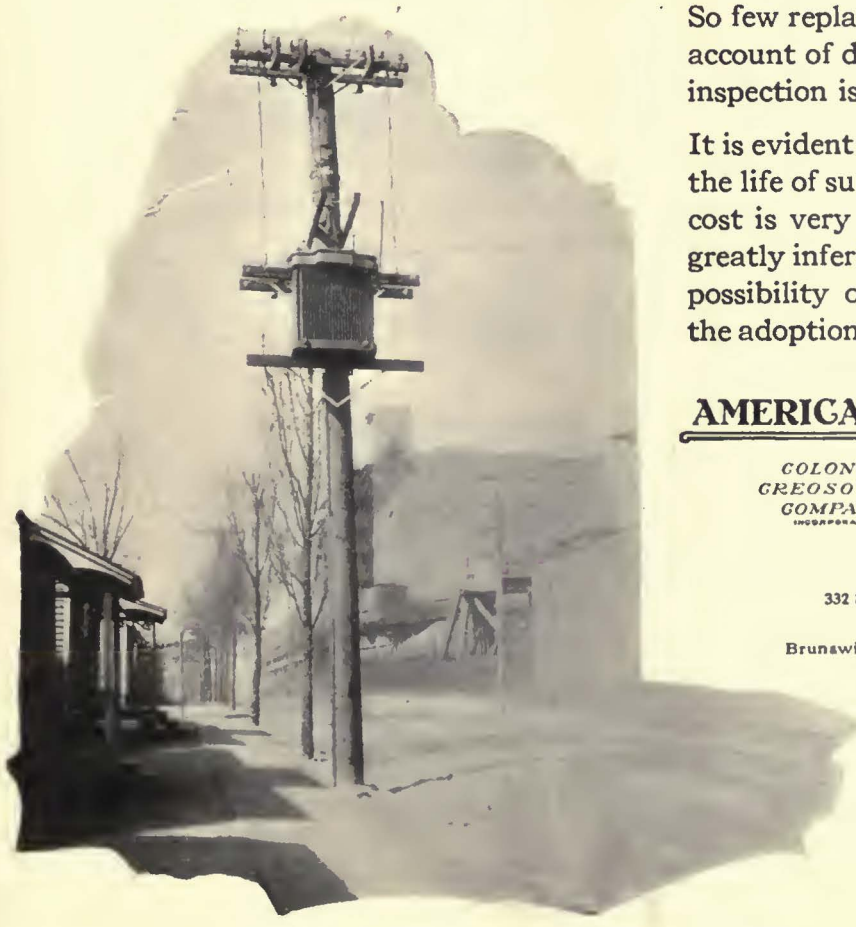
Creosoted pine poles 30 years old haven't yet begun to fail

IT IS difficult to say how long creosoted southern yellow pine poles will last. Very few such pole lines have been in service long enough to determine ultimate life.

The Washington Norfolk line of the American Telephone and Telegraph Company, built of creosoted pine poles about 30 years ago, is still in "good as new condition."*

So few replacements are needed in this line on account of decay that the regular routine pole inspection is not made.

It is evident from examples like the above that the life of such poles is well over 30 years. The cost is very little more than for poles having greatly inferior life. Have you investigated the possibility of maintenance economy through the adoption of Amcreco Creosoted Pine Poles?



AMERICAN CREOSOTING COMPANY

INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

AMCRECO LOWRY PROCESS CREOSOTED WOOD

GEORGIA CREOSOTING COMPANY INCORPORATED

LOUISVILLE ~ KENTUCKY

SALES OFFICES

332 So. Michigan Ave. Chicago

350 Madison Ave. New York City

Brunswick, Ga.

401 W. Main St. Louisville, Ky.

Bogalusa, La.

**See report of Committee on Wood Preservation A. E. R. A. 1926, page 98.*

ERJ4-16-Gray

GERARD SWOPE

BUSINESS PAPERS
—*spokesmen for industry*

"THE interpretation of the ethics and ideals of business and industry to the public," said Gerard Swope, president of the General Electric Company, at the last Associated Business Papers Convention, "can have no better mouthpiece, can have no better spokesman, than the technical and business press."

This publication you hold in your hand is a business paper. The publisher and his editors and advertising men are a part of the industry which they serve intimately, acquainted with the technical, professional, or trade practices and methods of that industry, or business or vocation.

The editors pick out of the many phases of the flow of trade, news and policy trend in methods or machinery which will best serve the reader's needs. The advertising pages are a huge many-leaved coupon on the editorial section. And above all, the paper as a whole seeks to express the higher purposes and objectives of the small and large business men it serves.

For as Mr. Swope further said in his fine analysis of industry responsibility in this same address:

"It isn't necessary to be big to be successful, but it is absolutely essential to be successful to be big. You can't grow without that."

Bankers and Engineers

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General Electric Co.
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Brill Co., The J. G.
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Cincinnati Car Co.
Ohio Brass Co.
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Bethlehem Steel Co.
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Cincinnati Car Co.
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Linn & Marshall Co.
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Elec. Service Supplies Co

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Haskelite Mfg. Corp.

Flooring, Fireproof
Irving Iron Works Co.

Flooring, Monolithic
Johns-Manville Corp.

Flooring, Non-Slipping
Irving Iron Works Co.

Flooring, Open Steel
Irving Iron Works Co.

Flooring, Steel Subway
Irving Iron Works Co.

Flooring, Ventilating
Irving Iron Works Co.

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Haskelite Mfg. Corp.

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Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Columbia Machine Wks.
Eureka Copper Prod. Co.
Standard Steel Works Co.

(Continued on Page 68)

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co. Inc.
Frogs, Track (See Track Work)
Frogs, Trolley
Electric Service Supplies Co
Ohio Brass Co.
Westinghouse E. & M. Co.
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Johns-Manville Corp.
Westinghouse Tr. Br. Co.
Gasoline
Texas Co., The
Gas Producers
Westinghouse E. & M. Co.
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Brill Co., The J. G.
Cincinnati Car Co.
St. Louis Car Co.
Gauges, Oil & Water
Ohio Brass Co.
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Brill Co., The J. G.
Carnegie Steel Co.
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Nuttall Co., R. D.
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General Electric Co.
Westinghouse E. & M. Co.
Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.
Gongs (See Bells and Gongs)
Grating, Steel Subway
Irving Iron Works Co.
Greases (See Lubricants)
Texas Co., The
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Railway Trackwork Co.
Grinders, Portable
Railway Trackwork Co.
Grinders, Portable Electric
Railway Trackwork Co.
Grinding Bricks and Wheels
Railway Trackwork Co.
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Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
Guard Rails, Tee Rail and Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
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Elec. Service Sup. Co.
Ohio Brass Co.
Harps, Trolley
Columbia Machine Works & M. I. Co.
Elec. Service Supplies Co.
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Elec. Service Supplies Co.
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Ohio Brass Co
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Headlining
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Heaters, Car (Electric)
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Brill Co., The J. G.
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Electric Service Sup. Co.
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Bethlehem Steel Co.
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Illinois Steel Co.

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L. J. DE LAMARTER
VICE PRESIDENT & GENL MGR

March 28th, 1927.

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ER

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