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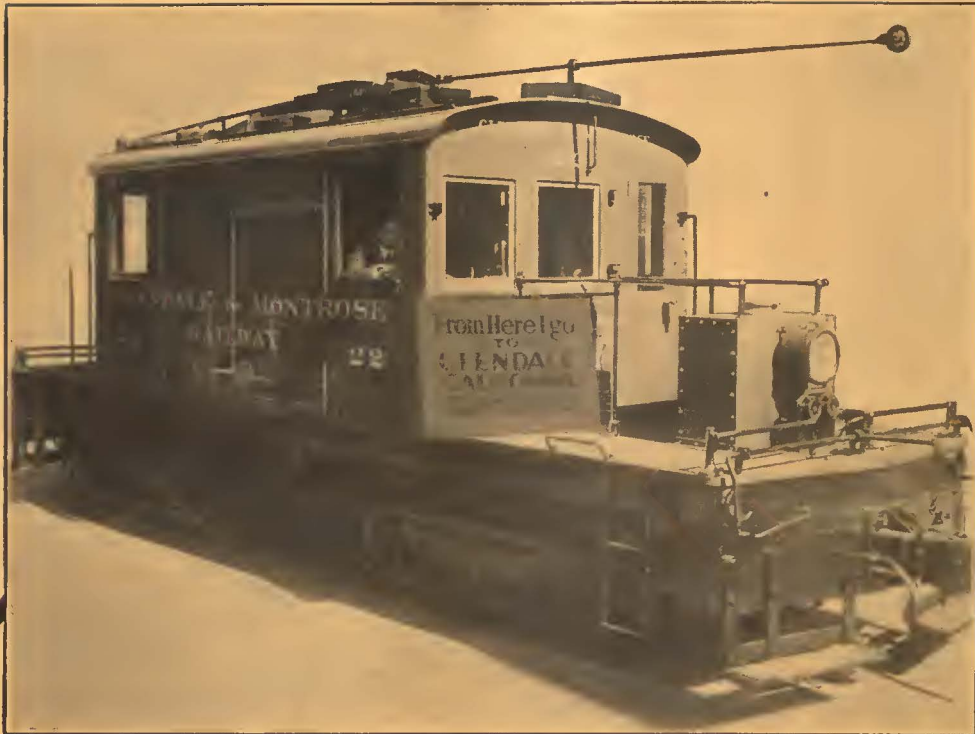
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ELECTRIC RAILWAY
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How One Railway
Puts the "Journal"
to Good Use

AN IDEA set forth in the pages of ELECTRIC RAILWAY JOURNAL was quickly taken advantage of by a railway executive who writes to us under date of November 21, as follows:

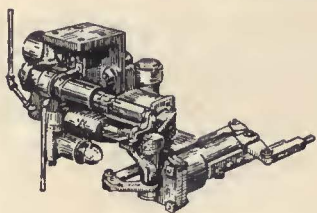
"You may remember your leading editorial in the JOURNAL week before last, 'A Basis for Getting Merchants to Accept Traffic Regulation.' I took a copy of this to the *Morning Sun* last Wednesday night, and on Thursday morning they printed it on the editorial page, as you will see by the copy that I am mailing you today. The editor had no hesitation at all when I offered it to him and seemed very glad to get it, which is pretty good evidence of his feeling toward the ELECTRIC RAILWAY JOURNAL and our company."

This editorial was later reprinted by that company in the form of a small four-page folder and mailed to all of the downtown merchants.

The JOURNAL frequently publishes matter with the idea in mind that it may form a helpful suggestion to the railways in advancing their local interests. Whether or not this aim is accomplished depends on the alertness of the railways in sensing the value of spreading the thought among the local people. The instance cited above is one example of putting the JOURNAL to effective use.



When the first of the 200 new type cars was delivered to the Brooklyn City Railroad Company it was placed on exhibition near Brooklyn Borough Hall. Alongside it was shown an old horse-car which saw service in Brooklyn many years ago.



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Section of the ear at base when clinched on 2-0 wire. Note how the lips encircle and protect the wire.



Section of ear for 3-0 wire. Good wheel clearance and smooth passage for the trolley wheel are obvious.



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The lips are ground to a knife edge at the tips and left heavy at the center. The wheel comes onto the ear gradually thru this special shaping at the tips.
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- 5. Long Life—**
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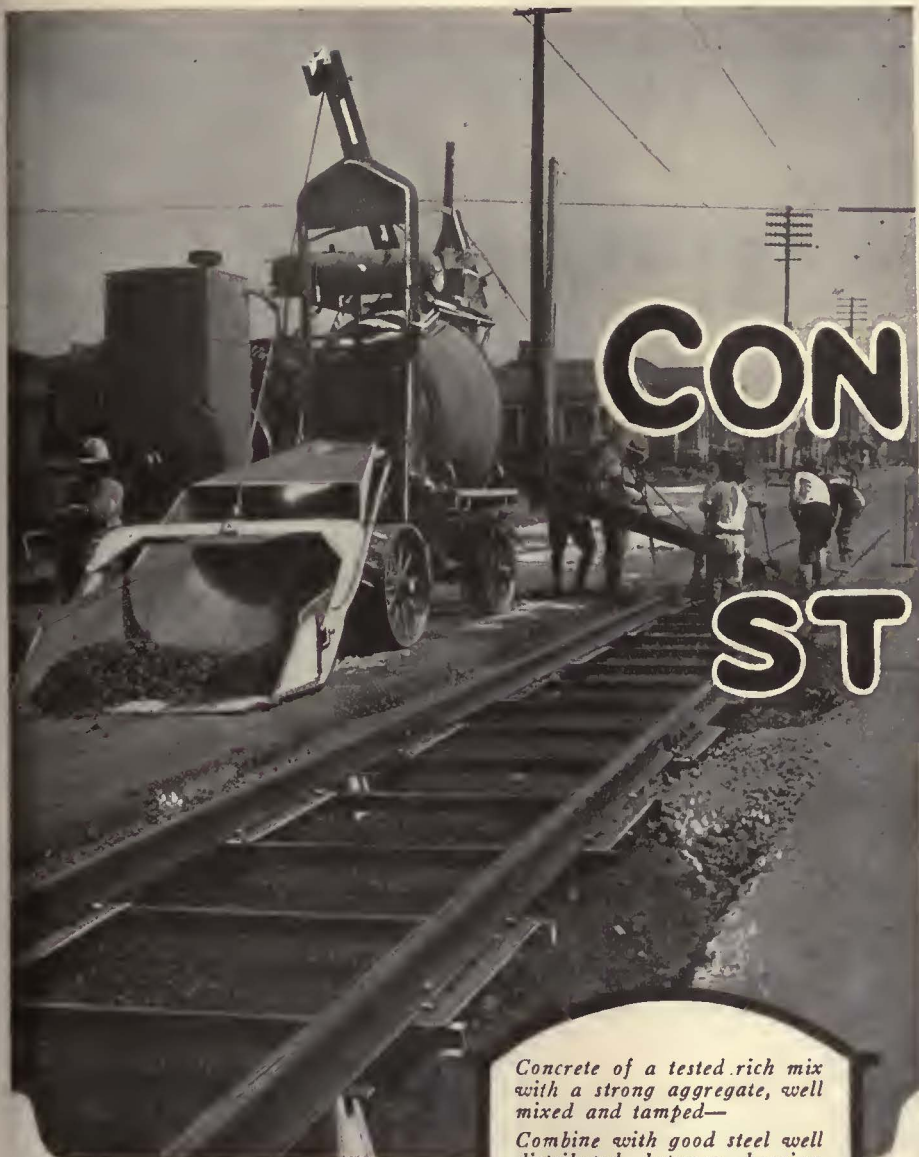
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Steel Twin Tie Track

Mr. Steward says "Of Course"

At the New England Street Railway Club's meeting on October 25, Mr. H. M. Steward, superintendent of maintenance, Boston Elevated Railway made an address on track appliances and practice. He said this:

*"Of course
welding machines, grinders
are used"*

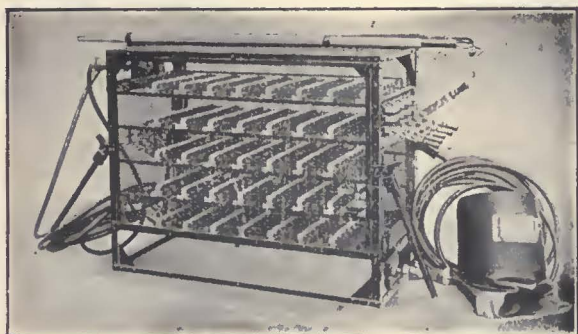
"Of course" the world's leading electric railway systems—including the Boston Elevated Railway, choose the welding and grinding equipment shown on this page.

Railway Trackwork Co.

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"Reciprocating" Track Grinder



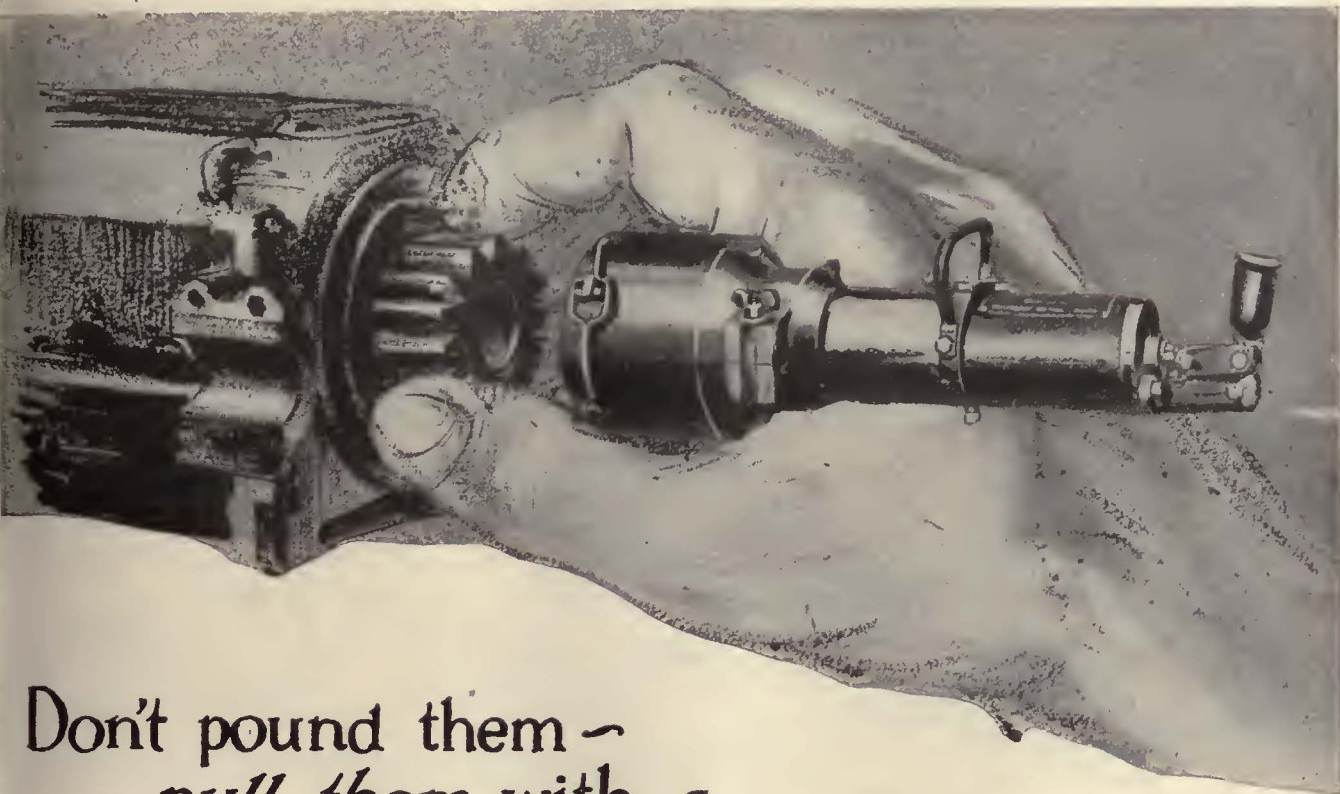
"Universal" Rotary Track Grinder



"Atlas" Rail Grinder



"Hercules" Rail Grinder



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International Creosoting & Construction Co.

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Plants: Texarkana, Texas

Galveston, Texas

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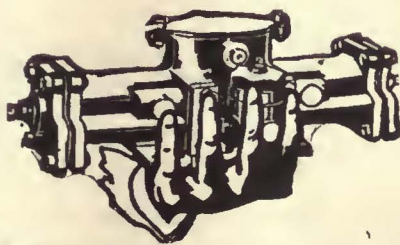
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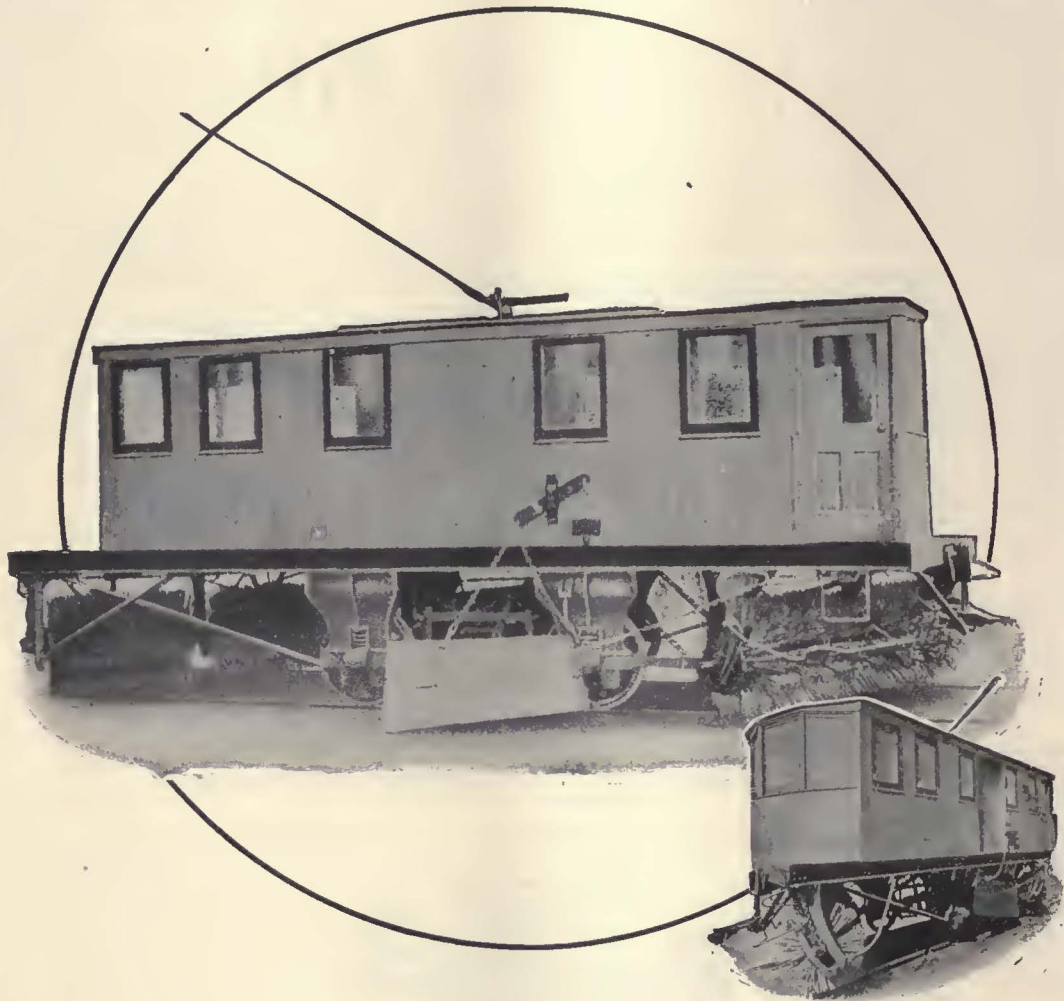
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*"More miles to the pint;
Better service to the mile."*



Galena-Signal Oil Company

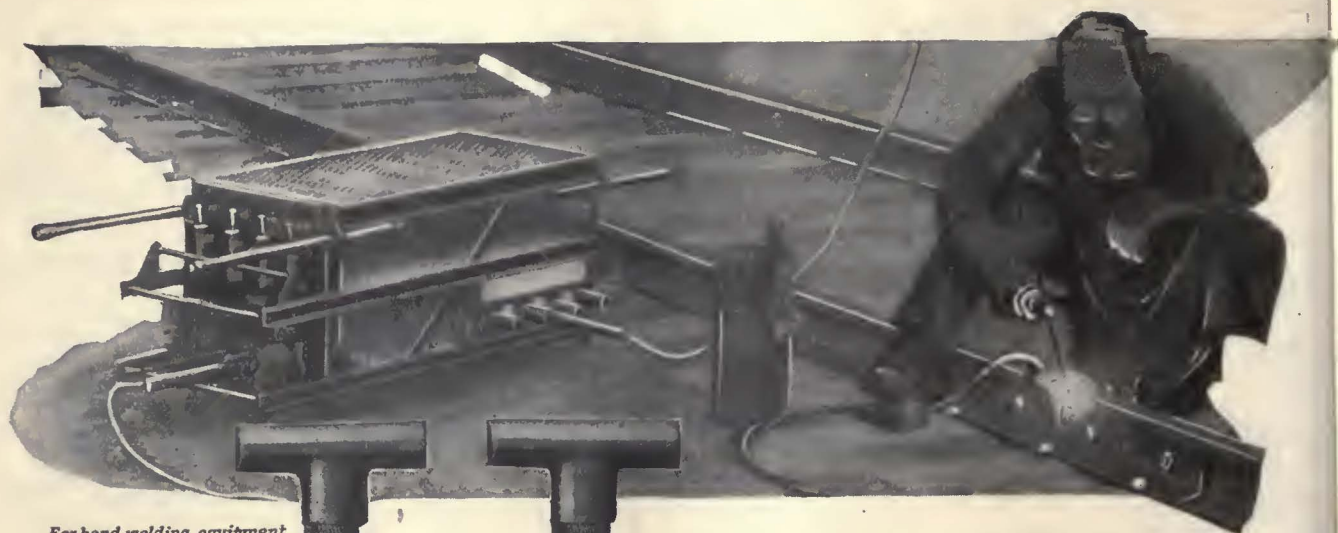
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Franklin, Pa.

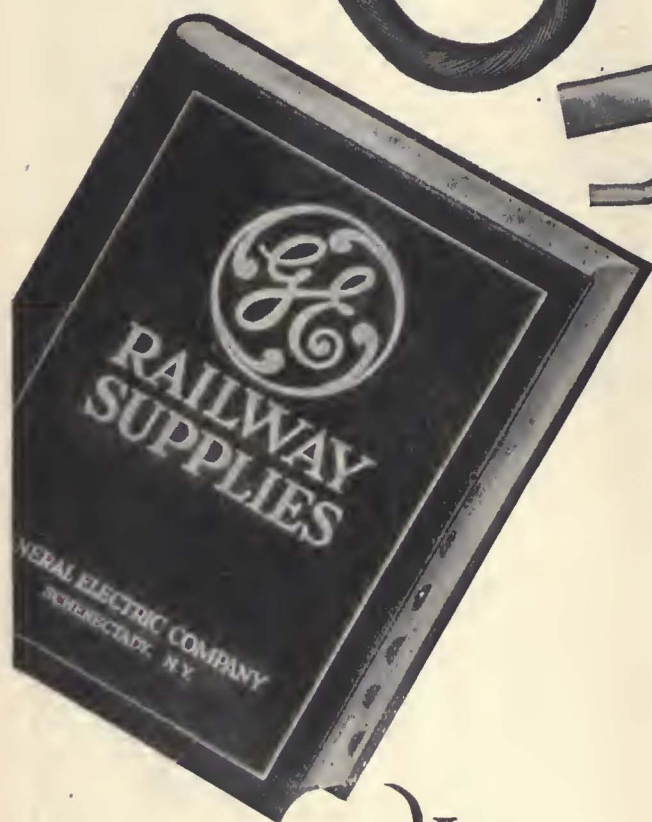
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Why invest in good bonding?

Because the high resistance of a poorly bonded or an unbonded joint causes a drop in trolley voltage that impairs your service.

Because with poor rail joints your motors, operating on abnormally high current at reduced voltage, are subject to more frequent repairs.

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GENERAL ELECTRIC

New York, Saturday, November 24, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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



Volume 62
Number 21

Chamber of Commerce Committees Make Constructive Reports

IT IS gratifying that a strong indorsement of the principle of co-ordination of service between bus and trolley is given in the report just issued by the special committee of the United States Chamber of Commerce appointed to study this question. Although representatives of the motor transport interests made up a considerable proportion of the committee, the report declares that the bus and the electric railway cannot permanently exist in a community and pay their way in competition with each other. It also says that there should be in each community a single reliable transportation agency, rather than individual transportation units, and that the electric railway is the best medium for the mass transportation of passengers and should be the foundation of the suggested co-ordinated transit system.

Nor is there any doubt as to where the committee stands in regard to regulation. Briefly, the committee says that any one engaged in the business of common carrier by motor vehicle should be subject to regulation as to its rates and service, just as any other common carrier. Regulation by state bodies having jurisdiction over intrastate traffic has been generally accepted in this country and should be applied to motor vehicle common carriers as well as to other public utilities. If a certificate of public convenience and necessity is granted to the operator of a motor vehicle, he should be compelled to furnish ample evidence of financial responsibility, or else carry insurance adequate to cover all injury to persons or damage to property resulting from negligent operation.

Of course, the need of any public carrier to assume full responsibility for damage caused by his negligence is not a new idea. The business of public carrier is one of the oldest in the world and reliability and responsibility are at the basis of the duties which the experience of centuries has shown should be placed on persons so engaged. Our present regulatory laws simply elaborate these rules to adapt them to modern conditions, particularly the replacement to a great extent of the individual carriers of the earlier days by large transportation systems. Primarily the purpose of all these laws is to protect the public by securing (1) regular and adequate service, (2) reasonable rates, and (3) responsibility of the carrier for damages which he may cause during transportation. There can be no permanent gain to any community which ignores these fundamental principles. Jitney service failed in respect to them, particularly regularity of service and responsibility, and this automatically keeps jitneys out of the class of legitimate common carriers.

The committee on taxation of motor transportation agencies of the national chamber, on which motor transport interests were also largely represented, has made

an equally valuable report. It points out that present electric railway taxes are unsystematic, to say the least, yet amount, with imposts, to nearly \$100,000,000 a year, while the maintenance of track amounts annually to even more than this sum. The committee comes out strongly for a tax based on both gross and net returns, rather than an ad valorem tax, for greater tax simplification and for placing the entire expense of maintaining improved highways upon the users of those highways. This latter recommendation should tend to make each form of transportation bear its fair share of the public expenditure, while the whole program of this committee if carried out should help to place the transportation agencies of this country on a logical basis and enable them to stabilize their financial status and to be of even greater help to the nation.

Proper Basis for Valuation Is of Vital Importance

VALUATION of electric railway properties continues to be a major topic for discussion. This is evidenced by the recent report of the committee on valuation of the American Electric Railway Association, printed in full in the issue of this paper for Nov. 3, and by the discussion by L. R. Nash which appears in this issue.

There have been so many differing views on the subject that the committee had much work to do to bring together the opinions and decisions rendered on the subject by the various regulatory bodies. Out of twenty-six commissions replying to a questionnaire sent out by the committee, fourteen, or more than half, belong to the class that refuses to recognize either original cost or reproduction cost of the present date as controlling, and have no definite method of relative weighting for these two evidences of value. Four others consider reproduction cost in varying degree. These eighteen, or 69 per cent of those replying, give some weight to reproduction cost, but it is difficult to determine just how far they consider it. The remaining eight commissions either ignore reproduction cost entirely or have some special theories of their own.

In view of the various decisions of the Supreme Court of the United States it is rather surprising that reproduction cost should figure so little in the decisions of the commissions. The only apparent reason why they should take this stand is that the Supreme Court itself has never made definite the weight that should be given to reproduction cost, merely stating that it must be considered. The railway valuation committee finds that the commissions in the largest group mentioned state that they consider all evidences of value which are presented and all other matters or circumstances which they feel have a bearing on the case, and

then announce what they believe to be the fair value under all of the circumstances. This is subject to such a broad interpretation that it may mean much or little, though shrouding the method in mystery often leaves an opening for the feeling that politics should have been included in the list of elements considered in the final determination.

The decisions of the courts, both state and federal, show less variation, according to the committee. These have held quite generally that the basis of rate making is the present value of the property, and that the present value is not necessarily either "prudent investment," "original cost" or reproduction cost at abnormal prices. Of course this again is disappointingly indefinite, for it states what present value is not, but fails to show what it is.

Comparison of investment value and reproduction cost is brought out in a definite way in Mr. Nash's discussion. Taking a hypothetical case, he shows how the investment value may be greater or less than the cost to reproduce at prices current. Where prices are rising, the cost of reproduction is the higher; but where prices rise and then fall as they have done during and since the war, and continue to fall as he states they are likely to do in the future, the actual investment soon becomes greater than the cost to reproduce. Thus there is a real danger to the utility in attempting to secure valuation on the basis alone of cost of reproduction at current prices, in that if it were followed to its logical conclusion during an era of falling prices the rate base allowed would not be sufficient to support the securities issued.

This shows rather clearly the weakness of the position taken by former valuation committees in declaring for reproduction cost at current prices, and this, undepreciated. The 1923 committee's report is more practical, and it is believed that the position it recommends would put a company in a better light before a regulatory body. Its work is a contribution in the direction of clarification and stabilization of valuation procedure. This is exceedingly important, since higher interest rates are demanded and capital is harder to secure in proportion to the doubt that exists as to the outcome of the question of the rate base on which the utility is entitled to earn.

Secretary Mellon's Recommendations and Railway Taxation in General

WITH the opening of Congress now only a few days off, special interest attaches to the marked indorsement which Secretary Mellon's tax reduction recommendations are receiving from business interests generally. These reductions are possible, of course, only if the incoming Congress does not pass a soldier's bonus or other bill which would add seriously to the outgo of the treasury. Hence a tax reduction act at this coming session is by no means sure. Nevertheless, as the Secretary's outline will probably form the basis for any tax reduction bill introduced by the majority party, its effect on electric railway companies may be considered.

As the Secretary's recommendations contain no suggestion of a reduction in the present corporation tax of 12½ per cent on net income, the effect on railways will come primarily from the larger market which they, like other corporations, will have for their securities, due to the reduction of surtaxes. This was one of the pur-

poses of the recommendations—the hope that some of the capital now going into tax exempt securities because of the high surtaxes would return to the field of productive business. Tables accompanying Mr. Mellon's letter to the House ways and means committee show in a striking way the virtual disappearance from the tax rolls of persons with large incomes. In the \$300,000 a year class, the reduction was from 1,296 in 1916 to 246 in 1921. Under the present surtax rates taxpayers with this income practically cannot afford to invest in securities other than those which are tax exempt.

Just how far the Secretary intended his incidental suggestion about abolishing for the purpose of the income tax capital losses and capital gains is hard to say. If these were given up, it is probable that investors would seek bonds carrying a low interest rate but sold at a large discount. Thus they would have to account only for the return received as interest. Even under the present law this is rather a profitable plan for the bond buyer, because it postpones till a later year, when the income tax rate will probably be lower, the portion of the return represented by the discount at which the bond was purchased; or he can group his capital gains in one year so as to take advantage of the 12½ per cent provision.

It is to be hoped that the discussion on taxation which is bound to take place in Congress this coming session will stimulate a study of the same subject in state capitols and by municipal governments. According to figures recently issued by the National Industrial Conference Board, while federal expenditures decreased from \$6,112,243,000 in 1920 to \$4,849,708,000 in 1921, expenditures of state and local governments increased during the same years from \$3,808,523,000 to \$4,523,887,000. The opportunity to sell bonds at low rates of interest has been a contributing reason for the plethora of expenditure in which local governments have lately indulged. Here is where a conference on taxation, if undertaken by a national body of influence, like the United States Chamber of Commerce, would help. Senator McCormick of Illinois recently made the suggestion that President Coolidge call a national conference of state and local taxing authorities to consider checking the steady increase of tax burdens.

From any reform which would put on a more scientific basis our present tax laws, the electric railway industry would be almost certain to receive benefit. This is shown by the situation in New York State. Here in 1922 a committee, of which Senator Davenport was chairman, canvassed the whole tax situation, and found that the taxes of the electric railway companies in New York were proportionately to both their gross and net incomes far greater than those of any other class of utility, and still greater on net than general business corporations, the net of these corporations being the only figures available as these are the ones on which their state tax is based. The figures from New York State are probably not greatly different from those which would be found in other states. While no general relief has come as yet in New York as the result of this committee's work, it is likely that when readjustment does come something will be done in removing the obvious inequality of tax assessment from which the railways are suffering. Similarly, studies in other states would pave the way for a fairer taxing of the electric railways.

Keeping Cars on Time

The Duties of Supervisors and the Importance of Adherence to Time-Tables
Discussed by J. R. Ong in His Los Angeles Report—Other
Suggestions for Improvement of Service

AN ACCOUNT of the traffic situation in Los Angeles, based on a report recently made to the management of the Los Angeles Railway Corporation by Joe R. Ong of Piqua, Ohio, was published in the issue of this paper for Nov. 3. That article also gave a number of ways by which, through the cooperation of the city, the situation could be helped. Mr. Ong's report included also observations as to electric railway operation in Los Angeles, with a discussion of supervisors and time-tables. An abstract follows of those observations of most general interest, with some additional information on the form of supervisor's book mentioned.

Adequate supervision is an essential feature of satisfactory service. Supervisors are the company's official representatives in directing the operation of cars on the streets. They should be able to grasp a situation and act quickly, at the same time displaying good judgment in their decisions.

Quite naturally, supervisors are recruited from the best of motormen and conductors because such a background of experience is necessary. In order that a supervisor's position may appeal to the trainmen best suited for it, it should be attractive not only because of its increased responsibility and authority, but also because of its financial advancement. In Los Angeles supervisors' salaries should be materially increased above the present scale so that it will be possible to attract the best men in the train service. The hours should be arranged to alternate the day and night work for all supervisors, the changes being made at intervals of two weeks or four weeks, because straight night work for a supervisor for several years makes little appeal to a platform man holding a good day run.

DUTIES OF SUPERVISORS

A supervisor's chief duties are to keep cars on time under normal conditions of operation and to see that patrons of the line get the best possible service under any unusual conditions that may arise. Normally, therefore, the supervisor should be watching his cars and checking their actual time against their scheduled time and ascertaining the cause for any deviations. Chronic cases of irregular operation should be checked in particular and fully reported so that appropriate measures or correction may be taken.

Obviously a supervisor cannot check his cars from memory unless he has very few cars on a regular but frequent headway. It, therefore, has been the practice to supply the supervisors with schedule data showing the time cars are due to leave the terminals, arranged in the order in which they are due to leave. Many supervisors carried only the terminal times in their books and had no time shown at the point where they are stationed for a period of several hours daily. The result was that an individual mental calculation of time had to be made in order to check each inbound

car by adding to the terminal time the running time to the point of observation, and to ascertain if that total corresponded to the observed time.

Upon Mr. Ong's recommendation there was adopted an improved type of supervisor's book which greatly facilitates his work. Time by half-minute intervals is printed in a column in the center of the page. The left half of the page is used for inbound cars and the right half of the page is used for outbound cars, one column being reserved for each route passing the checking point for which the book is made up.

The new book is made up to show the time that each car on the schedule is due to pass the supervisor's

7TH AT
8TH & MAPLE

INBOUND					Time	OUTBOUND					INBOUND				
J	H	R	S			J	H	R	S		J	H	R	S	
16			21		5:00	9	14		7						
		8			:00½										
	3				:01			27							
			13		:01½				36						
					:02			15							
22		9			:02½	30									
	4		2		:03			2	8						
					:03½										
					:04			16							
			20	14	:04½	10			41						
17	5				:05			28							
					:05½										
					:06										
					:06½										

Page from Supervisor's Time-Point Book, as Used in Los Angeles

station by having its train number in the proper route column on the proper horizontal time line. This enables the supervisor to tell quickly whether the car is on time, late or ahead of time. The clearly detailed yet compact arrangement of the schedule data enables him to tell quickly the relative position of the cars from different routes on common track, and if at a junction he can readily direct which car should have the preference when two arrive at the same time.

A part of a page of this book is reproduced. The letters J, H, R and S indicate routes. J and S are split lines, i.e., the cars run to two terminals. The large figures show train numbers. The small figures show minutes layover at the next terminal.

The figures are inserted in this book before the supervisor goes out on the street and he makes no notes in the book on the street. It is his reference book on schedules in concise form so that he can quickly determine when the cars should pass him.

All figures in the book except the headings are put in with pencil so that in the event of a schedule change on one line the train numbers on the old schedule are erased and the new train numbers put in without the necessity of making a whole new book. The supervisor may indicate by key letters or characters the destination of cars on split lines or cars scheduled to short terminals, and other information such as night cars which he may

desire to watch with particular care after the headways begin to spread.

To protect the book from the weather, sheets of transparent celluloid may be cut to page size and held on by rubber bands. For very wet weather a celluloid case large enough to take the book when open may be used.

Such a case is very similar to the identification card case one carries in the pocket except for size, closed on three sides and open at the bottom.

As explained, the book shows by a small number the layover at the next terminal for each train, so that the supervisor has right before him the number of minute

SCHEDULE NO. A-136
IN EFFECT 7-18-23.

DIVISION NO. 5. RELIANT POINT 54TH & NEAR DRIVE.

EAGLE ROCK & HAWTHORNE LINE.
DAILY EXCEPT SATURDAYS & SUNDAYS.

TR.	N.B.	OUT TERM.	IN	TR.	N.B.	OUT TERM.	IN
1	301	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	643 1010 303 720 104 1010 826 1156 1010 904 1247 1010 1000 IN 725	19	326	LANAR 28 BDT HAWTHORNE A.VITAE HAWTHORNE	754 1010 IN DIV. 1.055 328 651 1156 1010 755 1247 1010 1000 IN 725
2	304	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	750 1135 314 827 1204 314 940 124 1204 1000 IN 805	20	327	WESTVIEW PLAZA 28 BDT HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	806 1135 IN D. 830 309 655 1204 314 715 1247 1010 1000 IN 725
3	310	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	803 1148 315 840 1223 315 953 1364 315 1000 IN 817				
4	306	TOWNSEND PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	659 1022 301 736 1097 301 841 1204 301 1259 1247 1010				
5	307	TOWNSEND PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	652 1034 302 729 1109 302 840 1204 302 1259 1247 1010				
6	313	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	850 1223 305 819 1004 305 904 1204 305 1000 IN 627				
7	308	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	739 1059 312 806 1134 312 913 1246 312 1000 IN 745				
8	309	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	752 1112 311 822 1147 311 924 1259 311 1000 IN 734				
9	315	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	850 1238 321 927 1043 321 1043 1247 1010 1000 IN 1297				
10	302	TOWNSEND WESTVIEW PLAZA HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	610 426 815 1125 647 501 847 1197 736 591 931 1235 1055 1235 IN 1245 AM				
11	305	TOWNSEND PLAZA 28 BDT HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	713 850 1149 750 904 1224 537 127 250 400 IN 427 614 939 733 1050				

TR.	N.B.	OUT TERM.	IN
19	326	LANAR 28 BDT HAWTHORNE A.VITAE HAWTHORNE	754 1010 IN DIV. 1.055 328 651 1156 1010 755 1247 1010 1000 IN 725
20	327	WESTVIEW PLAZA 28 BDT HAWTHORNE A.VITAE HAWTHORNE HAWTHORNE	806 1135 IN D. 830 309 655 1204 314 715 1247 1010 1000 IN 725

TR.	N.B.	OUT TERM.	IN
301	1	4:15 A	12:27 A
302	10	4:05 B	11:05 IN
303	12	3:09 B	10:26 IN D.1
304	2	3:09 B	1:46 B
305	13	3:09 B	5:11 B
306	4	3:19 B	10:05 IN D.1
307	5	3:19 B	6:27 IN
308	7	3:19 B	12:16 B
309	8	3:19 B	7:15 IN
310	3	3:19 B	12:39 IN
311	14	3:19 B	10:12
312	15	3:19 B	10:42
313	6	3:19 B	11:01
314	16	3:19 B	11:25
315	9	3:19 B	11:45
316	17	3:19 B	12:05
317	18	3:19 B	12:25
318	19	3:19 B	12:45
319	20	3:19 B	13:05
320	21	3:19 B	13:25

EAGLE ROCK & HAWTHORNE LINE

Running times between time points for Schedule No. A-136, in effect July 18, 1923

LV. TOWNSEND

From 7:35 P.M. to 5:54 A.M. use No. 1
5:55 A.M. to 6:27 A.M. use No. 2
6:28 A.M. to 8:19 A.M. use No. 3
8:20 A.M. to 11:21 A.M. use No. 4
11:22 A.M. to 1:41 P.M. use No. 5
1:42 P.M. to 4:14 P.M. use No. 6
4:15 P.M. to 5:09 P.M. use No. 7
5:10 P.M. to 5:34 P.M. use No. 8
5:35 P.M. to 7:34 P.M. use No. 9

LV. HAWTHORNE

From 7:15 P.M. to 5:33 A.M. use No. 10
5:34 A.M. to 6:04 A.M. use No. 11
6:05 A.M. to 8:14 A.M. use No. 12
8:15 A.M. to 10:59 A.M. use No. 13
11:00 A.M. to 3:49 P.M. use No. 14
3:50 P.M. to 4:49 P.M. use No. 15
4:50 P.M. to 5:24 P.M. use No. 16
5:25 P.M. to 7:14 P.M. use No. 17

TOWNSEND TO	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	HAWTH. TO	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17
Westview.....	5	7	7	6	6	6	6	5	5	A. Vitae.....	7	8	9	8	8	8	8	8
So. Vdgo.....	7	9	8	8	8	8	8	7	7	Regent.....	3	4	4	4	4	4	4	4
28 & Day.....	8	8	8	8	8	8	8	8	8	67th.....	5	6	6	6	6	6	6	6
Bdge. Jct.....	5	5	5	5	5	5	5	5	5	54th.....	3	4	4	4	4	4	4	4
Plaza.....	6	7	7	7	7	7	7	7	7	Dalton.....	7	10	10	9	9	9	9	9
1st. & Spg.....	3	3	3	3	3	3	3	3	3	Hoover.....	4	4	4	4	4	4	4	4
7th & Bdy.....	6	6	6	6	6	6	6	6	6	Jeff.....	5	6	6	6	6	6	6	6
11 & Main.....	3	3	3	3	3	3	3	3	3	Wash.....	4	4	4	4	4	4	4	4
Wash.....	3	3	3	3	3	3	3	3	3	11th.....	3	3	3	3	3	3	3	3
Jeff.....	4	4	4	4	4	4	4	4	4	7th & Bdy.....	3	3	3	3	3	3	3	3
Hoover.....	5	5	5	5	5	5	5	5	5	1st. & Spg.....	6	6	6	6	6	6	6	6
Dalton.....	3	4	4	4	4	4	4	4	4	Plaza.....	3	3	3	3	3	3	3	3
54th.....	9	10	10	10	10	10	10	10	10	Bdge. Jct.....	6	6	6	6	6	6	6	6
67th.....	3	4	4	4	4	4	4	4	4	Ave. 28.....	5	5	5	5	5	5	5	5
Regent.....	5	6	6	6	6	6	6	6	6	So. Vdgo.....	8	8	8	8	8	8	8	8
A. Vitae.....	3	4	4	4	4	4	4	4	4	Westview.....	9	9	9	10	10	10	10	10
Hawthorne.....	7	8	8	8	8	8	8	8	8	Townsend.....	6	6	6	8	8	8	8	8

The Upper Table is a Reproduction of Part of a Schedule Sheet, with Run Guide and Working Times for Crews. The Lower Table Shows in Type the Running Time Between Time Points in the Schedule Sheet Reproduced Above

leeway he has on the outbound car before it will be necessary to consider turning it short of destination. For example, if an outbound car has seven and one-half minutes layover and passes the supervisor six minutes late it should leave the terminal on time. If the car was twenty minutes late outbound with only seven and one-half minutes layover it lacked twelve and one-half minutes of having time to make the terminal to leave on time. The supervisor then may put this car on time by turning it back at a crossover from which the running time to the terminal and return is not less than twelve and one-half or thirteen minutes.

The advisability of turning cars short of scheduled destination is a matter that must be considered in the light of circumstances and conditions at the time. It would depend upon how many passengers the car had on board, upon whether the prevailing direction of travel was outbound or inbound, upon whether other cars were immediately ahead of or behind the car to be turned short, and perhaps on some other conditions.

The elimination of, or a reduction in the number of, turnbacks may be a general indication of improved operating conditions, but the fact must not be overlooked that there are times and conditions when the service would be benefited if there were more turnbacks. There are usually more people desiring transportation at other points along the line than at the terminals and they are to be considered. Day cars which are late in the morning rush and night cars which are late in the afternoon rush often can be advantageously put on time by turnbacks, and the service to the terminal supplied by tripper which is due to pull in.

STREET SUPERVISION EIGHTEEN HOURS A DAY

On a system the size of the Los Angeles Railway there should be direct supervision on the street for approximately eighteen hours per day, according to the following plan. Supervisors should be located at strategic points for control of the various lines. On through routes there should be a supervisor located on each half of a line at a point beyond the congested area, each supervisor looking after one or more lines passing his station.

One supervisor should be held primarily responsible for each line to avoid confusion over orders, but the supervisor stationed on the other half of the line should assist in carrying out the plan of control determined upon by the supervisor in charge. In fact, each supervisor should have in his book the times of cars on all lines past his station—not that he will have to work all of them but that he should be in a position to step in and take action in an emergency.

It is not contemplated that a point supervisor can ever be taken off the point. He should leave his station to go to an accident, derailment or blockade if he can do more good there, but except in emergencies he should stay at his point, which, if properly selected, is a strategic point for the control of the lines under his direction.

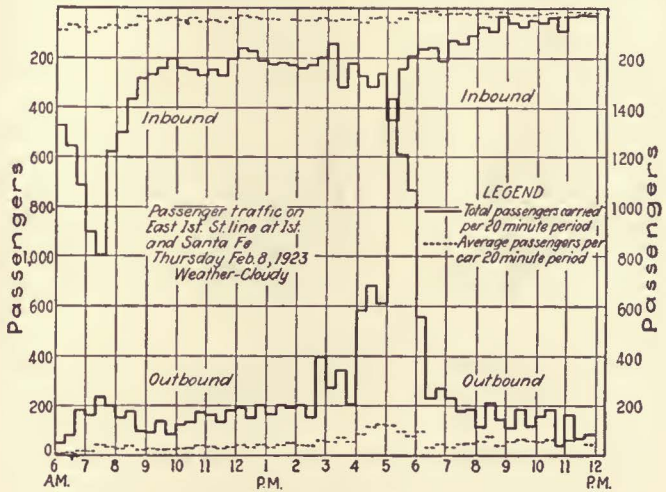
The objection is sometimes raised to point supervision on the ground that the crews always know where the supervisors are located and may be leaving terminals late, running by passengers or running ahead of time because they think it will not be discovered. If the point supervisors are giving careful attention to the cars passing their stations they will usually be able to

detect any serious irregularities. A limited number of traveling supervisors should be assigned to travel on several lines to correct such matters as mentioned in this paragraph and to follow up cases of recurring irregular operation reported by the point supervisor.

On many street railways the division superintendents have the responsibility for the operation of cars on the street, but on the Los Angeles Railway this function is delegated to "district chiefs" under the director of traffic. The district chiefs should be assigned to a certain territory and have general direction of all lines and all supervisors within that territory. Territorial division for the district chiefs is to be preferred over a group of through lines, because it enables them to cover the lines with less lost motion or duplication of supervision on trunk lines. It gives a better distribution of their services.

PREPARATION OF SCHEDULES

In the preparation of schedules Mr. Ong's recommendations for using traffic graphs have been adopted and are now in effect. Twenty-minute charts (similar to that shown below) for several different days are taken and analyzed, with one day compared with another and corrected for distortions. A representative one is then selected. From it the headways are determined based



Schedules Are Drafted After Studies of Charts Like This

on the number of passengers carried. For example, the chart published shows approximately 250 passengers as the average sustained maximum per twenty-minute period during the middle of the day in the controlling direction of travel, which is inbound. If it is desired to schedule service on the basis of fifty passengers per car, then five cars will be required in each twenty-minute period, resulting in a four-minute headway. It may be noted that after 11:40 a.m. the inbound travel falls off so that a four-minute headway throughout the middle of the day would show an average of less than fifty passengers per car.

In a similar manner the headways required for other periods are calculated except that in the rush hours the average number of passengers per car must be increased to perhaps eighty or eighty-eight. To carry 1,300 passengers per 20-minute period on the basis of eighty per car would require a one and one-quarter-minute headway. And in this manner the required headways past the point of maximum load are selected. In translating the twenty-minute chart into headways a convenient table

has been devised which shows the passenger carrying capacity on different headways at different densities of loading per car.

In addition to the traffic charts from which the headways are determined, the schedule maker must also have riding checks to show the time required between time points all along the line at the different periods of the day. Preferably he should make several trips himself over the line to refresh his knowledge of conditions.

Where all cars do not go through to the end of the line, short line cars should follow longer headways than through cars in order to balance the loads on the long and short line cars. Thus, an average main-line headway of five minutes might be split as a six-minute interval before the short-line car and a four-minute interval before the long-line car, or the differential cut to one minute by using five and one-half and four and one-half-minute spacing.

A change has been made in the form of the schedule and crew assignment sheets. Formerly the schedule sheet showed the leaving times of each train number from one terminal on the left half of the sheet and from the other terminal on the right half of the sheet, all on one horizontal line. To follow a train number through its operation from the time it left the carhouse until it pulled into the carhouse it was necessary to look back and forth from one side of the sheet to the other. This schedule sheet was never posted for the trainmen but was used for office reference. Copies were secured by the ditto-graph.

For the trainmen's use there was a large sheet that showed the day's work for a crew arranged in a horizontal section of the sheet, giving the various times at which they were due to leave the terminals and the times when reliefs were made. On this sheet the various pieces of work by each crew were grouped together, but in order to follow one car or train on its schedule throughout the day it was necessary to look all over the sheet for the particular train number. For the division clerks, the timekeepers and the auditor's office a condensed work run sheet was supplied showing "time on" and "time off" for each piece of work for each crew and the total time of the run. Thus, on the old plan, the information was grouped three ways on three forms.

NEW SCHEDULE REPLACES THREE SHEETS

On the new form of sheet (see page 388) the information that was formerly in three places has been combined on one form and additional information shown. The run guide as arranged in the form previously sent to the timekeeper is retained in the new schedule sheet. The times that cars are due to leave terminals and one intermediate point on each half trip are shown in the body of the schedule. The intermediate time shown is usually for the time point just at the edge of the congested area inbound.

The details of runs are read horizontally, and each section of the details of runs represents the movements of an individual car or train during the day. The movements of each individual crew are indicated by run numbers written in bold figures, so that the various pieces of work of each individual crew may readily be picked from the schedule. By using this method, the schedule permits one to follow all movements of cars as well as crews, a feature which is not easily possible when each horizontal section of the details of runs refers

to the day's movements of an individual crew rather than of an individual car.

The new schedule sheets are prepared on the type writer and are arranged for blueprinting so that as many copies as desired may be had at any time. All working copies should be blueprints. The master copy should be kept corrected to date so that any copies taken at any time may be correct. An office copy, a carbon copy of the original, should be kept to show the successive changes and alterations without obliterating the original figures, so that ready reference may be had at any time to the exact times on the schedule on any particular date.

WORK ASSIGNMENTS FOR TRAINMEN

It is also a part of the work of the schedule department to make up the work runs for motormen and conductors after the schedules have been prepared. Inasmuch as schedules are based on the demands of traffic they should be laid out to meet that demand as nearly as is reasonably possible and not with the idea of providing work runs for any individual trainman or group of trainmen. Conditions controlling the number of cars operated are something which the company cannot change and therefore it is not to be expected that work runs for the motormen and conductors can be laid out exactly the same from one schedule to another. The cars cannot leave and return to the carhouse at the same times on all schedules.

Those not familiar with the street railway business sometimes find it difficult to understand why the working conditions for motormen and conductors cannot be made the same as working conditions for employees in other lines of business. For example, the question is raised why is it necessary for street railway men to have such a long spread of time in which to complete a day's work. It might help some in the understanding of this question if reference were made to the lower chart on page 772 of the Nov. 3 issue showing the cars scheduled for operation on April 2, 1923, by one-hour periods throughout the day. Cars must be on the street in time to take other employees to their places of business in the morning, and cars must be on the street to take other employees home and return to the carhouses in the evening, so that street car men are required to extend their day's labor over a long period of time.

Many references have been made to the morning and afternoon rush periods when great masses of people demand transportation within limited periods of time. This uneven demand for service is one of the fundamental characteristics of the business which every street railway would gladly change if it could, because it affects not only the working conditions for the trainmen, but also involves a heavy expense on the part of the company for cars, carhouses, power, substations and equipment in use for only a limited period.

One of the fundamental difficulties in connection with the operation of cars on the Los Angeles Railway was that too many of the cars were operated as trippers by extra crews and not enough of the cars were made a part of regular runs. This means an unusually large extra list and it means that men have to "fight the extra board" for perhaps several years. This is not a satisfactory condition of affairs and could be improved by allowing a slightly greater spread in the runs so that the day crews coming out of the carhouse not too early in the morning could be used again in the afternoon rush.

It is apparent from the chart on page 772 of the Nov. 3 issue that a great many crews must be used both morning and afternoon if the total number of cars operated are to be handled efficiently. The spread in the runs on the lines of the Los Angeles Railway is not excessive and in fact is much lower than the spread in runs on most other large city properties. It is considered a distinct detriment to the service, without being an advantage to any particular number of men, to maintain the old system of making up runs. It was recommended that more of the trippers be worked into parts of regular runs and that the allowable spread in the time to complete the day's work be sufficiently extended to permit this.

OTHER SERVICE IMPROVEMENTS

A number of other service improvements were also introduced as a result of the survey. Thus, the layover time was reduced by introducing more time points, particularly during the outbound trip and by an adjustment of running time to meet the varying conditions of operation. This kept some motormen from speeding and resulted in better spacing of cars along the line and less bunching of cars at the terminals. Further reduction in layover time is expected to follow the adoption of a further differential in running times. It had been the practice for some time on the Los Angeles Railway lines to have only two running times, i.e., "short" time and "long" time. Short time was from 6:15 p.m. to 7 a.m. and long time from 7 a.m. to 6:15 p.m. It will be noted that the new schedule on page 888 calls for several running time changes in twenty-four hours.

Larger train number plates were put on so that the supervisor could distinguish train numbers more quickly and easily. Formerly the train number was on a 2½-in. disk and was carried inside the window on the front end of the car only. The new train number plates are of sheet metal 5½ in. x 6 in., with aluminum leaf letters on a black background. Two are used for each train, one placed on the front end and the other on the rear above the window to the right of the center line of the car. The train numbers stay in place from the time the car leaves the carhouse until it returns to the carhouse, while it is on the same train run.

A clear and more definite system of route and destination sign is under consideration. The report favors roller signs adjustable from within the car, rather than metal roof and dash signs, because the former can be changed only if some one climbs to the roof, and both require more trouble to change the car from one route to another.

CARS AND SPECIAL WORK

A low-floor car designed to facilitate the rapid handling of passengers was recommended. One-man cars have been found too slow for operation in the congested area and to cause additional delays. The report recommended two-car units for mass transportation, particularly for operation on heavy lines. For the lighter lines which run through the congested area a one-man-two-man car was recommended to supersede the safety car

for conditions existing. These cars would operate with one man except during rush hours.

The report also urges the addition of more special trackwork, so that the opportunities for turnbacks and for maintenance of service by diversions during emergencies may be increased. On some lines the skip stop or alternate stop plan is now in force, and it is recommended that the same plan be extended to all lines.

Statistics on Twelve Large Properties

STATISTICS showing a comparison between six of the largest surface lines and an equal number of rapid transit properties are presented herewith. They afford an interesting comparison of these figures with the figures which show the results of the electric railway industry as a whole, as published in ELECTRIC RAILWAY JOURNAL, on page 578, of the March 31, 1923, issue.

While the 121 companies covered in the analysis on March 31 produced gross earnings of over \$393,000,000, the twelve city properties under consideration showed a total of over \$316,000,000, although they operate only one-ninth of the track mileage in the United States. Of these twelve properties, six are classed as rapid transit, although only three operate elevated or subway lines exclusively, the other three being in combination with surface lines. Each of the twelve companies collected over \$8,000,000 in its last fiscal year and its average receipts exceeded \$26,000,000. The prevailing rate of fare varies, three charging 5 cents, two 5 cents with a 2-cent transfer charge, one 5 cents with a 1-cent transfer charge, four 7 cents and two 10 cents, while in some cases the company sells tokens at a lower rate.

Gross earnings of the six surface properties show a decrease of 3.5 per cent below the previous year, while operating expenses, including taxes, decreased only 1.6 per cent. For the rapid transit companies the increase in receipts was 1.7 per cent and the decrease in cost 6 per cent. The operating ratio for the surface group averaged 83.34 per cent, as against 85.08 per cent in the previous year, and ranged from 68.93 to 93.35 per cent. The average for the rapid transit group was 71.63 per cent, ranging from 59.08 to 83.03 per cent, compared with an average of 77.92 per cent in the preceding twelve months. Considering only the three roads which operate subways or elevated lines exclusively, the operating ratios average 69.17 per cent, as against 75.9 per cent in the previous year.

The total passengers per mile of single track operated showed an increase of 0.89 per cent for surface companies and 4.7 per cent for rapid transit lines. The number of passengers per mile of track in the former group ranged from 929,650 to 1,940,456, and in the latter group from 1,263,286 to 1,463,592. Several companies, however, do not keep account of transfers and free passengers and for that reason the figures shown are low. On the surface lines, less service was rendered by each car in the past year than in the preceding year, the annual miles operated per car averaging 34,877, as against 35,862. On rapid transit lines

STATISTICS PER CAR-MILE AND PER CAR-HOUR ON TWELVE LARGE ROADS

	Six Surface Roads				Six Rapid Transit Roads			
	1919	1920	1921	1922	1919	1920	1921	1922
transportation revenue per car-mile.....	38.9 cents	44.7 cents	47.8 cents	47.8 cents	33.1 cents	38.0 cents	40.7 cents	40.8 cents
expenses and taxes per car-mile.....	32.5 cents	37.6 cents	43.2 cents	43.2 cents	25.9 cents	30.6 cents	33.4 cents	31.1 cents
transportation revenue per car-hour.....	\$3.26	\$4.00	\$4.03	\$3.14	\$4.21	\$4.63	\$5.21	\$5.14
expenses and taxes per car-hour.....	\$2.75	\$3.37	\$3.62	\$3.64	\$3.25	\$3.70	\$4.13	\$3.81
operating ratio, per cent.....	83.06	87.45	85.08	83.34	74.00	77.26	77.92	71.63

there was an increase, the figures being 39,271 for the last year against 38,557 in the preceding year.

Revenue passengers on surface lines increased 1.1 per cent and the car mileage was less by 0.55 per cent. On rapid transit lines the number of passengers increased 3.3 per cent and there was an increase of 1.7 per cent in service. The average car-miles per car-hour on surface lines increased 1.1 per cent over the previous year, while the rapid transit lines remained the same. The figures just given used to be considered as an index of speed performance, but in recent years car-hours have been so augmented by contract requirements that it is no longer regarded as of much value. The figures given above as well as those contained in the table are for the twelve largest companies, five of which have a fiscal year ending June 30, while the others have a fiscal year more nearly corresponding to the calendar year.

Rapid Transit Parkway Proposed for New York

For Outlying Sections, with Track on Surface, Commission Engineer Declares Cost About Same as Elevated and One-Third that of Subway

AN ACCOUNT was published on page 572 of the issue of this paper for Oct. 6 of a rapid transit parkway line, recommended as part of the New York Transit System by Daniel L. Turner. The report of Mr. Turner goes into considerable length as to the advantages of this system over an elevated or subway line for undeveloped portions of a city. Briefly, the plan consists of a reservation strip approximately 500 ft. wide with two or four tracks in the center and vehicular, overhead or under crossings about every third or half mile. The right of way would be divided as shown in the accompanying section.

Mr. Turner points out that such a line would have all the advantages of an elevated line, in that it is in the open air, and also the advantages of a subway in

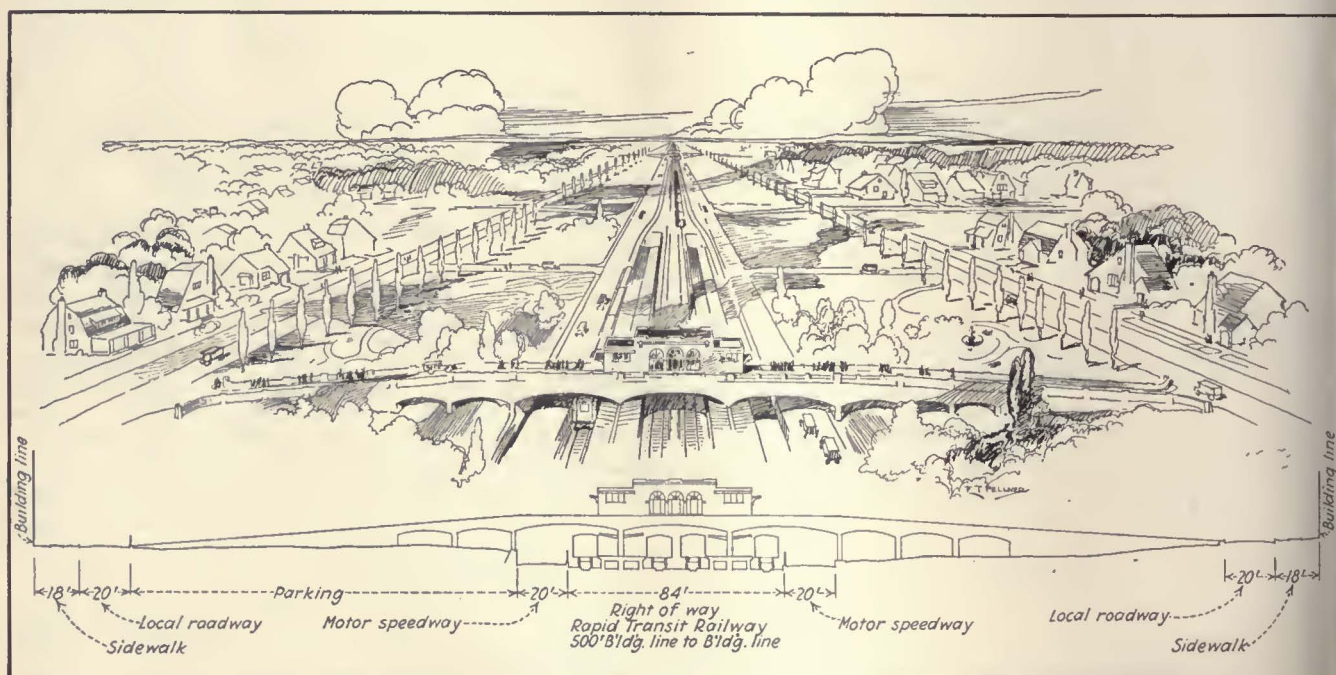
that it does not disfigure the streets or cut off light and air from abutting property.

As regards cost, Mr. Turner estimates that such a line, including real estate in suburban territory, would be slightly more expensive to build than an elevated line, but considerably less costly than a subway, based on the figures of \$2,300,000 per route-mile for a two-track subway line and \$700,000 per route-mile for a two-track elevated line. For everything except real estate for a two-track parkway line, built either in open cut or on embankment or as an elevated railroad, as best suited to the topographical conditions, Mr. Turner allows \$500,000 per route-mile and believes that the real estate for a 400-ft. wide strip could be secured for \$400,000 a mile and if 100-ft. wide for \$100,000 a mile. The approximate unit cost figures, including real estate for a two-track structure, would be as follows:

	Per Route-Mile
For a two-track subway line.....	\$2,300,000
For a two-track elevated line.....	700,000
For a parkway line through a 400-ft. wide strip costing \$400,000	900,000
For a parkway line through a 100-ft. wide strip costing \$100,000	600,000

In his remarks on cost Mr. Turner says: "The conclusion seems inevitable that through undeveloped country, instead of building elevated lines as we have done in the past, the parkway line should be built, a wide parkway line if possible, but in any event a narrow parkway line, and that the land necessary for such parkway should be obtained in advance and held until the building of the rapid transit line becomes necessary."

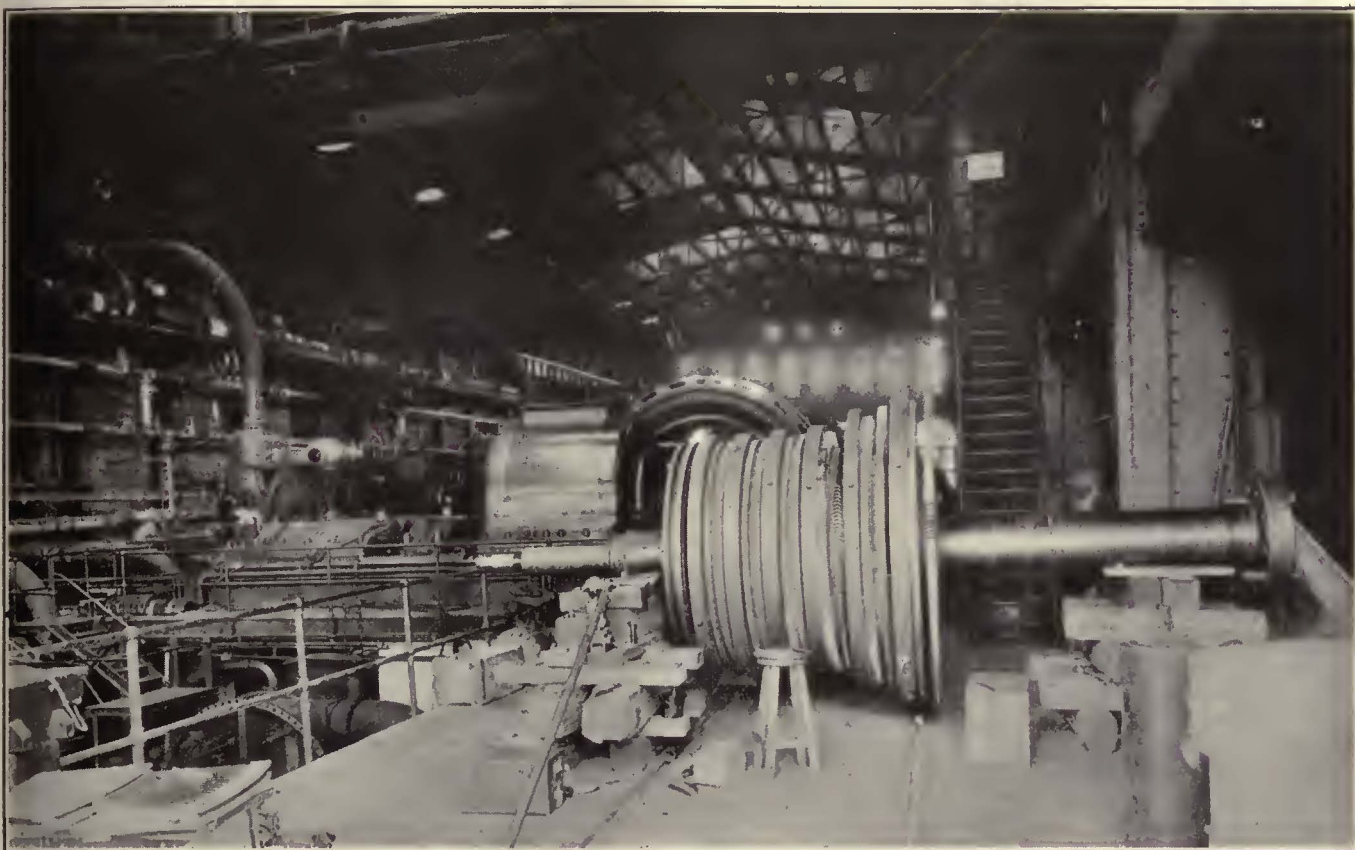
In discussing the matter of assessment of cost, Mr. Turner says that while the New York State law provides for local assessment for rapid transit lines, based on the enhancement in land values, no rapid transit line has yet been built under the assessment plan. Nevertheless, an assessment for a parkway is a common procedure and should meet with no obstacles of any kind, particularly if the parkways are to be of the width and importance that a strip approximately 400 ft. wide would permit to be developed, thereby bringing the parkway within a half mile of everybody living within the area developed in such a manner.



Section of Suggested Parkway Line for Rapid Transit Development in Outlying Sections of New York

Remodeling a Power Plant to Improve Performance

Batavia Station of C., A. & E. R.R., Twenty-two Years Old, with Changes Costing \$11 per Kilowatt, Has 12 per Cent Lower Water Rate and 30 per Cent Less Maintenance—Capacity Also Is Increased About 10 per Cent



This View of the Engine Room Shows the High-Pressure 7,500-Kw. Turbine Under Repairs

EXTENSIVE changes have been going on in the Batavia power plant of the Chicago, Aurora & Elgin Railroad for the past year, the idea being to improve the efficiency of the station. While the work is not yet fully completed, the results to date indicate that evaporation will be bettered approximately 9 per cent, and the turbine and engine water rates will be decreased approximately 12 per cent. The maintenance budget for the last half of 1923 is almost 30 per cent less than maintenance expenditures for the last half of 1921, before the new work was started. On this reconstruction H. W. Brooks acted as consulting and construction engineer.

Though not an original objective of the work, the output of the rehabilitated equipment has been increased about 2,000 kw. Line drops and distributing losses have been decreased materially, while the railway schedule has been speeded up and the service made more frequent. The possibility of service interruption has been reduced to a minimum. The plant as remodeled, if kept in a reasonable state of repair, should render effective service for at least ten to fifteen years at economies comparing favorably with the average ob-

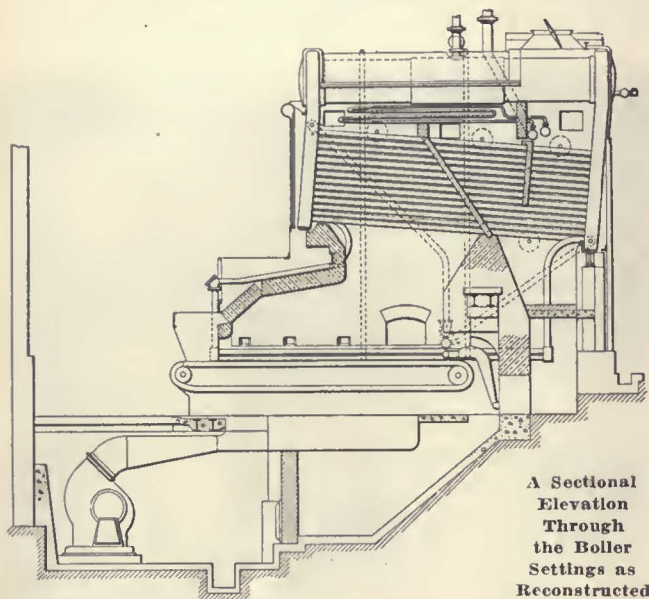
tained in modern plants of equal size. Based on the station capacity the entire cost of the work will not exceed \$11 per kilowatt. Including the new line and substation work the total unit cost will not exceed \$15.

The original station, installed in 1901, consisted of three 1,500-kw. and one 1,800-kw. engine generators driven by 32x64x60-in. cross-compound Corliss condensing engines at 75 r.p.m. This equipment was augmented in 1912 by a 7,500-kw., 1,500-r.p.m. condensing turbo-generator and a 3,000-kw., 1,500-r.p.m. low-pressure condensing turbo-generator. All this generating equipment is rated liberally, however, in comparison with present standards, tests having proved the continuous 40-deg. capacity of the station to be about 18,000 kw., with 22,000 kw. obtainable on the swings. Three-phase, 25-cycle current is generated at 2,300 volts. Each generator is connected through a separate bank of transformers to the station 26,300-volt, three-phase bus, and all switching is done on the high-tension side.

In the boiler room there are eighteen 5,000-sq.ft. water-tube boilers equipped with chain-grate stokers. Steam is now generated at 200-lb. pressure and 150 to 200 deg. superheat.

Four boiler settings were excavated beneath so as to lower them, their stokers, hoppers and accessory equipment by 4 ft., thus increasing the height of the combustion chamber from 8 to 12 ft. This permitted increased combustion efficiency, particularly with the long-flaming, high-volatile southern Illinois and Indiana screenings burned. The method of excavation was found more economical than the more usual plan of raising the boilers.

The natural draft stokers on these four boilers were



replaced with forced-draft chain-grate stokers equipped with side-wall tubes and pressure water bags. With the forced-draft stokers the fluctuations of the load, which are especially heavy in railway service, are accommodated readily through the greater inherent flexibility of this type, while the steady base load is carried by the natural-draft boilers at their most efficient rating.

While the furnaces were being rebuilt it was considered advisable to reconstruct the old baffles, which were of the standard type, nearly vertical, replacing them with inclined baffles, thus tapering the gas passages to follow as closely as possible the reduced volume of the gases with their shrinkage at lessening temperatures. The lower entrance velocity aids the draft and

relieves clogging of the gas passages by slag present in large quantities in the Illinois and Indiana screenings. Two different types of baffles were installed for competitive purposes, the interlocking tile type with plastic joints on two boilers, and monolithic baffles shot with a cement gun on the other two. The aggregate found most satisfactory for the monolithic baffles consisted of two and one-half parts of ganister screened through $\frac{1}{8}$ -in. mesh with one part of portland cement and one part of ordinary fire clay.

Experiments were made to determine the correct amount of excess air to be introduced and the correct location for orifices. Dampers or grates will be placed over these orifices later and calibrated in such a manner that the firemen always will know what setting to employ with a given fire condition and steam flow.

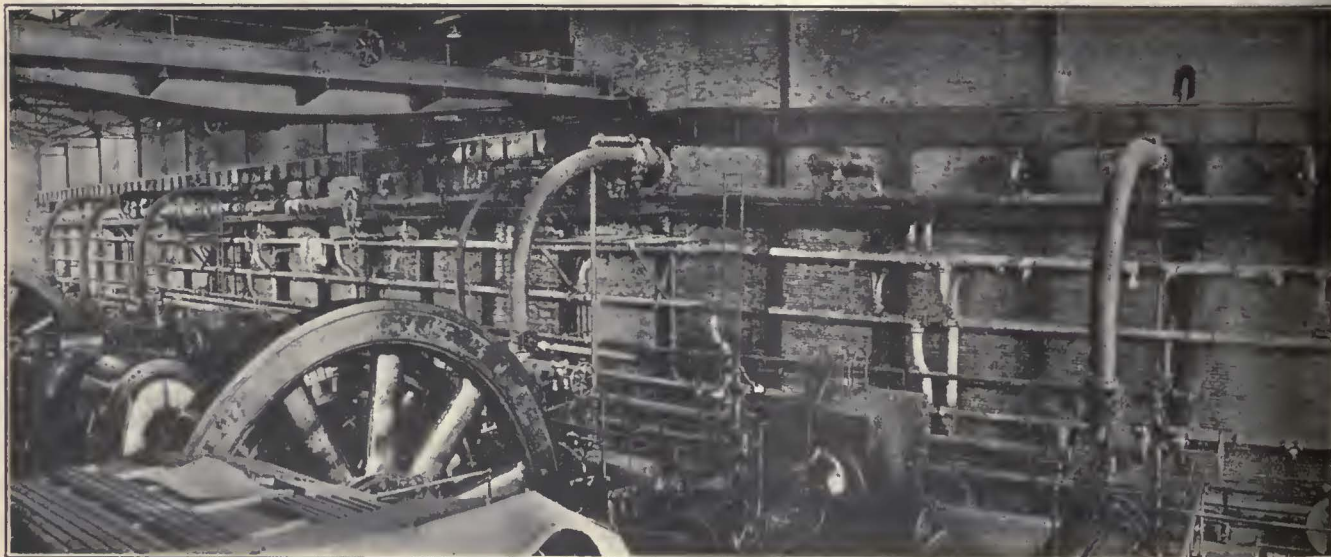
A number of other changes have been made in the boiler room, such as the installation of d.c. motors to drive the forced-draft stokers, fans and damper machines; the design and installation of coal spreaders in some of the stoker hoppers to cut down the labor cost of firemen and to produce uniform fuel beds; installation of recording meters and draft gages, including a trial installation of the Lea recording coal meter to give a continuous boiler check on pounds of steam per pound of coal.

Eight superheaters were installed to obtain decreased engine and turbine water rates possible with superheated steam at approximately 550 to 600 deg.

A large portion of the pneumatic ash conveyor system was replaced with a new steam-jet system for the purpose of reducing operating and maintenance costs. White iron ash conveyor pipe 1 in. thick was used, with a joint somewhat resembling Vanstone construction. Five boiler water deconcentrators and a feed water filter in the make-up line were installed to minimize boiler cleaning and upkeep expense. All cast-iron fittings, valves and screwed flanges in the boiler and engine leads were removed and replaced with steel fittings and valves and Vanstone flanges to withstand superheated steam.

Heat insulating materials were used to cover all steam and hot water lines, boiler drums and heads, etc., to cut down the heat losses in transmission.

The 7,500-kw. turbine was completely rebladed and repaired to place it in efficient operating condition, and the cast-iron head was replaced with a new steel head



Cast-Iron Valves and Fittings Were Replaced by Steel Parts in the Engine Room



Interior View of Furnace Looking Toward the Arches

to permit the use of the increased temperature. A desuperheater and attemporator were designed and constructed for the purpose of automatically maintaining the temperature in the main steam header opposite the reciprocating engines at a point not in excess of 500 deg. F. at all conditions of flow.

The turbine-driven hydro-flow air pump on the main turbine condenser was replaced with a twin two-stage steam-jet air removal pump with inter and after condenser and the consequent halving of steam consumption necessary for air removal. A small automatic dual drive exciter set was installed for the purpose of constantly and automatically maintaining a station heat balance. A 750-gal. per minute boiler feed pump driven by a variable-speed motor was installed with automatic constant pressure differential speed regulating control. Under the load conditions prevailing computations proved a power saving of 17 per cent by the use of speed regulating control of the motor as compared with throttling control of the pump.

The station bus was redesigned and reinforced, as were the cables and wiring, the present output having outgrown the capacity for which they were designed.

A 1,000-kw. frequency changer was added to permit handling additional 60-cycle commercial load until an increase makes necessary additional 60-cycle generating capacities. Two 1,000-kw. full automatic rotary converter substations were also installed, with all necessary equipment, making possible faster and more frequent railway schedules at a minimum expenditure for labor.

In addition to the major items there were scores of minor changes, repairs and additions effected. All boilers were turbinized and washed and a fixed cleaning schedule established. Masonry in furnaces and settings was placed in first-class condition, all steam or water leaks were sought out and eliminated, valves

were repacked and ground, auxiliary turbines, engines and motors repaired and placed in first-class operating condition, main engines gone over in detail and completely rehabilitated wherever necessary. A complete new system of power house logs and accounting was introduced, which makes possible a much more accurate prediction of the annual maintenance budget or subsequent new construction budgets.

As not all the items of new equipment are yet in service, nor has the operating personnel yet had time to become so intimately acquainted with all details as to be able to say what maximum results are to be obtained, definite figures just at this time are not available. The general conclusions stated at the beginning of this article have, however, been definitely established.

What It Costs to Operate an Auto

CONSIDERABLE interest has recently been manifested by electric railway men in automobile operating cost figures for use in telling the owners how much they save by leaving their automobiles at home and riding the electric cars. L. S. Cowles, writing in the *Stone & Webster Journal*, gives figures throwing some light on the subject. The following is abstracted from his article:

Any driver knows that with "gas" at 20 cents per gallon and his car making 10 miles per gallon the fuel cost is 2 cents a mile. Beyond this, few care or take the trouble to go. When you see a Pierce-Arrow roll by with a chauffeur at the wheel, you may know at once that such an outfit is costing the owner from 50 to 60 cents per mile traveled. For small annual mileage, say 4,000 miles, the cost per mile may easily exceed \$1. Few would believe this without analyzing the situation carefully. A few exact figures bearing on the actual cost of operating one particular car will enable one to get some idea of operating and maintenance expense.

ANNUAL STATEMENT OF MOTOR CAR OPERATION June 11, 1922, to June 11, 1923

Make	Buick
Model	22-44
Type	Roadster
Total miles traveled	6,114

Operating and repair cost (not including replacements):			
Interest	\$35.61	Two bottles body polish.. 1.45	
Depreciation	355.02	Cheesecloth..... .15	
Registration	10.00	One can leather dressing .75	
Driving license	2.00	One can nickel polish.... .90	
Fire and theft insurance..	12.50	Distilled water10
Liability insurance	46.69	One flashlight bulb.....	.20
Personal property tax....	22.56	Three 21-cp. lamp bulbs..	1.50
16.75 gal. engine oil.....	15.91	Three 2-cp. lamp bulbs..	.90
405 gal. gasoline.....	113.95	12 lb. grease	2.60
Two carbon burnings.....	9.00	1.75 gal. alcohol	1.50
Repair labor	74.18	One roll friction tape....	.35
Tire repairs	6.65	Two flashlight batteries..	1.00
1.75 gal. transmission oil	1.82	Battery charge	1.20
Tire powder20	Cotton waste90
One can "tar remover"....	1.00		

Cost per mile operated:		Cents
Fixed charges		6.30
Operating fees		0.196
Insurance		0.970
Taxes		0.396
Fuel		1.865
Lubrication		0.333
Repair labor		1.470
Miscellaneous supplies and expenditures.....		0.260
Total cost per mile.....		11.870

From the above it is seen that fuel cost is a relatively small part of the whole. While no one wants to waste gasoline, the question of high mileage per gallon of gas is not as important as one might at first believe. In the case cited no allowance was included for garage rental and car washing, as these vary with the requirements of the owner.

Some Useful Elements of the Street Railway Philosophy

By W. E. Wood

Manager Houston Electric Company, Houston, Tex.

The Real Interests of the Three Groups in the Public Utility Triangle, Public, Employee and Owner, Are the Same — What the Railway Management Should Do to Bring About Real Co-operation

PHILOSOPHY, as such, is generally conceded to be a dry subject, especially for the practical business man. But in our desire to analyze our business so that we may popularize it and administer it more successfully, we have naturally gravitated into a study of its philosophy. Having got into this study, we have been agreeably surprised to find how beautifully the facts we have always known develop themselves in the most logical fashion.

As a basis of our study we have accepted as true two important facts. A proof of their truth will not be attempted here because of the space that would be required, but surely we could not so earnestly continue to pursue our business if we did not believe them to be true. The assumptions are these:

1. In the heart of every human there is a spark of reason and justice that is capable of being fanned into a flame under proper condition.

Within this assumption lies our hope of obtaining the popular co-operation so essential to a successful operation of our business, for while it is true that we may temporarily lull our public into a quiet state of mind or even make them enthusiastic for us by catch phrases, attractive publicity and the like, if our basic arguments are not founded on "justice and reason," eventually these efforts will surely fail. Then the enthusiasm aroused in our favor will react with most unwholesome results. But if this enthusiasm is based on justice, reason and sincere efforts it is on the firmest foundation on which our industry can stand.

2. Up to the present time private ownership and operation have been capable of rendering street railway service more efficiently and economically than has municipal ownership.

THREE DISTINCT GROUPS INTERESTED IN EVERY PUBLIC UTILITY

Having accepted these two assumptions as true we should next make a careful analysis of the public utility triangle.

There are three and only three distinct groups interested in each public utility. The public, the employees and the owners.

It should be beneficial to determine in what each of these groups is interested and what each may properly expect to receive from the business and from each other.

The Public: By virtue of the fact that the public through its constituted authorities has granted to the utility the right to use certain portions of its property in the transaction of its business, it has a right and does desire and expect to receive from the utility the best practicable service at the lowest possible cost.

The Employee: It is an accepted theory in this country that all employees are entitled, for proper performance of their duties, to receive, and it is their natural instinct to be interested in, fair wages and proper working conditions.

The Owner: Capital is essential to the construction and establishment of public utilities. There could be no reason why any one should become interested in acquiring or investing in public utilities unless he can reasonably expect the capital he so invests to earn a fair return.

So we find three separate and distinct interests, each apparently having a right to expect to derive some distinct benefit from the operation of the utility. Their interests may appear divergent, but a study makes it certain that for each to receive the greatest possible permanent individual benefits their interests must be unselfishly mutual.

The history of our industry clearly indicates that the public and employees will persecute the owners of a utility when they discover that the owners are receiving more than a fair return. Therefore it is to the owners' best self-interest, when the returns exceed a fair amount, with wages and working conditions all that they should be, to return the excess to the public in better service or cheaper rates.

If the public insists on getting its service cheaper than will yield the owner his fair return and the employee his fair wage and working conditions, the utility must fail and ultimately cause the public to receive an inferior service which necessarily becomes more and more expensive to operate. During the period of rising prices of wages and material, caused by the recent war, it was very hard for the public to realize that the above was a fact; however, its truth is becoming more and more apparent to the public every day.

Should the employees of a public utility demand and obtain more than a fair wage and working conditions, either the rate of fare of the service of the public must furnish this excess or it must be taken out of the owner's fair return. In either event the result would ultimately defeat its own purpose.

MUTUALITY OF INTEREST BETWEEN GROUPS

We have recited a few instances which tend to demonstrate the mutuality of interest of the three groups interested in the public utility. Like the axioms in geometry, this fact is so clear and apparent that it is difficult to prove.

The public's manner of expressing its approbation or dislike for the owner or employee is through public attitude.

The employee's method of showing his interest for the owner or public is through loyalty.

And the owners express themselves through their policies.

Believing, as we do, that there is a distinct and invariable mutuality of interest between the groups, then why is there so often controversy between the groups? Employees and owners are frequently at odds. Employees and the public sometimes entertain a healthy disrespect and dislike for each other, and in the immediate past instances of antagonism between the owners and the public were continually arising. Our reasoning shows that such conditions are contrary to the best interests of all concerned. To eliminate them we must first determine their causes.

IMPROPER POLICIES AND LACK OF UNDERSTANDING CAUSES FOR DISAGREEMENT

There seem to be two major reasons why the public's attitude toward the owners is hostile or the employees are disloyal to the owners:

First—The formulation and maintenance of improper policies by the owners toward the public or the employee.

Second—Lack of understanding.

These causes seem to cover every case both in connection with the public's attitude and loyalty of employees. As a rule, where the public attitude is the most favorable, the employees are the most loyal. In his case the owners' policies necessarily approach right, and there is little lack of understanding.

In some cases the employees are loyal yet there is an unfavorable public attitude. This indicates that the owners' policies point right but that the public lacks the understanding of the situation which it has been possible to convey to the employees. In every case it must be remembered that the employees' loyalty is weakened by improper policies toward the public and the public's attitude is adversely affected by the improper policies of the owners toward their own employees.

Continuing the analysis, we find that the owner should weigh his policies to the public in respect to service, publicity, citizenship and expansion.

The owners' policies toward the employee include wages, working conditions and welfare work.

All of the phases are susceptible of a most interesting further analysis.

Now, if the owners' policies toward both the public and employees are right, fair and just, then certainly, if our first original assumption is true, and in some manner we can convince the public of the fairness and justice of our policies, the antagonism will begin to disappear.

Lack of understanding can only be wiped out by the education of both the public and employees concerning utilities in general and the specific utility concerned in particular.

COMPONENTS OF SERVICE

We are studying the street railway business, the most important feature of which to the public is service, therefore special care should be taken in analyzing our service.

Service is composed of: (1) Safety, (2) quantity, (3) personal service (commonly called courtesy), and (4) cleanliness and comfort.

Safety is the first and most important component of

street railway service. When we do not make it so, our widespread catch phrase "safety first" is insincere and therefore a cause of public disrespect. There are so many phases to the study of safety that although most interesting and important, it cannot be considered here.

By quantity of service we mean the amount, frequency, regularity and speed. It should be unnecessary to point out to any street railway man the importance of having an entirely sufficient service with as excellent a standard as possible. It is equally our duty to the public to be sure that this service is rendered as economically as possible in order that it may be given "at the lowest possible cost."

PERSONAL SERVICE RENDERED IS DIFFERENT FROM THAT IN OTHER UTILITIES

The third component mentioned of railway service is personal service. Although we have barely pointed to the importance of safety and quantity of service, we must not in the slightest degree minimize their importance. Service is like a three-legged stool standing on safety, quantity and personal service. If deprived of any of the three legs, it cannot stand. It is difficult to say which leg is the most important, but for fear that the usefulness and spirit of "personal service" may not be fully appreciated we will inquire into this phase more minutely.

To understand to the fullest the place of personal service in street railway service, it is necessary to digress sufficiently to study street railway psychology as compared with that of other utilities. For the greatest contrast we will compare electric lighting with street car service. One enters a dark room and wishes light. A switch is located in the room convenient to the entrance. With a minimum of effort the button is pressed and instantly the room is lighted, and the person unconsciously feels a sense of satisfaction. Psychologically there is nothing in the operation that would prepare his mind to harbor any ill feeling or mistrust for the lighting company. He knows of no substitute at any cost that is comparable in convenience or satisfaction.

But picture a modern man, our friend Bill Jones, a regular patron of the street car service on an ordinary morning's ride to his office. Mr. Jones may or may not be the possessor of an automobile, but surely he is fully acquainted with the comfort and speed they offer and besides can easily forget their small disadvantages. Possibly his family has started him a little late to work. He has to walk two and a half blocks to the car line. Although there is no particular objection to this, he doesn't relish it every morning. He has to wait four minutes for a car, not an unreasonable wait but seemingly much longer, and distasteful. The street car maintains a good average schedule speed to town, but automobiles pass it and, darting in and out of traffic, weave their way to the city in less time. Somehow, the occupants of the automobile look more comfortable to him than he feels. At times a broken truck may delay the street car. Bill Jones is not an unreasonable man, but under these conditions the street car ride furnishes him no real sense of satisfaction and very probably his mind is prepared to entertain some ill feeling or mistrust for the street car company.

So we find that very few people will get pleasure out of street car riding even when the safety and quan-

tity are above reproach. But all is not lost. We have a most effective way of preventing this ill feeling and mistrust from capturing Bill.

By the use of what we have called personal service, even under the conditions mentioned, we can gain his respect and very frequently his active co-operation. The lighting has practically no human contact with Bill, but the street car company has, every time he uses its service. We have commonly called this phase of our business "courtesy." But sincerely based on the golden rule our organization, if it is permeated with the spirit of personal service, can effectively win over Bill Jones. The definition of personal service is:

Those acts of kindness, courtesy, accommodation, attention, favor, respect and consideration which we may render to our fellow man in connection with our business.

Personal service tends to gain a favorable public attitude for the company. For the employee it makes individual friends, creates self-respect, gives the satisfaction of a duty well performed and makes his work more pleasant.

Besides this, if the company's policies are right (and if they are not, the spirit of personal service will be difficult to obtain), this spirit is the surest way of obtaining real co-operation in the utility triangle. Therefore, if there is a mutuality of interest the employees will ultimately be rewarded by better wages and working conditions. We might add, however, by way of warning, that if the personal service is rendered primarily in the hope of a material reward without a sincere desire to live up to the golden rule, it is not likely to be effective enough to gain the material reward.

CLEANLINESS AND COMFORT THE FOURTH COMPONENT OF SERVICE

The fourth component of service mentioned was cleanliness and comfort. Although these may not be as important factors of service as the three others, we feel that their necessity is apparent enough without further argument.

For fear of exhausting the patience of the reader no attempt will be made here to analyze the other factors of the owners' policies to the public, namely, publicity, expansion and citizenship, or to the employee, which can be summed up under the headings of wages, working conditions and welfare. It is necessary clearly to understand the public's and employees' rights and the company's obligations in these respects to "formulate and maintain the proper policies."

REAL CO-OPERATION NECESSARY

What we have tried to accomplish is to show the relationship between the three groups interested in the public utility; to prove an absolute and unchangeable mutuality of interest between these groups, which in turn means that for their own interests there must be a real co-operation between the groups. And, lastly, we have tried to analyze the things the owner, through its management, can and ought to accomplish to bring about this mutual understanding and co-operation.

If we can render a better service more cheerfully by understanding this philosophy, is it not necessary for us to teach and preach it throughout our organization until every one of our employees can better perform his daily duty because he understands how to and believes in the necessity of winning the public?

Concrete Paving of Track in Chattanooga

Tennessee Power Company Is Installing Concrete in Track Area with Excellent Results—Ballast Is Tamped Under Traffic

WITH a view to securing permanently satisfactory results with concrete paving in and between tracks, the Tennessee Power Company, which operates the city railway lines in Chattanooga, Tenn., has lately used the track construction shown in the cross-section Fig. 1.

The trench for the single track is 9 ft. wide and the bottom is inclined toward a 12-in. x 12-in. drainage ditch in which a 6-in. farm tile is laid. If the soil is soft, 2 or 3 in. of ballast is rolled into the bottom. The trench is about 22 in. deep at the middle and 2 in. less

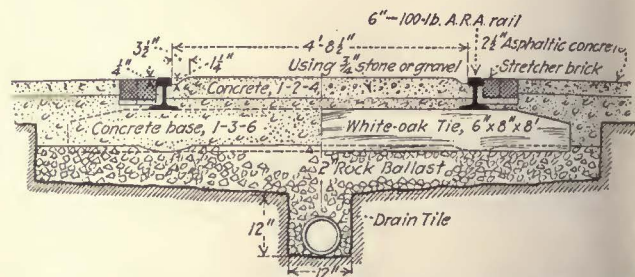


Fig. 1—Typical Cross-Section of Track for Paved Streets with Concrete Paving Used in Chattanooga

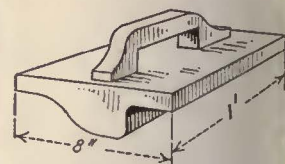


Fig. 2—Grooving Tool for Use in Forming Flangeway in Concrete Paving

Concrete Track Paving in Chattanooga Like that Shown at the Left Is Turning Out Well

at the outside. Broken stone ballast is laid in the bottom to a depth of 8 in. at the middle, on which white oak ties creosoted by dipping one hour in hot oil and one hour in cold oil are laid. Standard 6-in. 100-lb. A.R.A. rail is spiked to the ties.

A concrete paving base with a 1-3-6 aggregate mixed one and one-half minutes is poured between and over the ties, covering them to a depth of 2 in. The concrete base is deepened slightly under the rails by scraping out the ballast before the base is poured.

The paving base is made about 9 in. deep outside of the rails, where, as in the case illustrated, an asphaltic concrete paving is to be laid by the city. Outside the rails the concrete is depressed to accommodate two or more rows of stretcher brick, which are laid on a sand cushion.

The concrete between the rails is 4 in. deep, of 1-2-4 concrete mix, surfaced as indicated in the cross-section.

Contour strips of wood are laid in the rail flangeways while the concrete is soft, and the surface is smoothed by means of a level board. The surface is not crowned. After the concrete has hardened suffi-

ntly to "stand up," the flangeway is smoothed by ans of a special grooving tool shaped in the form own in Fig. 2.

Expansion joints are placed 15 ft. apart, a space $\frac{3}{4}$ in. le at the top battered to $\frac{1}{2}$ in. at the bottom being t for this purpose. A board with the proper taper used in forming this joint, and the concrete is mixed th as little water as possible to enable it to stand when the expansion joint board is removed.

After the removal of the board, a grooving tool, ch as is used by sidewalk layers in marking lines in crete surfaces, is drawn through the groove, slightly nding the edges. Pitch is poured into the joint er twenty-one days.

The concrete paving and the ballast tamping are done under traffic. Sometimes ten tappings of the ballast are needed when the ground is soft. The tamping is done with ordinary hand picks. Care is taken to see that no flat-wheel cars go over the line while the concrete is setting, and all cars are run during this period at reduced speed.

For the first seven days the concrete is continually wet down to permit uniform setting.

The cost of this work was from \$1.25 to \$1.50 per yard on two recent jobs on Walnut Street and Harrison Avenue. This work was carried out under the direction of R. C. Morrison, engineer maintenance of way Tennessee Power Company.

Moving Platform Tests Show Low Power Requirement

A Demonstration Plant of the Type of Platform
Recommended for Forty-second Street, New York,
Has Been Built for Tests and Demonstration Purposes



A Short Section of the Platform Has a Steel Surface and Upholstered Seats of This Type

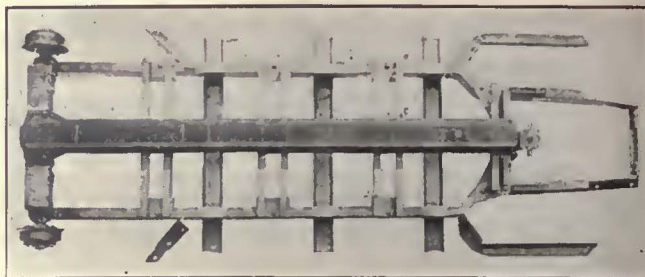
A SERIES of dynamometer tests has recently been concluded on a demonstration plant of the type of moving platform considered by engineers of the New York Transit Commission for use under the New York Transit Commission for use under Forty-second Street in place of the present shuttle car service. This demonstration plant has been built in Jersey City by the Continuous Transit Company, of which H. St. Clair Putnam is president.

The demonstration plant is constructed in the form of a loop approximately 200 ft. long and 100 ft. wide, with a 50-ft. radius at each end. It consists of three parallel continuous platforms designed for operation at 6 and 9 m.p.h. respectively. The high-speed platform is 57 in. wide, is provided with seats spaced 32 in., holding two passengers each. At 9 m.p.h. this gives a total seating capacity of 35,640 per hour. Each of the lower-speed platforms is 27 in. wide, and there is a stationary walkway path alongside the slowest plat-

form. The total width of the three platforms assembled is 9 ft. 3 in., and the height above the rail is less than 12 in. Each loop is made up of a series of small trucks 8 ft. long with circular ends exactly fitting into each other. The trucks are supported at the rear end by two independent wheels with ball bearings. The forward end is connected to the preceding truck by a universal coupling. The track for the high-speed platform has a gage of 37 in., and for each of the other platforms it is 17½ in.

The general design of the installation is along the lines of a paper read by L. B. Stillwell before the American Society of Civil Engineers on Nov. 17, 1920, and reported in the ELECTRIC RAILWAY JOURNAL for Nov. 27, 1920, page 1102, and Jan. 15, 1921, page 124. The most important change in the present demonstration plant from that description is that only the high-speed platform is propelled by induction motor

elements, the other two being driven by racks and pinions. With the induction motor type of drive a stationary element is placed between the rails. This consists of a development of the ordinary primary or stationary part of an induction motor, as shown in the illustration. These sections are approximately 5 ft. long and are placed between the rails in groups about 140 ft. apart. The secondary element is similar to the developed rotor of the squirrel-cage type mounted on the bottom of the truck. It consists of a laminated iron core with punched copper windings. Except for the necessary breaks between the trucks this is continuous for the entire length of the platform. The primary is supplied with three-phase alternating current at $37\frac{1}{2}$ cycles per second for a speed of 9 m.p.h. In the demonstration plant the alternating-current generator supplying the propulsion power is capable of



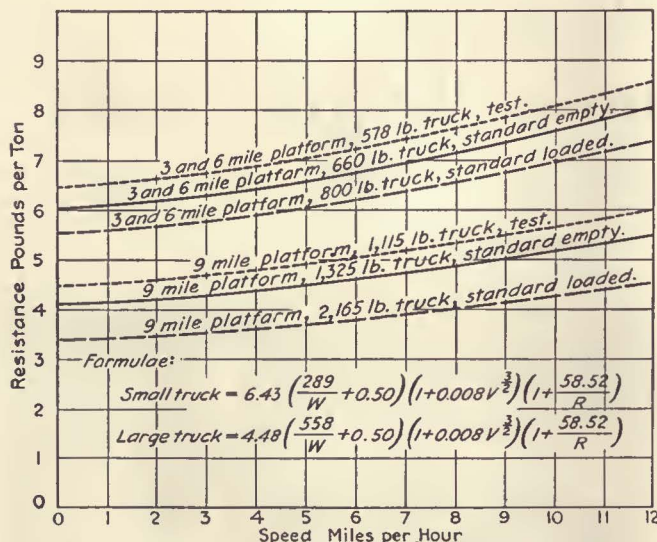
Under Side of Truck for High-Speed Platform, Showing Induction Motor Secondary Element

for longer platforms of the same type. Tests were made at various speeds in order to determine the train resistance, both on tangents and on the curves. From these tests the train resistance has been worked out, as shown in the accompanying curve sheet.

Average figures show that the train resistance on tangents of the high-speed platform at 9 m.p.h. is approximately 5 lb. per ton empty, and 4.1 lb. per ton fully loaded. The other platforms have a resistance of approximately 6.3 lb. per ton at 3 m.p.h. and 6.7 lb. per ton at 6 m.p.h. when empty and 5.8 lb. per ton at 3 m.p.h. and 6.2 lb. per ton at 6 m.p.h. when fully loaded. It is not expected, however, that large numbers of persons will desire to ride on the slower platforms. The resistance on curves is from two to two and one-half times the tangent resistance.

It is stated that this low train resistance is due largely to the use of ball bearings and independent wheels and to lubrication of the rails. It has been found that this reduces the frictional resistance to a material degree. Rail lubrication is of course possible in the case of an installation of this kind, since the rails are not used for traction.

The average resistance of three loops of moving platforms 2 miles each way in length, which would be required for the Forty-second Street installation, is 6 lb. per ton including curve resistance. The average resistance under maximum load conditions is 5.13 lb. per ton, including curves.



Train Resistance of Moving Platforms on Tangent Track

drive at variable speeds in order to change the speed of the platforms.

The two lower speed platforms are similar in type. The racks are continuous, and are mounted on the underside of the platform in the same manner as the secondary element in the induction drive.

In the demonstrations witnessed by representatives of the *ELECTRIC RAILWAY JOURNAL*, the three platforms have been run at various speeds to determine what will be practicable in service. With the high-speed platform running at 4.5 m.p.h. and the others at 3 m.p.h. and 1.5 m.p.h. respectively no difficulty at all was experienced in getting on or off, or stepping from one platform to the next. This also held true when the platforms were speeded up to 2, 4 and 6 m.p.h. At speeds of 3, 6 and 9 m.p.h., for which the installation was designed, it was necessary to practice getting on or off before facility could be had in it, or in stepping from one platform to the next. It was difficult, however, to trip oneself so that a fall was imminent. It has been suggested that the platforms can be operated at reduced speeds during the non-rush hours, and speeded up for the maximum loads.

The power requirements for this type of platform have been determined from dynamometer tests made by the Electrical Testing Laboratories of New York. Since the platform is continuous and approximately 73 per cent of the track length is curved, this was the only method available to determine the power required



Three-Phase Induction Motor Primary Windings Are Placed Between the Rails

Since there is no power needed for acceleration except at such times as the platforms have to be started, the only power requirement is that for overcoming the train resistance. Running at constant speed the power per mile for the three platforms unloaded is 91 hp., and 114 hp. per mile for maximum load conditions is needed. On this basis the complete double-track loop, required for Forty-second Street, would take 364 hp. unloaded and 456 hp. loaded.

West Penn Center-Door Cars Successful

Interurban Service in Difficult Pennsylvania Section
Much Improved Through Use of This Type of
Car—Details of Construction
and Equipment

A MATERIAL saving in the time required for loading and unloading passengers is the chief advantage found by the West Penn Railways in center-door cars for interurban service. Cars of this type are in use on the 40-mile line between Uniontown and Greens-

burg, as well as on 95 miles of shorter routes on the Coke Region division, and have proved to be much more satisfactory than the end-door cars formerly operated.

The first cars of this type were built with a large two-part two-leaf folding door controlled by a hand-operated mechanism from the center compartment. In the later equipment the door is the same except that it is set flush with the sides of the car and is electrically operated by a Westinghouse 1/12-hp. 250-volt motor. All grab handles close inside of the car, and the doors on either side may be operated from any position within the car. Each door has an independent motor with a cord connection to the operating switch. A three-way snap switch to change the cord control from one door to the other has been installed. Besides these, each door has an independent lever by which it can be manually operated.

The length of the car is 58 ft. over bumpers, and the seating capacity is seventy, the general compartment containing thirty-six seats, the smoking compartment thirty seats, and a small compartment at the center having four more. Standard practice has been followed



This Type of Interurban Car Has Proved Superior to Earlier End-Door Cars on the West Penn System

burg, as well as on 95 miles of shorter routes on the Coke Region division, and have proved to be much more satisfactory than the end-door cars formerly operated.

Physical difficulties of railway operation are great in this territory, due to the fact that it lies among the foothills of the Allegheny Mountains. Grades in some cases are as steep as 12 per cent. Careful operation and strict observance of the rules on the part of employees is necessary for the safety of the passengers and the maintenance of scheduled speed. Stops are well spaced, and attention has been given to the matter of increasing the speed of passenger interchange. During recent years the number of cars on time has averaged from 96 to 98 per cent of the total cars operated.

The West Penn Railways was one of the first companies to use center-door cars in interurban service. In 1910 an experimental car designed by W. E. Moore, general manager, and Daniel Durie, superintendent of equipment, was placed in service. While the original car was crude in a good many details, nevertheless from it has been developed the present standard interurban

car of the company, which is thought to be ideal for the particular conditions prevailing in that territory. All the subsequent cars of this type have been built in the West Penn Railways shops at Conneltsville.

The entire interior of the car is finished in cherry except the ceilings, which are enameled in light buff. Artificial lighting is accomplished by thirty 23-watt Mazda lamps, located in two rows, one on each side of the car directly over the seats. The buff color ceiling has been found to be an excellent reflecting surface for these lights.

An outside marker or taillight is a combination of daylight and night stationary fixture with a turning arm inside of the car. Each marker is equipped with green and red glass and a 6-volt 2-cp. lamp on an Edison three-cell 18½-amp. storage battery. The battery is kept charged by a connection through the headlight resistance. In addition to that a lamp of similar size is placed in the center compartment ceiling to show when the trolley wheel leaves the wire. This also makes it pos-

sible for the conductor to keep close track of the marker lights, as they are in parallel with this lamp.

A feature that has been found especially pleasing to the motormen is the front center "clear vision" window. Originally a double glass was used to prevent steaming and frosting during the winter weather, but more recently these have been replaced by a $\frac{1}{2}$ -in. French plate glass, which is far superior to the old arrangement. It does not steam nor frost, gives a clear vision, and is much easier on the operator's eyes.

The cars are equipped with Westinghouse magnetic brakes, which have proved to be very efficient. Truck maintenance costs are said to be considerably reduced and flat wheels are practically unknown. With this type of brake wheels have a very high mileage of service, records of more than 350,000 miles being quite common on the West Penn system.

The Readers' Forum

Zone Passes on Flat-Fare Systems

MOUNT VERNON, N. Y., Nov. 9, 1923.

To the Editors:

Any one who gives the principle of the weekly pass serious thought will find a number of advantages therefrom, not obvious at first sight. Among these is the one which Lawrence H. Doolittle has set forth in his communication "The Weekly Pass as a Simple Zoning Expedient," published in your issue of Nov. 3.

If I understand Mr. Doolittle aright, he suggests passes good within certain sections or zones on what to the cash and ticket rider is still a flat-fare system. In other words, if the standard fare were 7 cents we might perhaps have a universal pass at \$1 and shorter-distance passes at say 50 cents for one zone and 75 cents for two zones. A passholder who rode beyond the bounds, as Mr. Doolittle explains, would not gain thereby. "What goes up must come down" is still true. The passholder would not be likely to go much beyond his boundary, because on the return trip he would either start or end in the wrong zone and thus have to pay the unit cash or ticket fare. This would give a slight reduction in rate only for the occasional long rides.

This plan would not be feasible, of course, on the many systems where there is a combination like pay-leave outbound and pay-enter inbound. The passholder would buy a one-zone pass good in his suburban area. This he would show on leaving outbound or entering inbound, thereby getting the best of it every time.

While Mr. Doolittle has arrived at his suggestions independently, the same plan was set forth two years ago in a confidential report by the writer to a rapid transit company. In this instance, it was also proposed to retain the flat fare for cash and ticket riders but to sell both an inner and outer area pass as well as a universal pass. When one of the operating staff pointed out that the holder of the single-zone pass could over-ride without detection on this all pay-enter system, the general manager cleverly retorted that every station over-ridden meant just as many stations to overwalk on the return trip. The company adopted the pass plan, but refrained from installing the single-zone short haul pass for reasons of policy.

As a student of pass installations, Mr. Doolittle may be interested to know that the distance principle is in effect on at least eight installations in this country. In all these cases, the price of the pass has been shaded downward as the average length of haul increased and the probability of repeating full-length rides decreased. On several of these installations the character of fare collection is such that a passholder could readily over-ride if he wanted to do so, but the fare collection plan automatically minimizes this for the reasons noted hereinbefore. Even in those instances where the cash and ticket fares are zoned, abuse is minimized by the fact that the difference in price between passes is too small to encourage the practice of over-riding one way and paying the cash fare between boarding place and the boundary of the section within which the pass may properly be presented. For instance: With one pass costing \$1, the other \$1.25 and the cash fare 10 cents, it would not pay to do this more than twice a week.

There is no question that short-haul passes would bring more short-haul fares. They do so on the Beaver Valley Traction Company's system, where some of the passes cover sections having no exact relation to the cash fares. They also bring more short-haul fares on systems like Bradford and Doncaster, England, where there are short-haul cash fares as well. The job of introducing the weekly pass would be easier if we had more converts like Mr. Doolittle. WALTER JACKSON.

Men Take to Hand Ball in Boston

THE Boston Elevated Railway has constructed a hand ball court in the rear of several of its division headquarters. It is found that the men take a great deal of interest in this game and by its exercise acquire agility and other physical qualities very useful in their daily work. An advantage of the game is that it can be played for a short or long time, as may be desired. Another advantage is that it can be played in winter as



The Hand Ball Court, a Popular Place for Exercise Between Runs in Boston

well as at other times of the year, if only a little trouble is given to removal of snow in the court.

The hand ball courts in Boston are laid with a concrete floor and cost from \$1,000 to \$1,500 each to install, depending upon conditions. Four or five have been built, and it is the policy of the company to erect them whenever a carhouse is rebuilt, if there is sufficient ground for their installation.

Association News & Discussions

Relations Between Motor Bus and Trolley Car Outlined

National Chamber of Commerce Committees
Issue Long-Awaited Reports on Economies
of Transportation by the Various Agencies

EARLY this year, it will be remembered, President Julius H. Barnes of the United States Chamber of Commerce appointed five special committees of the chamber to report on various topics in connection with transportation. It is the intention to call a transportation conference at which these reports are to be considered. The topics selected for these committees were: (1) Governmental relations to transportation; (2) railroad consolidation; (3) readjustment of relative freight rate schedules; (4) highways and motor transport; (5) co-ordination of rail and water service.

As will be noted, the report of Committee 4 is the report of closest relation to electric railway companies. The report of this committee has just been made public, as has also a report of a special joint sub-committee, appointed by the chamber to consider the subject of the taxation of transportation agencies. Abstracts follow of the portions of these reports of particular concern to electric railway companies.

Relation of Highways in Motor Transport to Other Transportation Agencies

The committee appointed to consider this subject represented all branches of transportation service and was made up as follows: Alfred H. Swayne, chairman, vice-president General Motors Corporation, New York; W. J. L. Banham, general traffic manager Otis Elevator Company, New York; L. W. Childress, president Columbia Terminals Company, St. Louis; D. C. Fennner, engineer and manager Public Works Department, Macks Trucks, Inc., New York; Gerrit Fort, vice-president Boston & Maine Railroad, Boston; Philip H. Gadsden, vice-president United Gas Improvement Company, Philadelphia; W. H. Lyford, vice-president and general counsel Chicago & Eastern Illinois Railway, Chicago; Ralph H. Matthiessen, president Motor Haulage Company, New York; John D. Miller, president National Milk Producers' Federation, New York; H. H. Raymond, president Clyde Steamship Company, New York; Arthur T. Waterfall, vice-president Dodge Brothers, Detroit; Henry J. Waters, editor *Weekly Kansas City Star*, Kansas City; R. C. Wright, general traffic manager, Pennsylvania Railroad, Philadelphia.

In the introduction to its report, the committee, after referring to the rapid development of the passenger motor car and the motor truck, says that inevitably this rapid growth of a new transportation facility has had its effect on the old facilities. Inevitably there has been, and still is, misunderstanding and conflict in the fields of the old and the new facilities, and the old ones are only at the beginning of a readjustment of their activities to meet the new conditions. Meanwhile, the new facility, with inadequate organization and often with little knowledge of its own operating costs, has, in some cases, attempted to handle traffic for which it is not fitted, thus producing an incorrect popular impression as to its proper rôle in our national transportation system. There is already evidence of a tendency to a better understanding of this rôle and toward increasing co-operation of the motor with all other carriers. The present report points out ways further to effect this co-operation. Ways in which this co-operation can be effected.

RÔLE OF THE MOTOR TRUCK WITHIN THE TERMINAL AREA

There are three principal directions in which the motor truck can serve to relieve the present terminal situation. These are:

1. By organized cartage instead of the present go-as-you-please method of receipt and delivery at the rail terminal; further than this, by store-door delivery, which is the real completed transportation.
2. By a substitution of motor service for a part of the rail service. This would cover trap car l.c.l. freight service to industries and in a large measure similar movement in interchange as between local stations.
3. By complete elimination of certain rail service. This would cover intra-terminal movements, such as movements between industries or different plants of the same industry within the terminal area, which would then be handled by motor truck.

RÔLE OF THE MOTOR TRUCK OUTSIDE OF THE TERMINAL AREA

The committee believes that where a good highway exists the motor truck has the advantage over the steam and electric railway for distances up to 10 miles in some instances and 25 miles in

others, and that beyond 50 miles under certain conditions and 150 miles in others railroads would generally have the field. This leaves a competitive zone with a lower limit of 10 to 25 miles and an upper limit of 50 to 150 miles, with which each form of transportation has certain advantages, and the shipper should be free to make his choice with due regard to cost, time of transit, reliability of service and other considerations. Primarily, the question is one between steam railroad and motor vehicle, but in certain districts, notably in the Middle West and in California, freight movement by electric railways has been highly developed, so that electric railways are interested in this situation, as well as in the question of competition of motor buses in passenger service.

Altogether the estimated ton mileage of the electric railroads in 1922 is approximately 1,000,000,000, as compared with 340,000,000,000 for the steam railroads. Probably the ton mileage by motor trucks considerably exceeds that by electric railways. Because of the greater flexibility of the electric cars compared with the steam train and the lower overhead due to the smaller investment in terminals, the electric railway can in many instances handle package freight profitably for distances below the economic limit for steam railroads, thus widening the competitive zone as between the electric railway and the motor truck. The possibilities in the use of electric railways in the handling of freight have not as yet been fully appreciated, even by electric railway companies themselves, and a large development of this field may be expected in the future.

COMPETITION IN PASSENGER TRANSPORTATION

Competition of the motor vehicle with the steam and electric railways for passenger traffic divides primarily into two classes—that carried by buses and that carried by the private automobile. Whatever inroads the private automobile has made upon the carriers are inevitable and the carriers must adapt themselves to the new conditions. Bus service may be classified as (1) tourists' service; (2) de luxe service in urban districts; (3) non-competitive service; (4) feeder service to rail carriers and (5) parallel competitive service.

There can be little question as to the desirability of free play in the development of motor service for any of the four classes first mentioned. The fifth class, however, offers a more serious problem. The questions to be answered here are: Is the service of the rail car-

rier adequate and satisfactory to the public? If not, can the rail carrier make it so?

In some fifteen states the Public Service Commission already has authority to grant or refuse to grant certificates of public convenience and necessity to such prospective motor operators. It is wise for the commissions to have this authority as it will afford the existing railroads adequate protection.

The standards by which the merits of any medium of passenger transportation must be judged are:

1. Ability to render safe, adequate and satisfactory service in an efficient manner under all prevailing conditions.
2. Cost of the service.

COMPETITION UNDESIRABLE

There is now quite general agreement on the part of public officials and transportation experts in the automotive and electric railroad fields who have studied the problem that the two forms of passenger transit—motor vehicle and electric railway—cannot permanently exist in a community and pay their way in competition with each other. Furthermore, there exists today an almost unanimous opinion among those who are qualified to judge that the motor vehicle may be used to supplement the electric railway service in such a manner that the transportation needs of the community will be most efficiently met by the provision of a complete system of transportation, under the supervision of a single reliable agency, rather than by individual transportation units.

The problem must be analyzed from the standpoint of the requirements of the entire community. There may be instances where buses, operating in competition with steam and electric railways, have so flourished as to give rise to the feeling that the new medium was the more economical unit. That condition arises primarily because the bus most frequently operates over what may be termed "preferred routes," where the traffic density is greatest and the length of haul shortest, but without regard to the needs of the community as a whole.

On the other hand, nearly every large urban electric railway company has lines which are at present unprofitable to operate. They may reflect bad judgment on the part of an earlier management, or shifting population that has taken away traffic they once had, or they may have been built under public compulsion. In any event, the companies have heretofore been compelled to continue to operate these lines, with a resultant drain upon the revenues from their more remunerative lines and a lessening of their ability to render adequate service to the entire community.

It seems reasonable that in such a case the railroad company should be permitted to substitute bus for rail operation, or that if an independent bus company be granted a certificate of convenience and necessity to operate a parallel service substantially similar in

quality, the railroad company should be permitted to abandon the unprofitable rail line.

The Federal Electric Railways Commission, appointed in 1919 to make a nation-wide investigation of the electric railway situation, declares: "It is clearly in the public interest that all common carriers engaged in local transportation service should be required to render adequate and safe service, and that local transportation facilities should be developed in the most economical and effective way from the point of view of the community. Unnecessary and destructive competition ought not to be permitted, and the community at large should conserve the established facility that still is and promises to continue for an indefinite period the principal means of local transportation."

It is believed that the electric railway is the best medium for the mass transportation of passengers, and should be the foundation of the co-ordinated transit system of the whole community.

It is, however, recommended that a thorough study be made of the problems involved in the handling of the transportation of passengers within the terminal areas, with special reference to public and private passenger carrying vehicles.

RELATION OF MOTOR TRANSPORT TO HIGHWAY DEVELOPMENT

The motor truck did not find its place in national transportation until the war, and as it was during that period and the one immediately following that highway engineers were forced to cut down maintenance, it naturally followed that a question arose as to the ability of the engineer economically to maintain the road under the new traffic. Studies of the cost of highway maintenance have been made by the Bureau of Public Roads, in conjunction with the State Highway Departments in California and New York, and have brought to light certain facts in regard to the effect of traffic on road wear. They have shown, for example, that a "light" truck with an abnormal relation between sprung and unsprung weight, a heavy overload, or too narrow or worn tires, may cause much more damage to the highway than a so-called "heavy" truck. Other factors affecting maintenance are comparative density of traffic, speed of travel, width of axle rather than gross load, and the comparative type of the highway and its condition. While a heavier sub-base is being used now in highways, it is impossible to say for how much of this heavier design the motor truck is responsible and how much of it is attributable to the increase in motor traffic of all kinds.

REGULATION OF MOTOR CARRIERS

The committee believes there has been a growing recognition during the past few years of the principle that one engaged in the business of common carrier by motor vehicles should be subject to regulation as to its rates or service just as any other common carrier.

Unregulated competition of motor-bus lines with electric railways, or of several bus lines with each other, may temporarily give increased service or lower rates, but inevitably it will result in decreased earnings and a lowering of the standards of service, until one or all of the competitors are faced with ruin. Under proper regulation, intelligently and fairly applied, such as has been adopted in a number of states, the extent to which competition is desirable in the public interest rests with the regulatory body. Destructive rate cutting is prevented, and duly authorized motor vehicle common carriers are accorded the same protection given to other public utilities, this at the same time providing the greatest measure of useful service to the public. Through judicious regulation, and only in this way, will it be possible to obtain efficient, economical and adequate co-ordination of motor transport and electric or steam railroads.

Federal regulation of interstate common-carrier motor transportation has not as yet been adopted, but it is believed that it is necessary.

Municipal regulation of common-carrier motor service frequently interferes with the effectiveness of this form of transportation, particularly where such municipal regulation conflicts with regulation by the state.

The principle of regulation by state regulatory bodies of intrastate traffic has been quite generally accepted in this country, and is believed to be sound as applied to motor vehicle common carriers as well as to other public utilities.

The scope of the regulatory powers of the utility commissions varies widely in the several states. The following outline covers broadly the powers which have been vested in these commissions for the purpose of public supervision of common carriers:

(a) Power to grant, refuse to grant, supplement and amend the right to operate.

(b) Determination of the amount upon which, in fairness and justice to both the investor and the public, the enterprise should be allowed to earn a return.

(c) Establishment of rates or systems of rates which will yield sufficient revenue to meet all operating and overhead charges, including a reasonable rate of return to the investor.

(d) Power of regulation in respect to all matters affecting conditions and character of service, including extensions and improvements.

The right to operate common-carrier motor vehicles, similar to that to operate an electric railway or other public utility, should be contingent upon the granting of a certificate of public convenience and necessity. In considering an application for such a certificate, the state commission should take into account, as the commissions now do in the states where the motor vehicle is under their jurisdiction, the extent and quality of service rendered by the existing agencies, the desirability of intro-

ducing new competition or forcing existing agencies to curtail or discontinue their operations—in short, the public interest in the premises.

If a certificate is granted, the operator should be compelled to furnish ample evidence of financial responsibility or else carry insurance adequate to cover all injuries to persons or damage to property resulting from negligent operation.

Where motor transport, particularly by passenger buses, appears to answer the public need most fully, it is believed that other forms of common carriers should be permitted to install such service as an adjunct to their lines. They are now prevented by the laws of some states, and it is believed that such laws should be repealed.

SIZE, WEIGHT AND SPEED RESTRICTIONS

The enormous development of the motor vehicle, during the past ten years, not only in numbers but also in size and weight, has introduced a number of very perplexing problems with respect to the construction and maintenance of highways and the supervision of traffic on the highways. The increased wear on highways due to the increasing use of heavier and faster vehicles has resulted in the adoption by most of the states of size, weight and speed restrictions.

At the present time there is no uniformity in these restrictions, and this results in serious inconvenience and hardship on individuals and companies operating in more than one state. The weight restrictions in some states are rather indefinite, some specifying gross weight of vehicle and load, enumerating maximum permissible weight on four wheels and six wheels and stating distance between axles, while other states in addition to the above restrict the maximum load per inch of tire. It is believed that there should be uniform size, weight and speed restrictions in all states and municipalities, provided that, where conditions demand, seasonal restrictions, lower than those normally enforced, should be prescribed and administered, under proper safeguards, by the state authority.

CONCLUSIONS

The committee makes extended recommendations, among them the following:

"The best interests of the public and the rail, water and motor carriers lie in co-operation between the various agencies of transportation rather than in wasteful competition.

"To insure to the public continuity and reliability of service, sound financial organization of motor transport is necessary, as well as public regulation of common-carrier motor service.

"Passenger bus transport should be so regulated as to secure the best service to the public, certificates of public convenience and necessity as already required in many states being a useful means of insuring reliable and continuous service. Rail lines can often advantageously extend or supplement

their service by bus lines, and in states where this is now prohibited such restrictions should be abolished."

Report on Taxation

The sub-committee appointed to consider this topic was made up of the following: George A. Post, chairman Geo. A. Post Company, Inc., New York; A. J. Brosseau, president Mack Trucks, Inc., New York; Roy D. Chapin, chairman of board Hudson Motor Car Company, Detroit; W. R. Cole, president Nashville, Chattanooga & St. Louis Railway, Nashville; Gerrit Fort, vice-president Boston & Maine Railroad, Boston; Philip H. Gadsden, vice-president United Gas Improvement Company, Philadelphia; W. H. Maltbie, attorney-at-law, chairman committee on special taxes, American Electric Railway Association, Baltimore. An abstract follows:

TAXES PAID BY TRANSPORT AGENCIES

Statistics show that in 1913 the Class I steam railroads of the country paid \$118,386,859 in taxes, as compared with \$322,300,406 paid out in dividends. In 1921 these railroads paid \$275,875,990 in taxes and \$298,511,328 in dividends. The taxes exceeded the dividends in 1920 and 1922. The steam and electric railways and motor transport in 1921 paid more than 8 per cent of the nation's total taxes of approximately \$9,000,000,000.

In 1921, in addition to these taxes, Class I steam railroads expended \$756,413,690 for maintenance of way and structures, charging the sum to operating account. In the same year the electric railways paid in taxes and imposts \$92,033,000. In addition they paid approximately \$101,000,000 for maintenance of way and structures, charging the same to operating account. Motor vehicle owners paid in 1921 on the vehicles \$75,000,000 in personal property taxes, \$115,500,000 in special federal excise taxes, \$147,000,000 in special taxes applied directly to the construction and maintenance of public highways, and in addition large sums to various municipal taxes, corporation and business-income taxes, and other property taxes, for which no figures are available.

DIFFERENT METHODS OF TAXATION

Consideration of the different methods of taxation in ordinary use leads to the conclusion that it is impossible to recommend any one of them as ideal or equitable for the taxation of common carriers.

A frequent method of taxation of common carriers is ad valorem taxation; that is, a taxation rate applied to an investment or valuation basis. This is largely an attempt to apply the old general property tax, in use in the early days of this country for the taxation of lands and of simple personal property, to complex and widely distributed economic units, manifestly in form unfitted for such methods of taxation.

It is now admitted by most taxation

experts that the most equitable method of taxation for public utilities is that based upon earnings or income.

A graduated tax on gross earnings depending on the relation of net to gross was recommended by the New York State committee on taxation and retrenchment, in its report submitted March 1, 1922. This system has been designated the "gross-net" tax, and the committee recommends it as sound in principle, and one which should be applied to steam and electric railways and as far as practicable to motor vehicle common carriers. The details of such a tax scale would have to be worked out with much care in order that each form of transportation shall bear its just share of the requirements for public expenditures.

Such a tax has the elements of a sound tax, in that it has certainty, reasonableness and simplicity, while at the same time the state in each case will be assured of at least some revenue from each corporation.

This tax as applied to steam railroads and electric railways should replace the multiplicity of taxes at present levied upon them, including federal taxes on capital stock and income, and the various state and local taxes, such as franchise taxes (of different forms in each state), ad valorem taxes, taxes on gross earnings and on capital stock, annual licenses, special franchises, local real estate and personal property taxes. The gross-net tax should replace all of these taxes.

There are undoubtedly difficulties to be overcome in the application of the gross-net tax system. One of these is the allocation to the various political units of the gross and net earnings of interstate carriers on which the tax must be computed. The committee believes, however, that an equitable method of allocation can be devised.

Under the diverse bookkeeping methods employed by the small companies and by individuals who comprise the bulk of the highway transport common-carrier operators of today, practical administration of a gross-net tax is impossible. Pending common-carrier regulatory control which will place the earnings of these carriers upon a comparable basis for taxation, the committee believes that such increases should be made in the taxes now levied against the common-carrier motor vehicle as will bring its charges to an amount equitably proportionate to those that may be assessed against the other carriers.

It is recognized that this recommendation segregates common-carrier motor vehicles not only from private cars which have no gross or net earnings, but also from motor trucks used as private carriers and not subject to public control.

CONSTRUCTION AND MAINTENANCE OF HIGHWAYS

The report then gives the sources of money for the highway program for 1921, according to the United States Bureau of Public Roads, as follows:

AMOUNT AND SOURCES OF HIGHWAY BUDGET, 1921

Source	Amount	Per Cent
Bonds.....	\$417,817,208	39.0
General state and local taxation.....	381,091,542	43.9
Miscellaneous.....	88,919,158	
Gasoline tax and registration fees.....	109,154,226	10.2
Federal and forest road aid.....	74,679,897	6.9
Total.....	\$1,071,662,031	100.0

Of the \$853,844,823, representing all of the money above except that raised by bonds, the sum of \$183,000,000 came from special taxes assessed against the motor vehicle and the balance from general and miscellaneous taxation.

Continuing, the committee says that it frankly accepts the motor vehicle as an essential addition to the transportation agencies required in our modern economic life. It follows that improved roads to carry the motor vehicle are equally necessary. These highways are free to the general public, and are built out of general public funds just as are schools, parks and many other improvements essential to the public health and welfare.

In the case of steam and electric railways the investment in roadway is a capital account, and returns on this investment are paid out of income, but on the other hand the steam and electric railways have certain franchise rights in the use of their roadway. Since the motor vehicle derives a special benefit from the improved highway, the committee believes that it should bear the entire expense of maintaining these roads in as good condition as when they were built, even where this involves resurfacing or reconstruction of the same type of road. In addition to a maintenance tax, highway transport common carriers should pay a tax in exchange for franchise rights comparable to those owned by the other carriers.

By paying the cost of maintenance of the highways which it uses, the motor vehicle puts itself on an equality as to maintenance with the steam and electric railways, which pay for the maintenance of their own way and structures through direct charges to operation instead of by taxation.

The committee does not believe, however, that the motor vehicle should be burdened with a special tax for the maintenance of roads not suitable for motor use.

RECOMMENDATIONS

In conclusion the committee makes the following recommendations:

"1. Each form of transportation should bear its fair share of the burden of public expenditure.

"2. Taxation of common-carrier transportation agencies should be simplified as far as possible.

"3. Taxes on regulated common carriers operated for hire should bear a definite relation to gross and net earnings rather than to invested capital.

"4. This requirement can best be met in the case of steam and electric rail common carriers by the imposition of a gross-net tax in lieu of the present levies. Pending full regulation of the

motor common carrier, such increases should be made in taxes now levied against it as will bring them an amount equitably proportionate to that which may be assessed against the other carriers.

"5. The entire cost of maintaining the improved highways of the country should be borne from special taxes levied against the road user. Such taxes should be used for no other purpose.

"6. Co-ordination of highway construction and maintenance under centralized administrative agencies is urged to eliminate waste and secure efficiency."

Car Weight, Stability and Tires

AT THE fifteenth annual congress of the Tramways & Light Railways Association, held at Swansea, Wales, on June 21 and 22, W. E. Ireland, rolling stock engineer London County Council Tramways, presented a paper on "Electric Tramway Rolling Stock," dealing with the subject from an engineering point of view. He considered first the desire to produce rolling stock of lighter weight and the factors involved. In regard to double-deck cars, a prime essential was to determine what was to be top-deck load, bearing in mind stability of the car and its ability to resist overturning by wind pressure or by centrifugal force on curves. There had also to be considered strength of pillars, rails, etc., to resist vertical load due to weight of passengers, side stresses and members, the thrusts due to acceleration and retardation. It had to be appreciated that top-deck passenger loads will reach 6,440 lb. or more, added to the weight of the roof cover, say 3,700 lb., making a total of 10,140 lb. Tables were given showing the centrifugal force in pounds in case of a fully loaded car weighing 20 tons at speeds from 1 to 15 miles per hour and on curves of from 45 ft. to 100 ft. radius and total pressure resulting from a wind with a velocity of 60 miles an hour on side of car.

The application of these forces on a car fully loaded on the top deck only was shown, and from this came the deduction that to render the car stable sufficient weight must be introduced into the lower parts to balance forces acting above the center of gravity. The method of locating the center of gravity and determining the weight to be put into the lower parts of the car was illustrated by diagrams. In reference to the forces acting on the ends of the car, Mr. Ireland said that in order to provide a sound foundation and also additional support to vertical members the steel underframe had proved most successful, as it provided the necessary support in both vertical and horizontal directions and rendered the use of a truss rod unnecessary. The parts to resist stresses in their nature determined their own weight. Regarding the top-deck cover, loads were small and stresses limited, so that the structure

could be designed in the lightest possible way. With respect to adding sufficient weight to the lower parts of the car to bring the center of gravity to a predetermined position, in some cases it had been found necessary to increase the cross-section of truck sides considerably beyond that required for strength.

Coming to the question of single-deck cars, Mr. Ireland referred to efforts made in America to reduce weight and quoted weights of some single-deck cars in the United States and of double-deck cars in Britain in order to show that the weight per seat was much less in the latter case than in the former. Taking the bogie cars in use in London, Manchester and Birmingham (narrow gage) weights per seat were respectively 423 lb., 393 lb. and 569 lb. A single-deck car, in which the question of stability introduced less complication than in the case of double-deck cars, could be designed in much lighter material than a double-deck car of equal carrying capacity. Mr. Ireland showed a form of body which while giving ample resistance to stresses lent itself to lightness of construction, and also a design for single-deck coupled cars in which the weight of all members would be reduced to a minimum. The body would be supported directly on axle boxes through long laminated springs, with spiral springs between the links and underframe, thus dispensing with the usual form of truck. The motors would be suspended from the underframe and the drive to the axles would be by a silent chain. The axles would be forged hollow, so as to reduce the unsprung weight. The estimated total weight of such a car was 9,520 lb., or 244 lb. per seat. Provision would be made for automatic application of the brake gear in event of cars parting. Two independent systems of mechanically operated brakes were intended to be provided in cases where magnetic brakes were not used.

Mr. Ireland in the last part of his paper dealt with the subject of wear of tires, on which for the last three years he has carried out research work. His conclusions were published in the *ELECTRIC RAILWAY JOURNAL* Aug. 18, 1923.

Chamber of Commerce Begins Accident Campaign

THE Insurance Department of the Chamber of Commerce of the United States has just begun issuing a series of bulletins designed to assist local chambers of commerce and other civic organizations in conducting accident prevention campaigns. This series has been started on account of the serious public accident situation, which has become worse since the general introduction and use of motor vehicles. According to a statement by James L. Madden, manager of the insurance department, nearly one-fifth of all accidental deaths are now attributed to automobiles alone. The Ford Motor Company reports that of every sixteen fatal accidents experienced by its em-

ployees, only one occurs during the performance of duty. The other fifteen are the result of public accidents which the industrial safety measures established by the company do not prevent.

The first bulletin of the series, just issued, gives in considerable detail the activities of the Safety Division of the Milwaukee Chamber of Commerce, which is carrying out an ambitious program for assisting in the development of public and industrial safety. Methods of planning a safety organization and safety campaign are given.

Fall Meeting of the American Welding Society

THE fall meeting of the American Welding Society was held at the Fort Pitt Hotel, Pittsburgh, Pa., Oct. 24-26. In addition to the regular sessions of the society, meetings of the electric arc welding committee and of the board of directors of the American Welding Society were held and several inspection trips were made to neighboring industrial plants. At the industrial application session a paper was presented on the application of welding and cutting to industrial work. This included a description of various classes of work which have been done by the electric arc, oxyacetylene, resistance and thermit welding processes. Slides were shown illustrating practical work accomplished. The methods and illustrations relating to the electric railway field have already been published in previous issues of the *ELECTRIC RAILWAY JOURNAL*.

Utility Commissioners to Meet at Miami

THE thirty-fifth annual convention of the National Association of Railway and Utilities Commissioners will be held in Miami, Fla., beginning Dec. 4, and will last four days, according to an announcement by President Dwight N. Lewis.

The national association is an organization comprising all the railroad and public service commissions of the different states and the District of Columbia, together with the Interstate Commerce Commission and the commissions of Hawaii, Porto Rico and the Philippines. There is now a regulating commission in every state in the Union excepting Delaware.

The sessions of the convention will be devoted mainly to the presentation and consideration of reports from committees, and will include such topics as public ownership and operation; safety of operation of railroads and public utilities; the questions of service, rates and demurrage; express companies in their relations to the railroads; grade crossings; capitalization; motor vehicle transportation; telephone depreciation; valuation of railroads; and statistics and accounts. A special subject for discussion is the super-power movement, which has gained great headway in the last few years. Herbert Hoover, Secretary of Commerce, who has been

one of the leaders in this movement, has been invited to address the convention. The discussion will be led by Hon. W. D. B. Ainey of the Public Service Commission of Pennsylvania.

Representatives of the railroads and other public utilities will be heard during the convention. Addresses will be delivered by Donald D. Conn of the American Railway Association, Carl D. Jackson and M. H. Aylesworth of the National Electric Light Association,

J. B. Clumpp, president of the American Gas Association, and James P. Barnes of the Louisville Railway, representing the American Electric Railway Association.

Other questions to be considered will be the regulation of motor vehicle transportation, the valuation of the railroads by the Interstate Commerce Commission, elimination and protection of grade crossings of railroads and telephone depreciation.

American Association News

Bases for Valuation Compared*

By L. R. NASH

Stone & Webster, Inc., Boston, Mass.

IT IS not without significance that the committee on valuation now goes further than it did in 1919 in stating that it was strongly influenced in its recommendations by the fact that the courts have up to this time consistently held that present cost of reproduction must be considered. Obviously when seeking the protection of the courts, the methods which they adopt must be followed whether or not they appear most appropriate under existing circumstances.

In spite of the unbroken line of court decisions so far on record on this subject, it does not necessarily follow that some change with respect to public utilities may not be made because of special regulatory practices affecting them but not other industries subject to competitive influences. The Southwestern Bell Telephone case, referred to in the committee's report, occasioned a sharp division among the justices, disclosed in a dissenting opinion which presented in an able and forceful manner the advantages of prudent investment as a rate base. Although this basis was rejected in that case and in more recent Supreme Court cases, the actual recognition given in leading cases to present cost of reproduction as compared with investment has not been wholly encouraging up to this time. In no decision of last resort has present cost of reproduction been the sole measure of value, and in many cases fair value has been so brought down by averaging unit prices over a period of years, or by deductions for depreciation, or both, that the final finding of value has been but slightly higher than actual investment.

Regulatory commissions are still more strongly inclined to adhere to investment as the basis of return in rate cases. It is possible that a sufficient number of further decisions of our leading courts reversing this practice of the commissions would lead to their general adoption of the reproduction method as controlling. This process, however, would require a considerable period of years, during which, it is to

be expected, there will be some decline from the present level of prices to a level much below the maximum prevailing in the post-war period, during which a large amount of public utility construction was necessary. If a few years hence construction prices have fallen to a level 50 per cent above the pre-war level, they will still be at least 33½ per cent below the peak prices prevailing in 1920. It is, therefore, conceivable that actual investment may not only approach consistency with reproduction cost, as pointed out in the report, but that it may materially exceed it after a period of years. A strict adherence to cost of reproduction might, therefore, in time work to the disadvantage of at least some utilities and holders of their securities.

It will be of interest to make certain assumptions as to the future level of prices affecting public utility properties and the growth of these properties to determine when, if at all, the cost-of-reproduction method will cease to yield a value higher than the actual investment. For this purpose a public utility has been assumed having, in 1913, 10,000 units of property, each with a value of \$100 and, therefore, representing a total value (assumed to coincide with investment) of \$1,000,000. Each year there is added to the property a number of similar units equal to 5 per cent of those then existing. Such an assumption is not inconsistent with the history of progressive public utilities. Next there has been determined the annual weighted average prices of units such as those assumed, and estimates have been made as closely as possible of the future movements of these prices. The prices of materials entering into public utility properties are now substantially higher than the average of all commodities. While the reasons for the discrepancy will in part continue, it is to be expected that there will be a tendency toward greater consistency within the next few years, after which a decline in public utility and other prices will continue at about the same rate as the increase which occurred during the period from 1896 to 1913 and the decrease during

*Abstract of written discussion on the report of the A.E.R.A. valuation committee.

the preceding period which began about 1878. The rate of change in these periods was about 2 per cent per annum. It may appear inconsistent with the discussion and conclusions of the committee's report to assume a reduction in public utility construction costs continuing after they have come into accord with general prices, but such reduction is, nevertheless, anticipated by many well-informed people, and it is at least permissible to determine the results of such possible reduction.

The above assumptions are all embodied in an accompanying table which

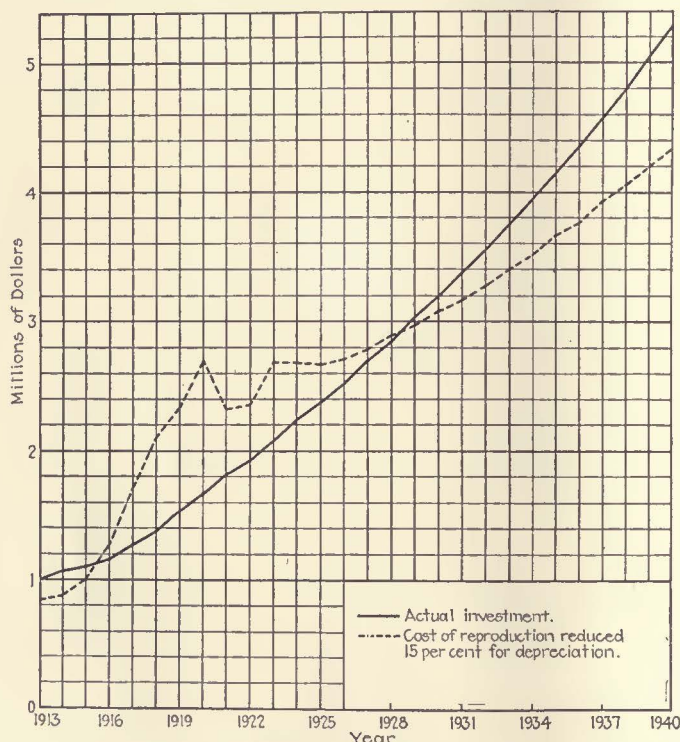
crease in the former but a far less regular change in the latter. The cost of reproduction increases rapidly up to 1920, after which there is an actual decline in spite of the annual increase in number of property units, which decline is not overcome for several years. It appears that in 1938 the investment begins to exceed the cost of reproduction, the excess increasing from year to year. It follows under the assumptions made that if public utilities, either voluntarily or through unreversed regulatory action, are limited to return on the investment for the next fifteen

the rate of growth were more rapid than that assumed in the accompanying table, the investment would overtake the cost of reproduction at an earlier date. If, for example, the property units increased at the rate of 10 per cent per annum instead of 5 per cent, the investment would exceed the cost of reproduction within ten years.

If the prices of public utility materials fail to decline materially during the coming years, the investment would not equal cost of reproduction until a later date, if at all, depending upon the trend of prices. If, on the other hand, the decline is sharper than that assumed, the investment would overtake the cost of reproduction more promptly. Computations in which prices are assumed to have fallen to 150 in 1930 instead of 1933, as in the accompanying table, show investment overtaking cost of reproduction within ten years from now instead of fifteen years.

The uniformity in rate of growth, assumed in the accompanying table, does not represent the facts, particularly during the period of most rapid price fluctuations. Prior to and during our participation in the World War there was an enforced curtailment of construction except where required for war purposes. During the following years of continued business activity and also of maximum commodity prices, it was necessary for many public utilities to undertake an exceptionally large amount of construction, and so the effect of peak prices upon investment becomes more pronounced than under the assumptions of a uniform growth. It follows that under such circumstances investment will overtake reproduction cost at an earlier date.

It is to be noted also that no deductions have been made for accrued depreciation from any of the figures compared in the accompanying table. A study of rate decision shows very few cases where deductions have been made from investment for depreciation, but a comparatively large number in which such deductions are made when the reproduction method is used in determining value. If, therefore, it is assumed that cost of reproduction figures are generally subject to such deductions and actual costs are not, there is a further tendency for investment to show an earlier advantage. Actual investment overtakes the cost of reproduction, shown in the accompanying



Relative Trends of Investment and Cost of Reproduction, Public Utility Valuation

shows for a series of years from 1913 to 1940 the number of units in the property, the current costs of these units, and the actual investment, starting at \$1,000,000 and increasing from year to year by the current costs of the added units. There has then been computed the cost of reproduction of the entire existing units in each year at the prices then prevailing. The figures shown are not exact, being obtained by slide-rule computations.

The columns of total investment and cost of reproduction show a steady in-

crease in the former but a far less regular change in the latter. The cost of reproduction increases rapidly up to 1920, after which there is an actual decline in spite of the annual increase in number of property units, which decline is not overcome for several years. It appears that in 1938 the investment begins to exceed the cost of reproduction, the excess increasing from year to year. It follows under the assumptions made that if public utilities, either voluntarily or through unreversed regulatory action, are limited to return on the investment for the next fifteen

years, it would thereafter be to their advantage to have this basis of value continue instead of changing to cost of reproduction. If other assumptions were made as to rate of growth or the trend of future prices, different comparative results would be obtained. It goes without saying that a property without any growth since 1913 would continue to gain advantage through the cost-of-reproduction method as long as current prices remained higher than those prevailing in 1913. On the other hand, if

PUBLIC UTILITY VALUATION—RELATION OF COST OF REPRODUCTION TO INVESTMENT
(5 per Cent Increase in Property Units per Annum)

Year	Total	Number of Units Annual Additions	Current Unit Costs	Investment			Cost of Reproduction	Year	Total	Number of Units Annual Additions	Current Unit Costs	Investment			Cost of Reproduction
				Total	Annual Additions							Total	Annual Additions		
1913	10,000		\$100	\$1,000,000			\$1,000,000	1927	19,800	945	\$166	\$2,698,000	\$157,000		\$3,280,700
1914	10,500	500	98	1,049,000	\$49,000		1,029,000	1928	20,890	990	163	2,859,000	161,000		3,405,000
1915	11,025	525	107	1,105,000	56,000		1,180,000	1929	21,935	1,045	160	3,026,000	167,000		3,510,000
1916	11,575	550	130	1,177,000	72,000		1,505,000	1930	23,030	1,095	157	3,198,000	172,000		3,616,000
1917	12,155	580	165	1,273,000	96,000		2,006,000	1931	24,180	1,150	154	3,375,000	177,000		3,723,000
1918	12,760	605	195	1,391,000	118,000		2,488,000	1932	25,390	1,210	152	3,559,000	184,000		3,859,000
1919	13,400	640	205	1,522,000	131,000		2,748,000	1933	26,660	1,270	150	3,750,000	191,000		3,999,000
1920	14,070	670	225	1,673,000	151,000		3,166,000	1934	27,995	1,335	148	3,948,000	198,000		4,143,000
1921	14,755	705	185	1,804,000	131,000		2,734,000	1935	29,395	1,400	146	4,152,000	204,000		4,291,000
1922	15,515	740	180	1,937,000	133,000		2,794,000	1936	30,865	1,470	144	4,364,000	212,000		4,444,000
1923	16,290	775	195	2,088,000	151,000		3,178,000	1937	32,410	1,545	142	4,583,000	219,000		4,600,000
1924	17,105	815	185	2,239,000	151,000		3,165,000	1938	34,030	1,620	140	4,810,000	227,000		4,764,000
1925	17,960	855	175	2,389,000	150,000		3,144,000	1939	35,730	1,700	138	5,045,000	235,000		4,940,000
1926	18,855	895	170	2,541,000	152,000		3,206,000	1940	37,570	1,790	136	5,288,000	243,000		5,103,000

table and chart, in 1929 if the cost is reduced by 15 per cent for depreciation.

It would not be unreasonable, in the light of the above data, to predict that with only partial recognition of present cost of reproduction, which still prevails, and the deductions for depreciation which may be made because of such recognition, this basis of value will yield higher results than actual investment during only a few more years, after which its exclusive use would not be advantageous even if permissible.

This discussion, with its accompanying data, is not presented for the purpose of discouraging reasonable attention to cost of reproduction but to point out that investment should not be ignored. The report recommends that both these evidences of value should always be presented in rate cases as has been the general practice in the past.

Before the war the simplicity of the investment basis, which did not differ radically from cost of reproduction, had its appeal to both utilities and commissions. During and following the war departure from this basis was necessary to maintain the credit or solvency of many companies. A rate of return within the limits which the commissions felt free to authorize would not, when applied to investment, yield a return attractive to new capital. Other companies, however, passed through the war period with satisfactory rate adjustments without claims for value higher than investment.

With return to more stable economic conditions this basis should show increasingly favorable results, but, as the valuation report points out, cost of reproduction cannot safely be ignored whether it be greater or less than investment.

Publicity Committee Activities

BROAD plans for closer co-operation between the American Electric Railway Association and the state committees on public utility information have just been announced by Secretary James W. Welsh.

The outstanding feature of the new plans is to have a member of the committee on state and sectional co-operation in each state where there is a state committee on public utility information who will see that electric railways co-operate not only with the state and sectional association, but also with the state committees on public utility information. James P. Barnes, as chairman of the committee, already is bringing about closer co-operation, and the committee has arranged to have several speakers at state and sectional meetings in the near future. It is planned to have a speaker representing the American Association at each of these meetings throughout the coming year.

Representatives on the committee were chosen after conferences between W. H. Sawyer, chairman of the committee on publicity, and the directors of state committees. Other recent ac-

tivities of the committee on publicity include:

A special interurban drawing designed to decrease crossing accidents has been reproduced on posters for hanging in car windows, waiting stations and elsewhere, and also on a postcard. Both posters and postcards are now being offered to the industry.

A special sticker for manufacturers' letters declaring that the manufacturer is dependent largely on electric railway sales for his business, and that the recipient as a customer of his should do all he can to help the electric railways, has been prepared and distributed. These stickers have proved very popular and orders for 50,000 already have been received.

The award of the special committee on inspection of exhibits at the Atlantic City convention, which was to determine what manufacturers were entitled to certificates of participation in the good-will work of the manufacturers, has been made. Certificates have been awarded to 115 companies, and the advertising section now is having the certificates signed and will place them in the manufacturers' hands in a few days.

The November issue of *Truth* has just been issued to the extent of 3,000 copies. Subjects with which it deals include Secretary Welsh's remarks regarding the increase in car riding; a story showing how it costs New York City taxpayers more than 10 cents to carry 5-cent passengers on the Staten Island trackless trolley; co-ordination of buses with electric railways; the decision of the Manchester (England) board of trustees that buses cannot perform the major traffic service; a human interest story regarding the introduction of new double-entrance cars in Brooklyn; the need for better vehicle laws; and the fact that workmen pay an average of \$4 apiece in special taxes through railway fares which the companies do not get.

Important subjects on which the committee on publicity plans to produce advertising material include general interurban and tax problems and Xmas shopping between 10 and 4 o'clock. Work on material for the last-named problem is now under way.

New Members

THE following applications for membership in the American Electric Railway Association were approved by the executive committee at its recent meeting:

The Decatur, Champaign, and Bloomington & Normal divisions of the Illinois Power & Light Corporation.

Continental Secret Service, Philadelphia, Pa.

Keystone Lubricating Company, Philadelphia, manufacturer of lubricants.

For associate membership: Parsons, Klapp, Brinckerhoff & Douglas, New York, N. Y.

Newman Saunders & Company, Inc., New York, N. Y.

Ten applications for individual membership in the various associations were also approved.

A.E.S.C. Special Trackwork Committee Meets

THE second meeting of the sectional committee on specifications for special trackwork materials and design of 7-in. plain girder rail of the American Engineering Standards Committee was held Nov. 7 at the headquarters of the American Electric Railway Association, New York. After considerable discussion the report of the sub-committee on scope was adopted in the following form:

1. *Title of Specifications*—Specifications for special trackwork materials.

2. *Definition of Special Trackwork*—All rails, rail structures and fittings, other than plain unguarded track neither curved nor fabricated before laying.

3. *Principal Structural Items in Special Trackwork*—Switches; mates; frogs; crossings; guarded, curved and fabricated rails, etc. Appurtenances and fittings for the preceding items, such as plates, rods, fillers, braces, knees, guards, risers, stops, springs, housings, clips, bolts, nuts, washers, rivets, etc.

4. *Principal Materials in Special Trackwork*—(a) Rolled rails: tee, plain girder, girder grooved, girder guard. These rails may be of bessemer carbon steel, open-hearth carbon steel or manganese steel. (b) Rolled shapes: steel, iron. (c) Forgings: steel, iron. (d) Castings: gray iron, malleable iron, carbon steel, manganese steel.

5. *Specifications*—Existing specifications of A.R.A., A.R.E.A., A.E.R.E.A., A.S.T.M., M.T.S., etc., to be used as far as applicable.

6. *Steam Railroad and Electric Railway Special Trackwork*—Specifications to include all special trackwork for whatever use and of whatever type or gage, including steam railroad use in all services, including use in paved streets, electric railway service, storage battery, gasoline engine or any other motive power; industrial and mine tracks.

7. *Authority of Committee*—It is recommended that the tentative report of the sectional committee be submitted for information and suggestions to the track committee of the A.R.E.A. and the committee on way matters of the A.E.R.E.A. before final action is taken.

8. *Designs for Plain Girder Rails*—It should be understood that the designs are not necessarily to be confined closely to the weights of 90 lb. and 91 lb. for such rails as given in the assignment of the subject.

Those present at the meeting were: V. Angerer, chairman; R. C. Cram, vice-chairman; C. A. Alden, E. B. Entwisle, G. L. Fowler, H. H. George, E. P. Roundey, E. M. T. Ryder, J. B. Strong and G. C. Hecker.

Maintenance of Equipment

Close Fitting Trolley Ears Reduce Line Maintenance Cost

BY G. H. MCKELWAY

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WITHIN the last few years manufacturers of overhead line material have brought out round top hangers designed so that the ear can be screwed up snugly against the under side of the hanger. This construction is a great improvement. With the old design there was no certainty that the ear would be brought up close to the hanger, and after installation, the ear usually would have to be backed off a part of a turn to make it line up with the trolley wire.

The advantage of a tight fit and the damage that occurs to both the hanger and the ear by their slight relative movements if they are not securely fastened to each other can be seen by an inspection of the scrapheap. On one property I found from 50 to 75 per cent of the hangers were scrapped because the threads on the studs were so badly worn by movement that it was unsafe to reinstall them after they had been taken down, or to screw a new ear to them after the old one had been pulled off.

WORN THREADS LIMIT SERVICE

Many hangers with shells and insulation in splendid condition are made useless by worn threads, and years of additional service could be obtained if the studs were in good shape. In nearly all cases the ears attached to the hangers must be thrown away too, because of worn threads and not because of lips worn away or other defects.

Before the tight-fitting feature was added to round top hangers, good results were obtained by using either the cap and cone or "West End" hangers. With both of these types, however, there was liability of the stud unscrewing from the ear and letting the wire sag down. The turning of the stud can be prevented by the use of a lock washer, but this adds another part to the hangers, which are already composed of three

parts, too many for quick and easy installation.

One engineer, seeing the advantage of keeping the ear close to the round top hanger, proposed making the hub of the ear thinner than was customary and dishing it out at the top. The outside rim of the hub would then bend down enough under pressure to permit twisting the ear another half turn. It would be necessary, however, to line up the ear if it should be out of line with the hanger. This plan was put into practice only to a limited extent and not enough to give it a conclusive trial.

The higher cost of the new design of hanger may seem to be a formidable objection, but careful consideration will show that there is a saving rather than a loss by the use of the newer type. If the old hanger costs 75 cents, and the new one 85 cents, and as not more than fifty-seven of these hangers are needed per mile, the increased cost will be only about \$5.50 or \$6 per mile.

The increase of life to be expected from the newer hangers over the ordinary type is at least 50 per cent and in some cases perhaps 100 per cent, so that the increased cost of 13½ per cent is more than offset by the saving. The ears when worn out will weigh 17 or 18 ounces and their scrap value is about 14 cents, at the present price of scrap copper. There will also be some saving in the number of ears, owing to the fact that a new car has to be installed practically every time a hanger is replaced. The percentage of such ears to the total number used will be very small, probably not more than 5 or 10 per cent, so that the saving on ears will reduce the difference in cost of the hangers by only about 3 cents.

The installation cost is still to be considered. If all of the hangers on a line are replaced at one time, this would be comparatively low, but the replacement of defective hangers is not done that way and often the line crew has to make a run of several miles, taking an hour or two of their time in order to replace a

single hanger. Even under much better conditions it will be easy to calculate that the labor and trucking cost, whether the latter includes the use of horses, auto trucks or cars, will reach 50 cents for each hanger installed, and if that low amount be added to the other costs it will be found that the new type of hanger will cost only about 5 per cent more than the old type.

How Car-Type Resistors Can Be Standardized

AMONG the items of car equipment in which standardization will effect material reductions in the number of spare parts required for maintenance, grid resistors offer attractive possibilities. Railway systems using many types of equipment

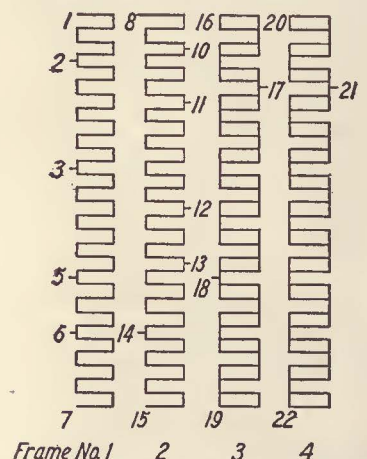


Fig. 1 — Standard Frames of 8-In., Three-Point Grid Resistors. Note That All These Frames Are of the Same Length (Thirty Grids) and Use Only Two Sizes of Grids

experience trouble and expense in maintaining resistors due to diversity in sizes and types. Under these conditions, according to the Westinghouse Electric & Manufacturing Company, a program of resistor standardization is practicable and will result in desirable saving in maintenance costs.

The ideal resistor equipment would be one in which grids of only one size are mounted in one frame, varying the number of these complete units on a car to suit the different motor and control equip-

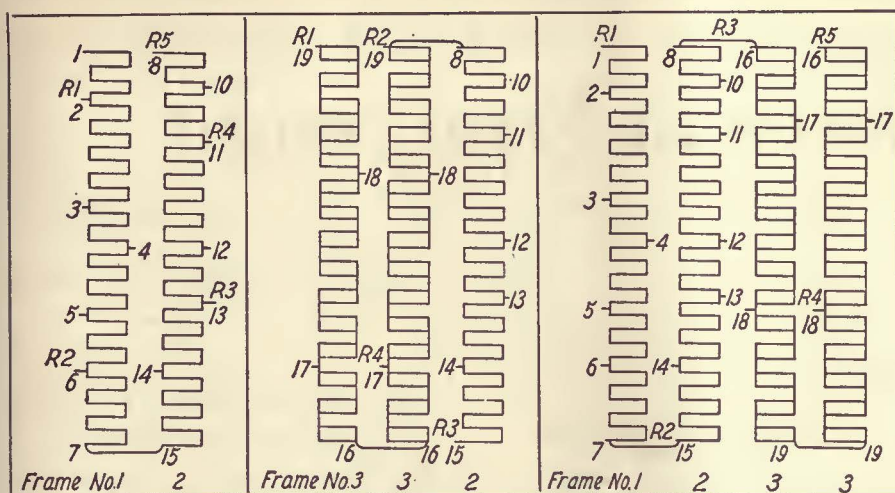


Fig. 2—Class "D" Standard Resistor. Made Up of One No. 1 Frame and One No. 2 Frame. Fig. 3—Class "J" Standard Resistor. Made Up of One No. 2 Frame and Two No. 3 Frames. Fig. 4—Class "C" Standard Resistor. Made Up of One No. 1 Frame, One No. 2 Frame and Two No. 3 Frames

ments. With many types of motor and control equipments on various types of cars, it is usually impossible to carry the standardization thus far, due to the capacity requirements and the various numbers of controller steps sometimes used on one property. The standardization usually can be carried to a point where not more than two different sizes of grids are employed. When more than one size of grid is required to provide for different equipments the individual frames should be designed, if possible, so as to use only one size of grid, i.e., with one current capacity and resistance value.

ONE SIZE UNITS DESIRABLE

A desirable arrangement provides a group of standard resistor units all of the same frame length, so that from this group certain frames could be connected in an assembly to give the required acceleration and current carrying capacity to any particular car equipment. It is possible to get an assembly suitable for each type of motor and control equipment by using other combinations of frames from this group of standard resistors.

Fig. 1 shows four typical standardized frames in which, however, only two styles of grid are used. Frames 1 and 3 use style A grids connected respectively in series and in parallel, and frames 2 and 4 use style B grids, similarly in the series and the parallel arrangements. From these four frames combinations such as those shown in Figs. 2, 3 and 4 can be assembled for various motor equipments.

In applying this plan a number can be assigned to each standard

resistor frame. Then in case of failure of grids it is only necessary to remove the defective frame and replace it by another of the same number, making the proper connections of resistor leads as shown on the car wiring diagrams. The car is then again ready for service. The damaged frame can be repaired later in the shop.

As a result of the decrease in types and sizes of grids that must be carried, this practice saves considerable investment in stock. In addition repairs can be made more quickly. The cars are therefore not kept out of service awaiting the assembly of special resistor frames. Still another advantage is that standardized resistor grids are readily obtainable from the manufacturer and will enable him to make shorter deliveries.

Beginning with the purchase of a certain lot of cars, the resistor frames for these and later purchases can usually be standardized. To extend this to older cars will, in some cases, require relocating other apparatus. The question to be determined, therefore, is that of selecting the standard frame length that can be applied to all cars, old and new, with the least expense in changing other apparatus under the car. Then the problem is to reduce the number of different grid resistors required to make up the frame to not more than three, and, if possible, two.

The standard resistor frame would provide for one standard tie rod with insulation, one type of terminals, etc., that are a part of the resistor. Further economies can be obtained by standardizing the insulated bolts, the hangers on the car and the method of mounting the resistors.

To carry out such a program, a thorough study of service conditions and requirements for different equipments on a given property must be made. In addition, the various weights of cars, types of motors, types of control, diameters of wheels, gear ratios, etc., must be considered.

Getting Best Results from Lightning Arresters

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DISSATISFACTION with the protection afforded by lightning arresters is usually not the fault of the arresters. Improper installation and lack of maintenance nullify the protective value of any type. When dissatisfaction exists it is advisable to call in an expert so that the maximum benefit can be obtained from the investment that has been made in car arresters.

Users of arresters can, however, do much for themselves by thoroughly investigating the installations along the following lines:

1. Make a careful inspection of all the car arrester equipments and put them in proper mechanical adjustment. Check the coils, gap setting (25 mil gap standard) and resistance rods on the MD and MD-2 types. Inspect the carborundum block of the MP arrester and see that the circuit is continuous down to the arrester and from there to ground. Many of the old arresters are possibly in such condition that they should be removed and replaced with modern arresters, saving any parts in suitable condition for spares.

ROOF MOUNTING BEST

2. If possible to do so, a better installation can be effected by mounting the arresters on the car roof. Here they are away from the wheel wash and road conditions to which they are subject when located under the cars. The roof mounting also makes them more accessible for inspection and thus keeps them in better operating condition. With the under-car location, the only convenient time for inspection is when the car is run in over the pits. Furthermore, when installed on the roof on steel frame cars, a ground can be made right at the arrester, supplemented by the usual ground lead to the motor frame or axle housing.

3. With the gap-type arrester, in particular, some improvement can be effected by using a small choke coil

in the leads to the controllers. This can readily be made up of ten or twelve turns of the line conductor on a wood core of about 6 in. diameter.

4. It is advisable to keep some record of actual failures on car equipments due to lightning, particularly to show the locations on the system where trouble occurs, as well as the nature of the failure and the effect on service. This would give a basis for a more logical analysis of conditions in the future.

5. The d.c. aluminum arrester is the only real solution of the lightning protection problem where severe conditions are met. This type, however, requires a definite amount of attention and has a higher maintenance charge than the gap type. Experience on a large number of 600-volt systems in the worst lightning zones in the country has clearly demonstrated that this extra maintenance and higher cost is more than warranted by the freedom from lightning troubles which this type of arrester insures.

CAREFUL MAINTENANCE ESSENTIAL

On some street railway systems, however, a large proportion of the system is so shielded that severe conditions do not exist and the gap type should give a favorable degree of protection. Further analysis may show that certain lines or sections may require a better degree of protection. The first step would logically consist in giving the present arresters the best possible opportunity of performing their function. Obviously, there is no real advantage in investing in lightning arresters unless the arresters are properly installed and maintained.

The gap type of arrester as represented by the MD-3 arrester, which is the modern type of the MD and MD-2 arresters, is an arrester of limited discharge capacity and subject to the further limitations of any series gap arrester. This gap requires a certain definite voltage to break it down, and up to that point no protection exists. Where really severe lightning troubles exist, the direct current aluminum arrester offers the most nearly perfect protection that can be obtained on street railway work.

It is obvious that with the degree of shielding that exists on some systems there cannot be the amount of trouble from lightning that would occur on a similar amount of trackage and overhead lines in exposed

open country. It is only on exposed sections outside the city that any very serious trouble might be expected. If conditions were such that cars were always operated on given lines, such exposed sections could be given a better class of protection than for the other lines. This has been followed with success in several instances. With the pooling of all equipment and its use anywhere over the system such a scheme is not feasible.

Supplying Sand to Locomotives

A CONVENIENT arrangement of elevated boxes for supplying sand to electric locomotives is used by the Norfolk & Western Railway at Bluefield, W. Va. Six sand boxes mounted on poles are arranged in two sets of three boxes each. These are placed so that the six locomotive sand boxes of a unit can be filled through the cab windows at one time by gravity, using the spouts which hang below the elevated boxes. An accompanying illustration shows the sand boxes and equipment. The sand boxes are filled from a drying room located on the near side of the track not shown in the illustration. The sand is conveyed from the drying room to the boxes by approximately 70 lb. of air pressure through 2-in. iron pipes, marked *B* in the picture. There are three of these riser pipes at the end of the first sand box of each group, one for each box. The distance from the drying room to the sand boxes is approximately 150 ft.

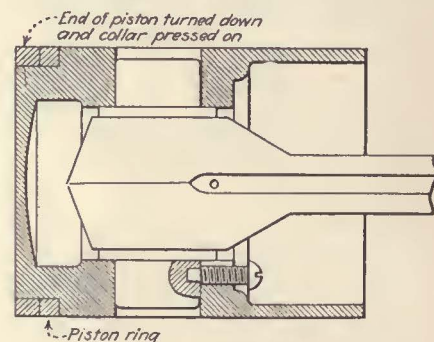
To fill the sand boxes on the locomotive the unit is run alongside and the spouts are placed in position through the cab windows. Valve

handles marked *C* in the illustration open the discharge pipes. The boxes are 2 ft. x 4 ft. x 6 ft. in size.

While receiving sand, the water rheostat used on the locomotive can also be filled. At the point marked *D* on the accompanying illustration there is a large pipe riser with a small horizontal cross pipe. A hose, marked *E*, hangs from this and is used to fill the rheostat.

Repairing Worn Piston Ring Grooves

WHEN the piston ring grooves in compressor pistons become worn to such an extent that a properly fitted piston ring cannot be installed, the New York Railways turns down the end of the piston and presses on a new collar to re-



Proper Fit of Piston Ring Is Made by Turning Down End of Piston and Pressing on a Collar to Replace Metal Removed

place the metal removed. The accompanying illustration shows the method as used in the Fiftieth Street shop. By this method, the collar to be pressed on can be made of such a size as to give an accurate fit of the piston ring and make the cylinder practically as good as new in this respect.



Special Arrangement of Elevated Boxes for Supplying Sand to Electric Locomotives of the Norfolk & Western Railway

The News of the Industry

Battle Promised in New York Legislature

Different Interpretations Placed on the Recently Enacted Home Rule Measure

At the November election the people of the State of New York voted in favor of an amendment to the State Constitution known as the "Home Rule for Cities" measure.

Recently, John H. Delaney, former transit commissioner of New York City, is quoted as having remarked:

We will contend that cities are given the right to regulate public utilities within their boundaries. We will press the Walker-Donohue bills at the 1924 session and claim that by the mandate in the amendment itself the Legislature is required to pass them. The only difference will be that they must be statewide rather than applying only to New York City.

Other authorities are broadcasting the statement that the acceptance of the Home Rule amendment by the people gives each and every municipality the immediate right to regulate utilities located within its boundaries.

Section 7 of the amendment itself, the opening sentence, states:

The provisions of this article shall not affect any existing provisions of law, but all existing charters and other laws shall continue in force until repealed, amended, modified or superseded in accordance with the provisions of this article.

It appears entirely clear to others, however, that unless and until the Legislature itself, in accordance with the constitution and law, modifies or amends present public utility statutes, such laws will remain in full force and effect, and unless and until the Legislature makes special provision for the application thereof, the new powers conferred upon cities will not be effective. That the Legislature of 1923 has something of this sort in mind appears to be evinced by the fact that it authorized a commission to prepare appropriate legislation to put the Home Rule amendment into effect provided it was approved by the people.

The exact status of the situation is this: The ratification of the Home Rule amendment by the people restricts the Legislature from the passage of any law affecting just one city of the state except the Governor recommends such legislation be enacted, and 100 members of the Assembly and thirty-four members of the Senate vote for its passage. There can be no more passage of local bills relating to one particular city on a mere majority vote of the Legislature; there must be a two-thirds vote and the Governor must first recommend its passage.

This means, in short, if the city of Buffalo wants authority to operate bus lines, if the city of Syracuse would

regulate gas and electric companies, if the city of New York would have complete supervision, untrammelled by state control, over the transit situation, the Governor must first recommend such legislation and then two-thirds of the Legislature must concur in its passage.

By the adoption of the amendment the Legislature has been deprived of the right to enact local legislation affecting one city or particular cities having certain population by a mere majority vote and in order to allow Buffalo to operate bus lines must authorize all cities to exercise the same function, but the cities themselves have apparently not gained anything in the way of regulation of utilities within their boundaries unless existing laws are amended and special legislation is enacted to enable them so to do.

Routing with Steam Property Delays Cincinnati Project

The reason has been revealed why the Cincinnati City Council has not acted finally on the ordinance granting the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad a franchise for an elevated structure from Anderson's Ferry to the heart of Cincinnati. Following the announcement of the intention of the city authorities to proceed with the Eighth Street viaduct reconstruction, notwithstanding the defeat of the bond issue for that project at the municipal election on Nov. 6, it was stated that the company's franchise ordinance would have to be revised to fit in with or accommodate itself to the general steam railroad terminal plans now being worked out by the managers' committee.

Stanley Shaffer, attorney for the Cincinnati, Lawrenceburg & Aurora, said it was true that delay regarding the ordinance was due solely to the fact that the routing of the line to co-ordinate with the steam railroad terminal scheme had not been determined, or at least disclosed. Mr. Shaffer, however, pointed out that a rerouting of the interurban line would be necessary only from near State Avenue eastwardly and that the plans already made would stand for that portion from Anderson's Ferry to State Avenue. He said he and his company wanted to "go along with" the general terminal plan, but they do not know what that plan is to be and when it will be possible for his company to proceed with construction. The plans of the interurban company call for the construction of an extension from Anderson's Ferry to Third and Walnut Streets. The elevated structure, a part of the general plan, would be built from State Avenue to Third Street over Mill Creek.

Transportation Systems Again Urged to Co-operate

Mr. Gadsden Urges Tax Reforms — Capital Can Be Obtained Only with Compensatory Rates

National transportation problems will be solved when steam, electric and gasoline systems are co-ordinated and when rates are established which will attract the investor in securities. This was the principal point emphasized in an address of Philip H. Gadsden, vice-president of the United Gas Improvement Company, Philadelphia, and former president of the American Electric Railway Association, before the Cincinnati Commercial Club, Nov. 17. Mr. Gadsden also is a member of a special committee of the United States Chamber of Commerce that recently has completed an extensive study of the national transportation situation.

No attempt should be made to elevate the taxes of motor cars to the present levels of electric railways, Mr. Gadsden said, because railway taxes are unfair.

On this subject of taxation he said that the broad policy to be adopted was not to load down the bus and the truck with taxes, as had been done in the case of steam and electric railways, but that action should be taken to review the whole subject of taxation of public utilities and instead of overburdening the bus and truck with taxation, the steam and electric railways should be relieved of all unjust and unnecessary taxation. He also said there should be worked out a principle of taxation for the public utilities on the basis of property value of franchises. He went on to say that when such equalization by way of regulation of taxation had been brought about the inevitable result would be that the field for the operation of the motor bus and truck would be as an adjunct and auxiliary of existing transportation systems.

Further that the proper solution of the whole problem could be found when it was approached from the standpoint of the economics of the transportation business. He said it was a matter of determining what was best for the country. Viewed from this angle, it meant that a system of transportation really was needed in which the steam railways, electric railways, bus and the truck had a proper and appropriate part to play.

He went on to urge the necessity of credit for effective railway operation. On this point he said that the companies ought to be allowed to charge such rates as will induce new capital to flow into the business.

The real test in the financing in the

last analysis was the investment market, but unless the rate is such as will induce new capital to flow into the industry, the rate was inadequate whatever authority may have fixed it.

He said that transportation was the foundation of our entire business structure and it ought to be the highest interest of all to see that these public servants were kept in strong and effective condition.

Joint Hearing on New York Central Application

A joint hearing will be held by the Transit Commission and the Public Service Commission on Nov. 26 on the application of the New York Central Railroad for the relocation of its tracks on the west side of Manhattan and for an order specifying the electrification of the company's lines south of Spuyten Duyvil.

The petition of the company seeks the relocation of its west side tracks under the general change of grade law which provides that one-half of the cost shall be borne by the company and one-half by the city and state. The company's petition to the Public Service Commission relates entirely to its obligation to electrify all its lines in the city under the provisions of an act passed by the last Legislature.

The hearing before the commission, which will be open to all individuals and organizations, is required by law and must be held upon not less than ten days notice to the company.

Public Service Speakers' Bureau

With the announcement by the Illinois Committee on Public Utility Information of the appointment of Keith Spade to head the Public Service Speakers' Bureau comes the information that this bureau will enter into a larger public speaking program. In the past year the work of this bureau has been to co-ordinate all the companies and their employees behind the speaker when he appeared in a community, to obtain proper newspaper and other publicity on speeches so that the message might go to others than the audience, and to assist managers in developing speaking talent within their own organization.

Mr. Spade comes to the bureau from the Monmouth Chamber of Commerce. He will further the activities of this department so that during the coming year greater benefit will be derived from the efforts of the speakers than has been in the past. In order to start this "greater speaking effort," a conference of managers in territorial districts will be held at conveniently located cities to acquaint local and district managers with the details of the program and to perfect district organizations. Each district committee will be responsible for formation in each city or town of a local public service speakers' bureau or unit and each local unit will take care of local engagements of lesser importance.

Two-and-a-Half-Cent Increase to Michigan Employees

The board of arbitration chosen to settle the wage controversy between the employees of the Michigan Railway lines, Jackson, Mich., and its officials, recently granted a 2½-cent increase an hour, effective June 1, 1923. The award was signed by Richard Price, the company's arbitrator, and John H. Lourim, the third arbitrator. Samuel H. Rhoades, representing the employees, refused to sign the award.

The men demanded an increase of approximately 15 cents an hour on April 30 to take effect as of June 1. At that time they proposed a wage scale of 60 cents an hour for motormen and conductors on two-man city cars, 65 cents an hour for operators of one-man city cars and 70 cents an hour for interurban motormen and conductors. The men had also asked for time and a half for overtime, fifteen minutes additional time for turning in day's receipts and thirty minutes additional time for making out accident reports.

The board said that in view of the company's financial condition the rates for conductors and motormen would be as follows: On city divisions the first year of service on two-man cars 44½ cents an hour; one-man cars 49½ cents; thereafter on two-man cars, 47½ cents, and on one-man cars 52½ cents.

On interurban divisions for the first six months' service 49½ cents and thereafter 54½ cents. In addition to the above there should be 5 cents an hour paid for all work in excess of regular schedule runs.

Samuel H. Rhoades, employees' arbitrator, who refused to sign the award, said that he did not think that the maximum rate of 54½ cents was a reasonable wage for the men, contending that with the present cost of living the wage was not sufficient for a position that was so exacting and which entailed great responsibility. Discussing the contention that the company was unable to pay more he said that the remedy should not be to make the employees work for an unreasonably low wage. He said that the public, which was given the benefit of the service, should pay what it costs to operate the railway system, including the payment of reasonable wages and a fair return to the owners.

Candidate Under Indictment Defeated in Buffalo—Socialist Re-elected

State Senator Robert C. Lacey of Buffalo, who is under indictment in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line of the International Railway during the strike a year ago, when about two-score passengers were injured, was defeated for member of the City Council at the last municipal election. He polled a larger vote, however, than the two members of the Citizens' ticket fostered by the Chamber of Commerce and other business interests of the city, Frank C. Perkins, Socialist, and

an advocate of municipal ownership, who has been bitter in his attacks on the International Railway, was re-elected by the largest vote ever received by a candidate for public office in the city. He polled almost three times the number of votes cast for the Citizens' ticket candidate for better government.

Official Must Serve Sixty Days for Criticising Court

The United States Supreme Court held, in effect, in a decision rendered on Nov. 19, that Charles L. Craig, Comptroller of the City of New York, must serve a sentence of sixty days in jail for contempt of the United States District Court. The case arose out of receivership proceedings for the New York Railways in 1919. Receivers were named by the District Court. The city of New York applied for appointment of a co-receiver to represent it for the Brooklyn Rapid Transit Company. This the court refused. Comptroller Craig wrote Public Service Commissioner Louis Nixon a letter criticizing the court. The letter was published. Some months later contempt proceedings were brought and Mr. Craig was adjudged in contempt. The case reached the Supreme Court on a question of the competency of the court to hold Mr. Craig and not on the main issue of contempt.

Trackwork Recommended in Madison in Connection with Paving

The city engineer of Madison, Wis., has recommended that the City Council should take the proper steps to adopt an ordinance requiring extensions and improvements to be made by the Madison Railways to its system simultaneously with the city's street improvement work so that rails will be placed when the city starts carrying out its paving program.

A big track extension problem faces the railway if the city carries out the improvement of streets in which there are car tracks, as it will require the company to lay a west track on Breese Terrace, double tracks on University Avenue, North Hamilton Street from Pinckney to Johnson, and Williamson from Baldwin to the Yahara River. Heavier rails will also be laid by the company on Jenifer Street from Williamson Street to Baldwin Street, a distance of six blocks, if a resolution introduced before the Council for that purpose goes through.

An ordinance passed by the Council last summer provided that the company would hereafter be relieved of all future charges for paving between its track zones.

Must Not Abandon Line.—The State Supreme Court at Topeka, Kan., recently decided in favor of the city of Salina in a case brought to compel the Salina Street Railway to continue operation of a part of its line which the company had thought to abandon.

Service Retained in Davenport

Agreement Between City Council and Tri-City Railway Allows for a Ten-Cent Cash Fare with Low Ticket Rate

Street car transportation has been retained in Davenport, temporarily at least, by the following major provisions of an agreement reached between the City Council and the Tri-City Railway of Iowa: A 10-cent cash fare, but fares as low as 6½ cents on a ticket plan, rerouting to eliminate approximately 4½ miles of trackage no longer needed, a faster service during the rush hours of the day, payment by the company of its assessed share of the 1923 paving program, valuation of traction lines on same basis as other business concerns for general taxation, single instead of double truck cars, trial period of four months for the new ticket plan, allowance of a 6 per cent return on the investment; city to favor enactment by the Iowa Legislature of provisions making it optional with cities to relieve electric railways of paving cost.

This settlement plan is not only accepted by the City Council and traction line but is also indorsed by a citizens' committee selected from non-political and representative civic organizations. The report, accepted by the committee of the whole of the Council on Nov. 20, will be ratified on Nov. 28 at the regular Council session.

It is in response to a clear statement by President B. J. Denman of the traction lines of the possibility of discontinuing railway service that the present plan came into existence. The surface lines have lost money for several years past and their straits finally became so acute that the city was told service would be abandoned unless a relief plan could be devised. Negotiations of several months have finally resulted in the acceptance of the present plan.

By the sale of fifteen tickets for \$1, seven for 50 cents and three for 25 cents, it is hoped that riding can be popularized to such an extent that it will be encouraged and revenues increased. The company is hoping that this will be the case, but acceded to the city's request along this line with considerable doubt as to the possibility of thereby increasing the revenues. The fare up to the present time has been a straight 8-cent fare.

Also by this arrangement the company agrees to pay \$120,000 for paving which it believes should not be assessed against a traction line. Such an investment will never bring in a cent of revenue and is also accepted by the company without enthusiasm and largely because of the fact that the company considered itself obligated to this payment.

The valuation on which the company is to be allowed a return of 6 per cent is \$3,250,721, another concession by the traction lines, as the latter proposed a

valuation of \$4,250,000. The new system of fares is to go in operation on Jan. 1, 1924, and the system is to continue for a period of four months after the entire plan is put into operation.

It is provided that, in case the revenues in succeeding months do not return 6 per cent on the investment, first the fifteen tickets for \$1 rate and later the seven tickets for 50 cents rate be abandoned and the three tickets for 25 cents rate be retained as the basic fare.



News Notes

Franchise Granted.—The Lake Shore Electric Railway, Cleveland, was granted a twenty-five-year franchise by the Sandusky County Commissioners on Nov. 13. Besides rights to operate cars through the county, the company can use the new concrete bridge to be built across Sandusky River at State Street, Fremont. Work on the new bridge will start at once. In return, the company must pay to the county \$12,500 cash within sixty days and make an annual payment of \$1,000 during the life of the franchise, or as long as it uses the bridge jointly with the county. The company must also move part of its track from McPherson highway, west of Fremont, to eliminate danger to traffic.

Inter-Utility Meeting Held.—For the first time in the history of Wisconsin utility circles an inter-utility meeting took place recently in Janesville. Approximately 130 executives and employees attended. Recommendations were unanimously passed to assemble informally at frequent intervals, affording individuals an opportunity to interchange ideas with one another.

Getting at Bottom of Dynamite Outrage.—New developments in the government's investigation of the dynamiting of the Buffalo-Niagara Falls high-speed car in August, 1921, during the strike of platform employees which resulted in the injury of almost forty passengers, are expected to implicate several more of the company's striking employees, it was stated at the office of Colonel William J. Donovan, United States District Attorney. The renewal of the investigation was prompted by alleged confessions by men believed to be involved in the dynamiting outrage. The fourteen men now under indictment will be placed on trial early next month in United States court.

Transit Work Hastened.—Following Director Twining's recent appearance before the City Council of Philadelphia, announcing that he would proceed with preliminary work on transit construction if he were given the necessary funds, it was immediately proposed that the money be provided. The preliminary work in connection with the Broad Street subway of the Darby line will be financed by an appropriation of \$50,000, which the City Council will give the

Department of Transit through a transfer bill. Director Twining said that the money would be expended in making borings, particularly in the Schuylkill, where it will be necessary to erect piers for the Darby line. Some part of it will be used for borings in North Broad Street.

High-Speed Line When Costs Come Down.—The Ohio River Edison Company, Youngstown, Ohio, a subsidiary of the Pennsylvania-Ohio Electric, in turn controlled by the Republic Railway & Light Company, is securing a right-of-way from the Ohio River Valley to this district for an electrically operated freight line to be built when conditions permit. The right-of-way for the contemplated freight line parallels that of a high-tension electric power line that the Ohio River Edison Company will build next year from its steam-electric plant at Toronto on the Ohio River to Youngstown.

Resolution Calls for Car Approval.—A resolution has been introduced before the City Commission of Trenton, N. J., calling for the approval of all trolley cars by that body before they can be placed in operation. The ordinance does not prescribe a type of car to be used by the Trenton & Mercer County Traction Corporation, but does provide that the type be of a character to meet the approval of the commission. The ordinance is understood to have been introduced on account of dissatisfaction with the conditions surrounding the one-man cars now being used in Trenton. The commission is said to be anxious to have the railway use larger one-man cars. The ordinance gives the commissioner the power to reject all cars not approved by that body.

Opposes Company's Relief Petition.—Protest against a petition filed with the Seattle City Council by the Seattle & Rainier Valley Railway, asking relief from certain franchise agreements, was voiced recently at a mass meeting of residents of the Rainier Valley district. The petition presented asks among other things that the road be released from the payment of a 3 per cent tax on its gross earnings, and from paving 1,000 ft. of the street between its tracks. W. M. Brown, manager of the company, appeared before the meeting and outlined the company's position in asking the relief, and stated that unless it is granted, the company will have to restore fares to the 10-cent level next month. The present cash fare is 10 cents. Three tokens are sold for a quarter.

Paving Plan Halted.—Denver figured a paving program, known as "the \$4,000,000 paving job," but on the eve of starting, the city engineer's office finds that the Denver Tramway, which is supposed to stand its proportion of the amount, cannot pay for more—in any one year—than "between and for alongside of its tracks, a 6-mile length." City officials, the tramway officials and others are trying to work out a plan that will permit the city to proceed with the program.

Foreign News

May Electrify Rumanian Railways

A recent report from Bucharest stated that the Rumanian government intends electrifying portions of the railways of the country. Some facts with respect to this property are noted in view of this report.

In September, 1923, the railway traffic on Rumanian territory amounted to more than 50,000 trains per month, or an average of 1,600 trains per day, as against only 287 trains per day in 1921. Of the total number 57 per cent are passenger trains and 43 per cent freight trains. The traffic is carried on by means of 2,000 locomotives, as compared with 1,540 in June, 1922, and 1,050 in June, 1921.

Most of the bridges have been reconstructed and rails and sleepers renewed. Large orders have been placed in Germany of late for all kinds of rolling stock and material. The railway lines in Bessarabia—formerly Russian territory—have undergone great improvements and the gage has been changed from the Russian to the standard Rumanian. However, the substructure of these lines leaves still much to be desired. The receipts of the Rumanian Railways rose from 64,000,000 lei in September, 1921, to 200,000,000 in 1922, and amounted in August, 1923, to 305,000,000 lei.

American manufacturers of electric railroad equipment would do well to pay close attention to the further developments of the Rumanian Railways. All the roads are owned and operated by the state (Căile Ferate Române), with head offices at Bucharest.

Berlin's Record Under Private Company

The transfer of the Berlin Municipal Street Railways from direct municipal operation to operation by a private corporation seems to be working well, according to an article by Dr. Lademann in the Oct. 26 issue of *Verkehrstechnik*. It will be recalled, as the *ELECTRIC RAILWAY JOURNAL* for Sept. 15, page 423, pointed out, that the lines are still publicly owned.

The reorganization became effective on Sept. 10, 1923, and was accompanied by a large reduction in personnel and also a more practical interpretation of the municipality's eight-hour day rule for all employees. In the case of the street railways, this rule now means eight hours' platform time. The system has also been rerouted to great advantage and eighty-nine routes have been cut to thirty routes which are far more direct. The new lines are better balanced as regards traffic and there has been a reduction of car-miles by more turn-backs.

The lines now have a single fare

without charge for transfer. This fare was 200,000,000 marks up to Nov. 1, but on that day it was to be increased tenfold. The same increase to the same fare was to be made on the subway and on the bus lines.

The earnings for the first five weeks of operation under the company plant, i.e., since Sept. 1, have proved encouraging. The deficit of 20,000 gold marks (100,000,000,000 paper marks) a day has been eliminated. The number of car-kilometers run has been reduced from the August average of 200,000 (124,000 car-miles) to 120,000 (74,400 car-miles) a day. The density of traffic has increased from 3.31 per car-km. (5.1 passengers per car-mile) to between 4 and 5 per car-km. (6.4 to 8 passengers per car-mile). It must be remembered in connection with the density figures that the average Berlin street car has less capacity than a Birney safety car.

Electric Cars Replace Mules in Maranhao

Mule-drawn cars operated by the State of Maranhao, Brazil, are to be replaced with modern electric cars. Maranhao, the sixth largest state with a population of more than 500,000, occupies a wide sweep of the north coast of Brazil.

Electrification Plans in Czechoslovakia

A comprehensive program of electrification of the steam railroads of Czechoslovakia is just beginning. The first line to be electrified will be the Prague-Kladno line, which is a single-track coal-carrying railroad 30 km. in length. After this will follow the Prague-Zdice-Plzen and Prague-Kolin-Pardubice lines, respectively 115 and 104 km. of double track.

Electrification work will be furthered by the construction of several electric central stations, the first of which, at Rvenice, in the north Bohemian lignite coal district of Chomutov, Most and Duchcov, is nearing completion and will have 40,000 kw. in service next year. A 100-kv. transmission line between Rvenice and Prague, over 84 km. long, is being erected. Following this a hydraulic plant will be built at Stechovice on the Vltava River, with a capacity of some 30,000 kw. Both these plants are being constructed by the Central Electric Plants Company, partly with public and partly with private funds.

The system of electric traction to be used has not yet been definitely decided. The neighboring lines of Germany and Austria employ single-phase current with 15 to 16½ cycles and 15 to 16 kv. on the trolley wire, but the high-tension direct-current system also has many

adherents, as in France, Belgium, Holland and Great Britain.

The railroads are of light construction, with normal weights per axle of 14.5 metric tons and 1,435 mm. gage, thus giving only limited possibilities as to weight and dimensions of the traction machinery.

London Tube Facilities to Be Extended to Meet Competition

More than £13,000,000 will be expended on extensions of London's tube railways during 1924 and 1925. It has been demonstrated to the satisfaction of the London company's management that a short underground railway no longer can be operated profitably. For this reason plans have been perfected for joining existing lines and for the driving of new tubes, so as to make possible longer hauls. Provision will be made for the operation of more express trains and the maintenance of much higher speeds. This will require some substitution of rail and extensive roadbed betterments.

The announcement has been made that during this month construction will be started. These new works were authorized by an act of Parliament passed last summer, and the beginning of operations has been expedited in order to help in the coming winter the relief of unemployment. It is stated that this new work, along with other projects, will give employment to 25,000 or 30,000 men for nearly two years.

The principal extensions will be the driving of the London Electric Railway's Hampstead tube from Golders Green to Eggewear and the carrying of the tube of the City & South London Railway from Clapham Common to Morden. This latter extension also involves heavy reconstruction in increasing the bore of the existing tube from 10 x 7 ft. to 11 x 8 ft. A new cut-off will be put through which will give the South London line through service from two great traffic centers—Charing Cross and Waterloo Station.

The Piccadilly tube of the London Electric Railway is to be extended from Hammersmith so as to connect with the District Railway near the junction of its branches to Richmond and to Uxbridge. This will make possible the operation of through tube trains from those important suburbs. The Piccadilly line runs under the very heart of the business district, but its income comes largely from short-haul traffic.

These major improvements have been hastened by the loss of buses of short-haul business. Underground lines in 1923 have been running some 500,000 passengers weekly behind the 1922 figures. The decrease is due almost entirely to the use of buses for the shorter trips it is believed. Since some 60,000,000 passengers are carried weekly on the underground railways, the loss is less than 1 per cent as compared with 1922, but the management believes these losses will continue at an increasing rate and steps are being taken to meet them.

Financial and Corporate

Interurban Control Changed

**Bondholders Now Operate Iowa Road—
New Interests Hope to Make
Line Profitable**

Control of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, has passed into the hands of the holders of the first mortgage bonds of the company through their protective committee. E. B. Kane, chairman of that committee, has explained that on Oct. 27 it secured control of 21,700 shares of the total outstanding of 23,330½ shares of the common stock. The stock has been transferred to him as trustee for the bondholders' protective committee for the purpose of enabling the committee to take over the company and all its property and assets and operate them without immediate recourse to the remedies provided in the deed of trust under which the first mortgage bonds are secured.

Immediately following the transfer of stock, the old management resigned and was succeeded by the following new directors representing the bondholders' protective committee: C. M. Cheney and J. B. Knowles, Waterloo, Iowa; George E. Hise, Des Moines, Iowa, and Charles J. Hetburn and Edward B. Kane, Philadelphia. The officers who resigned were L. S. Cass, president; J. F. Cass, vice-president; C. D. Cass, general manager, and W. H. Burk, secretary, treasurer and auditor. Officers were elected as follows to fill these vacancies: C. M. Cheney, president and general manager; C. D. Cass, vice-president, and J. B. Knowles, secretary, treasurer and auditor.

Mr. Kane explains that the immediate effect of the change of management was a reduction of expenses. It is believed that other economies are practicable without affecting the efficiency of the service. The developments just noted clear the way for constructive efforts. Radical changes, he says, must not be expected at once. Reasonable time should be allowed the new management for the application of new policies, the introduction of economies and the development of new business. Not until these influences have been fully tested, will the committee be able fairly to gauge the earning possibilities of the property under the reorganization.

Mr. Kane says that the strategic position of the road with its valuable freight belt line and its connection with five steam trunk railroads suggest the practicability of a merger under the new railroad act. This, too, he says will require time for consideration and negotiation. He explains that the company is at present earning little more than its operating expenses, taxes and maintenance. Liberal allowance has, how-

ever, been made for upkeep so that the property is in fair physical condition. What with economies, increased traffic and reduced bus competition, the new management hopes to present in the coming year results which will reflect a favorable contrast with the past.

Up to the present time, 85 per cent of the outstanding bonds have been deposited with the protective committee. In view of the developments just noted, the committee has decided that the time for the deposit of additional bonds under the bondholders' protective agreement shall be extended to Dec. 31.

Deficit in Cincinnati in October

Compared with October, 1922, when a 7½-cent fare was in effect, the report of the Cincinnati Traction Company for October, 1923, shows that while the income of the company was slightly in excess of the corresponding period last year, there were fewer cash fares paid. In October, 1923, when the 8-cent fare was started the traction company carried 9,263,041 pay passengers and the revenue obtained was \$730,643. During the same period in 1923 under the 7½-cent rate the number of car riders was 9,282,803 and the revenue produced was \$705,295.

Other revenues received by the traction company during October, 1923, bring the total receipts to \$737,391. The traction company paid for operating expenses during October \$499,533, and the remainder was used to pay off other obligations due under the service-at-cost franchise, with the exception of \$29,989 due the city for that period as a franchise tax.

The traction company during October incurred a deficit of \$73,350. In the event the company shows a deficit in its operating expenses for November it will be compelled to raise the rate of fare another half cent to 8½ cents on Jan. 1. Under the terms of the service-at-cost franchise the traction company is permitted to raise its rate of fare following deficits in its operating expenses for two consecutive months.

J. K. Newman Reported in Kansas City Reorganization

It is expected that J. K. Newman of Newman, Saunders & Company, New York and New Orleans, will head the movement to reorganize the Kansas City Railway. Mr. Newman is said to be at the head of a syndicate which has purchased through the Chase National Bank, New York, \$5,000,000 of defaulted notes and bonds of the Kansas City Railways. The consideration is not known, but the company's first mortgage bonds have been quoted at 40 cents on the dollar, and second mortgage paper much lower.

Mr. Newman has been conferring with other security holders in the company in Chicago, Philadelphia and other northern cities.

Resolution Authorizes Bond Issue by Philadelphia Rapid Transit

A resolution was introduced in the City Council of Philadelphia recently by Mr. Weglein which authorized the Philadelphia Rapid Transit Company to float a \$2,500,000 first-mortgage bond issue. The \$2,500,000 bond issue, made possible under the transit agreement of 1907, will be secured by mortgages on the Luzerne Street and Callowhill Street carhouses, and upon the terminal to be built at Twentieth and Johnston Streets. At present there is an existing mortgage on the Luzerne and Callowhill Streets terminals for \$1,300,000, of which \$335,000 has been paid off. The proceeds of the \$2,500,000 issue will be used to pay off the \$965,000 outstanding and to complete the construction of the South Philadelphia terminal.

A second ordinance, which was also presented by Mr. Weglein, would permit the company to buy up \$8,874,000 of a \$10,000,000 bond issue floated in 1912. The bonds were sold with the understanding that they could be recalled at any time up to Dec. 31, 1923, and resold at a higher figure. According to a letter to Mr. Weglein from W. C. Dunbar, president of the Philadelphia Rapid Transit Company, the issue is recalled because the company wants to avoid a permanent sale of the bonds at the low figure.

Another Melon at Montreal

The *Canadian Financial Post* says that there is reason to believe that shareholders of the Montreal Tramways will shortly have the opportunity of subscribing for about \$1,000,000 of stock of their corporation. The stock is now selling at \$150 a share. The amount of capital stock outstanding is only \$4,000,000, and a \$1,000,000 issue would give each shareholder the opportunity of buying one share of stock at \$100 for each four shares now held. This would make the "rights" of subscription worth about \$12.50 for each share at present outstanding.

There was \$2,000,000 of Montreal Tramways stock issued at the time of organization. In April, 1913, stockholders were offered \$1,000,000 at par, and as the stock went to about 235 in the next year the privilege of buying the stock at par was valuable. In September, 1915, another \$1,000,000 was allotted at par, although the stock was selling in the neighborhood of 220.

Negotiations for the sale by the Montreal Tramways of an important right-of-way owned by it in the city of Montreal to the Canadian National Railways has attracted attention. The right-of-way parallels the C. N. R. line, which requires additional land to bring its right-of-way up to the minimum requirements of the Board of Railway

Commissioners. The sale, which is understood to have been consummated, would add a comfortable sum to the company's cash position.

Washington-Virginia Securities in Default

The Washington-Virginia Railway, Washington, D. C., has defaulted in the payment of principal and interest of its 6 per cent bond secured gold notes, dated Jan. 1, 1920, maturing Jan. 1, 1922. In consequence it has been announced that the Bank of North America & Trust Company, Philadelphia, trustee, will sell on Nov. 28, at public auction, \$3,000,000 first lien refunding mortgage gold bonds of the company, dated Jan. 1, 1919, due Jan. 1, 1929.

The company operates 63 miles of line from Washington, D. C., to Alexandria, Mount Vernon, Arlington, Fort Meyer, Rosslyn, Clarendon, Vienna and Fairfax.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons, there were sold this week 400 shares of Interborough Consolidated Corporation, common \$6 lot, and 1,000 shares of Brooklyn Rapid Transit (old stock), \$12 lot. There were sold last week 300 shares of American Cities, 6 per cent preferred stock, \$16 a lot; seventy-five preferred parts of the Kansas City Railway Company beneficial certificates, \$77 lot, and 1,618 shares of the Omaha & Council Bluffs Street Railways Company, common, \$1,600 lot.

High-Speed Electric Line Pays Dividend.—The West Jersey & Seashore Railroad has been put on a semi-annual dividend basis by declaration of 2 per cent paid Oct. 15 to stock of record Oct. 1. Last March the company resumed dividends with a declaration of dividend of 2 per cent out of earnings for 1922. The Pennsylvania Railroad owns 54 per cent of the stock. At a meeting of a committee of stockholders of the West Jersey & Seashore Railroad appointed by the board to consider a lease of property to the Pennsylvania, David Baird resigned as chairman of the committee on account of press of other business and in his stead William

J. Sewell was elected chairman. Mr. Baird remains a member of the committee.

Authorizes Interest Payments.—The receivers of the Pittsburgh Railways were recently authorized by Judge Gibson, in the United States District Court, to pay the Union Trust Company of Pittsburgh, trustee under the Southern Traction Company mortgage, \$100,000, representing interest coupons due Oct. 1, 1923. The receivers were also authorized to pay the Guaranty Trust Company of New York \$63,475 which was the installment due Oct. 1, on the outstanding bonds secured by the general mortgage of the Pittsburgh Railways.

Authorizes Bond Issue.—The Arkansas Railroad Commission has authorized the Fort Smith Light & Traction Company to issue \$107,000 in bonds, the proceeds to be used for extensions and improvements.

Stage Lines Affect Railway's Earnings.—Invasion of the Portland-Willamette Valley district by stage lines has so depleted the earnings of the Oregon Electric Railway, serving this district, that the line was unable to meet its bond interest payments on Nov. 1. Whether the Spokane, Portland & Seattle Railway, which owns the line, will advance the necessary funds in the sixty days allowed before default is problematical, in the opinion of W. F. Turner, president of the Oregon Electric. The net loss from operation, taxes and bond interest during the present year so far amounts to \$204,000, or approximately \$40,000 greater than the corresponding period of last year. It is expected, Mr. Turner stated, that the deficits for the entire year of 1923 will exceed \$300,000. In the event of foreclosure proceedings, a reorganization of the Oregon Electric Railway to bid in the property may be undertaken, it is said.

Preferred Stock for Sale.—Bonbright & Company, New York, are offering at 97½ and accrued dividends to yield about 6.15 per cent, \$2,400,000 of the Electric Bond & Share Company 6 per cent cumulative preferred stock. The preferred stock will be followed by \$22,-

400,000, par value, of common stock, all owned by the General Electric Company.

Bonds Offered.—The National City Company, New York, is offering \$1,000,000 of the Tennessee Electric Power Company ten-year 6½ per cent debenture bonds. The bonds are dated Oct. 1, 1923, and are due Oct. 1, 1933. The proceeds from the sale of these bonds will be used to finance additional property expenditures and to increase the company's working capital. The issue has been authorized by the Railroad & Public Utilities Commission of the State of Tennessee.

Bonds Called.—In connection with the sale of the properties of the Tuscaloosa Railway & Utilities Company to the Alabama Power Company, arrangements have been made for the surrender of the cancellation of more than 90 per cent of the first mortgage, twenty-five year 6 per cent bonds dated July 1, 1940. For the purpose of redeeming and cancelling the bonds, the company has called in all of the bonds at 102 and interest on Jan. 1, 1924.

To Hear City's Appeal.—The Superior Court will hear during the week of Dec. 10 the appeal of the city of Philadelphia from the ruling in which the Public Service Commission fixed the valuation of the Philadelphia Rapid Transit property. This is the result of an order of that court signed by President Judge Orlady. The date had been set for Nov. 19, "but under an agreement the hearing was deferred.

State Commission Fixes Buffalo Valuations.—The New York State Tax Commission has submitted to the municipal authorities of Buffalo the valuation figures it puts on the special franchises held by up-state public utility companies for use as the basis for calculating their taxes. The figures as relating to traction lines are as follows: Buffalo & Lackawanna Traction Company, \$200,000; International Railway, \$7,345,000; South Buffalo Railway, \$22,800. The commission will hold a hearing in Buffalo on Nov. 27, at which the corporations will have an opportunity to protest if they feel the valuations are too high.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares*	Nov. 1923	Oct. 1923	Nov. 1922	May 1921	May 1923
1913 = 4.84	6.95	6.95	6.98	7.24	6.88
Street Railway Materials*	Oct. 1923	Sept. 1923	Oct. 1922	Sept. 1920	Sept. 1921
1913 = 100	161	163	177	247	156
Street Railway Wages*	Nov. 1923	Oct. 1923	Nov. 1922	Sept. 1920	Apr. 1923
1913 = 100	218	218	208	232	207
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Oct. 31 1923	Sept. 30 1923	Oct. 31 1922	July 31 1920	Feb. 28 1922
	4.67	5.04	6.90	11.12	4.14
U.S. Bank Clearings Outside N. Y. City (Billions)	Oct. 1923	Sept. 1923	Oct. 1922	Mar. 1920	Feb. 1922
	16.18	13.90	15.37	18.54	10.65
Business Failures Number	Oct. 1923	Sept. 1923	Oct. 1922	Jan. 1922	Sept. 1923
Liabilities (millions)	1,584	1,280	1,602	2,722	1,280
	74.43	27.50	39.94	105.7	27.50

Conspectus of Indexes

for
Nov., 1923
Compiled for Publication in this Paper
by
Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Nov. 1923	Oct. 1923	Nov. 1922	June 1920	Mar. 1922
	220.9	220.3	186.6	273.8	162.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Oct. 1923	Sept. 1923	Oct. 1922	May 1920	Jan. 1922
	153	154	154	247	138
Bradstreet's Wholesale Commodities 1913 = 9.21	Nov. 1 1923	Oct. 1 1923	Nov. 1 1922	Feb. 1 1920	June 1 1921
	13.14	13.10	13.35	20.87	10.62
Dun's—Wholesale Commodities 1913 = 120.9	Nov. 1 1923	Oct. 1 1923	Nov. 1 1922	May 1 1920	July 1 1921
	191.8	190.8	182.3	263.3	159.8
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Oct. 1923	Sept. 1923	Oct. 1922	June 1920	Mar. 1922
	150	149	143	219	139
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Oct. 1923	Sept. 1923	Oct. 1922	July 1920	Aug. 1922
	164.1	163.4	157.1	204.5	154.5

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of

materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Orders Seven per Cent Stock Issue.—The directors of the Public Service Corporation of New Jersey on Nov. 7 directed that an issue of the 7 per cent preferred stock be made totaling \$11,000,000, which is approximately 12½ per cent of all outstanding shares. The stockholders of record Nov. 17 have the option to take such stock at par in proportion to their holdings. For each eight shares of stock held, common or preferred, the stockholders will be entitled to subscribe for one share of 7 per cent preferred stock. The stock may be paid for in full or in installments, one-tenth with the subscription and at least one-tenth on Feb. 1, 1924, and the first day of each month thereafter. The subscribers will be allowed on such payments interest at the rate of 6 per cent per annum to be accounted for at the time such stock is fully paid for.

Company Is Insolvent.—C. A. Fagan, receiver of the Pittsburgh Railways, has filed a report with the United States District Court at Pittsburgh stating that his company is still "manifestly insolvent" and not in a condition to be returned to its owners in a reorganized state. Mr. Fagan is acting independently of his colleagues, U. D. George and S. L. Tone. Mr. Fagan took issue with Special Master Wasson, who predicted that a surplus of \$264,987 would be shown for the end of the first year after the lifting of the receivership. Mr. Fagan believes that a deficit of at least \$1,549,194 would appear.

Preferred Stock Issue Approved.—The Wisconsin Railroad Commission has placed its approval on the proposal of the Eastern Wisconsin Electric Company to issue \$40,000 of preferred stock for the purpose of securing funds with which to pay for additions and extensions.

First Report Since Reorganization Submitted.—Commissioner Paul H. Maloney of the Department of Public Utilities of New Orleans has submitted to the Commission Council the first annual report of the Public Service, Inc., since reorganization. It covers the trial period of one year, during which it was agreed that the company was to earn a return of 7½ per cent on a valuation fixed by the city. The returns of the corporation for the year show that the net profits were only 6.69 per cent. No comment was made by Commissioner Maloney upon the report in submitting it to the Commission Council, other than the announcement that the figures are now being gone over by the Auditing Department of the city, and that the report will soon be available.

Seeks Authority for Issue.—The Oklahoma City-Shawnee Interurban Railway has applied to the Interstate Commerce Commission for authority to operate the 38 miles of main track and other properties acquired at a receivers' sale on Sept. 28, and for authority to issue common stock and first mortgage bonds to the extent of \$800,000 each to be delivered in payment to H. R. Hudson for the title to the railroad. The stock

is to be full paid, non-assessable, of a par value of \$100 per share. The bonds are to be issued for twenty years in denominations of \$1,000, to bear interest at 6 per cent. The application is signed by C. A. Birge, president; Ernest Warley, secretary; and E. W. Shartel, attorney.

Income Increases.—For the first nine months of the current year the Twin City Rapid Transit Company, Minneapolis, reports gross revenues of \$10,210,796, against \$10,251,795 for the first nine months of 1922. Operating expenses were \$7,455,143 for the nine months period last year and this year they were \$7,267,192. The net income increased from \$1,044,509 for the January-September period in 1922 to \$1,151,756 for the same nine months of the present year.

Line Bought.—The Pennsylvania-New Jersey Railroad, a 26-mile branch line from Bristol to Doylestown, Pa., was recently bought by the S. Snyder Corporation, Rochester, N. Y. Salvaging of the line will be begun soon. The purchasers acquired all the track, overhead wires, culverts and stations of the Bristol road, in addition one \$50,000 steel bridge. The Bristol-Doylestown branch was bought by the Pennsylvania-New Jersey Railroad for about \$550,000 in 1912. Automobile competition has been instrumental in the suspension of the railway service.

Preferred Stock Offered.—W. A. Hariman & Company and Dominick & Dominick, New York, are offering at 89½ flat to yield more than 7.8 per cent, \$4,000,000 of the West Penn Company, 7 per cent cumulative preferred stock. The preferred stock is redeemable as a whole or in part on any dividend date on thirty days notice, at 115 and accrued dividends. The West Penn Company owns directly or through subsidiaries substantially all the common stock of the company, constituting the West Penn system. This system is the largest unit in the group of public utilities, controlled by the American Water Works & Electric Company, Inc. The railway comprises 520 miles of track.

Bonds Offered.—W. C. Langley & Company and John Nickerson & Company, New York, are offering at 94½ and accrued interest to yield about 7 per cent \$1,200,000 of the Mississippi Power & Light Company first and refunding mortgage sinking fund gold bonds, known as series A, 6½ per cent. The bonds are dated June 1, 1923, and are due June 1, 1943. The Mississippi Power & Light Company was organized recently to acquire and merge a group of properties which furnish the entire light and power service in Jackson, Vicksburg and several other communities in Mississippi, also railway service in Jackson, Vicksburg, and Greenville. The proceeds from the sale of these bonds and from the sale of preferred stock will be used to pay for additions, extensions and improvements to the properties of the company, to retire certain underlying obligations for other corporate purposes.

Certificates Offered.—Stone & Webster, Inc., will offer \$1,115,000 of Electric Railway Equipment Securities Corporation 6 per cent equipment trust gold certificates, known as the trust of Nov. 1, 1923. These certificates are to be dated Nov. 1, 1923, and will be payable in serial installments Feb. 1, 1924, to Oct. 1, 1928, both inclusive.

Stockholders to Meet.—A meeting of the stockholders of the St. Charles Street Railway has been called for Dec. 12, when that utility, the New Orleans Gas Light Company and the New Orleans & Carrollton Railway, whose stockholders will meet subsequently, will be amalgamated with the New Orleans Public Service, Inc. There are only a few shares of these companies outstanding at the present time, the combination being simply a matter of form, as the merging of the utilities named was provided for when a reorganization of the companies was effected. Carrying out of the plan has been delayed by legal technicalities.

Dividend Declared.—The first dividend to be declared on the second preferred stock of the Portland Railway, Light & Power Company, Portland, Ore., amounted to 1½ per cent. This is payable Dec. 1, to holders of record Nov. 17. The second preferred stock is a 6 per cent non-cumulative issue.

Must Pay Taxes.—Despite protests, the Wisconsin-Minnesota Light & Power Company will be required to pay taxes on property in Chippewa Falls although it is not being used and of no revenue producing value. This decision was handed down by the Wisconsin Tax Commission which sustained the opinion of the city tax assessor, who placed a value of \$95,000 on the property. The company held that this assessment was illegal in that the property was not being used due to the fact that high water in the river in the spring of 1918 damaged the flume which supplied water for power producing purposes from the river to the electric light plant, causing the property to be abandoned shortly thereafter. The city sought to compel the company to pay taxes on the property since 1919, but the commission invalidated this point, allowing the city, however, to place this property on its tax rolls as of 1923 for taxation purposes.

Seeks Bill Dismissal.—The Chicago Railways has opened its case in the Federal courts to dismiss a bill of equity filed by a protective committee of holders of the series 1 participation certificates. These certificates required the company to show cause why \$1,478,400 in cumulated dividends had not been paid. The counsel for the company claimed that there was no money to pay dividends because the earnings had been used for capital expenditure. Attorney for the participation holders asserted that bonds should have been issued to provide for capital expenditures and that the certificate holders had a prior claim on the earnings. Dividends on the series 1 participation certificates have been in arrears since 1917.

Traffic and Transportation

Would Settle Out of Court

Committee of Citizens at Houston Advances Plan for Straightening Out Transportation Tangle

The Houston Electric Company's court case for an injunction to prevent the city from enforcing the present fare ordinance has again been postponed, this time until Nov. 21. This postponement was granted at the request of a committee of citizens who are endeavoring to settle the case out of court.

John A. Beeler, New York, the expert employed by the city, in his report to the city stated that the jitney was the greatest obstacle to an adequate railway system in Houston.

It is Mr. Beeler's opinion that Houston offers a field for both the electric railway and buses, but that both systems should be controlled by one company so that the two systems could be co-ordinated and duplicate service thereby avoided. With this thought in mind, he recommends that the present jitneys be abolished and that the Houston Electric Company be required to establish bus lines wherever they may be needed.

The report recommends several changes in the present operation of the railway system in order to speed up the cars and increase the earnings. The suggestions include several minor changes in present cross-town lines and track layout, the use of one-man cars, double berthing and use of street collectors in the downtown district, a reduction in number of stops per mile (at present cars stop at every corner or about every 250 ft.), and a change in the transfer system so as to reduce the misuse of transfers.

Acting on these recommendations a group of citizens, calling themselves the Citizens' Committee, filed a report with the City Council recommending settlement of fare litigation along the following lines.

Fare case to be suspended pending jitney election. If elimination of jitneys is voted company and city will agree to:

1. Drop fare case.
2. Begin bus operation on Austin Street immediately.
3. Put into effect all of Mr. Beeler's service and operating recommendations within a year.

It is estimated that the immediate improvements will cost \$450,000. The agreement further provides that the Houston Electric Company shall in addition expend \$250,000 during 1924, \$375,000 during 1925 and \$375,000 during 1926 for extensions and bus lines which are detailed in the report.

It is interesting to note that Mr. Beeler states in his report that twelve of the nineteen car lines now in operation are not self-sustaining, while some

of the lines have been losing money for years. His final report supplements the one presented to the City Council. It was addressed to the Citizens' Committee and the public. The report follows substantially in full:

To substitute for Houston's present dual system of transportation, now part railway and part jitney, all railway or all jitney affords opportunity for further interesting comparisons that should be understood by the users, taxpayers and public generally, in order that the merits of the respective methods may be weighed so as to determine what the best plan for the community may be.

To handle the city's combined load by the jitney alone, some new problems are presented, as from 1,500 to 1,800 jitneys will be required during the maximum rush hour.

New elements will enter into the operation, some of which will have a tendency to raise present operating costs. The service will have to be organized under a corporation or central control in order that the outlying and sparsely settled non-paying section will receive necessary service, and such a large force of men will call for a systematic and close supervision in order properly to schedule and control the service. This will require a well-organized force of supervisors as between 2,250 and 2,700 drivers alone will be employed. Accidents and insurance costs will rise, and schedule speed will be decreased on account of the congestion.

Our report shows that the longer haul of the car rider, on the present jitney fare basis, calls for an 8.67-cent fare. With these increases in operating costs, it is safe to say that with the whole city covered, the fare will have to be very close to 10 cents. This will bring the riders' annual bill up to \$4,000,000, or about \$1,500,000 more than the railway charges under the present rate of fare.

Other items of expense should be considered, even though they may be indirect. Many streets now unpaved will have to be improved in order to permit of the extension of this method of service. This item is likely to run into large figures, and will all be at the expense of the property owners and the city.

In addition to this, increased wear and tear on the streets already paved will result from the tremendous increase in traffic. More traffic officers will be necessary to control the increased traffic. All of these items will increase the cost of operating the municipality, and must be met by increased taxation, so that these indirect costs will still further augment the total cost of the city's local transportation should the jitney be adopted.

With the great number of jitneys on the streets, the congestion will become most acute, especially in the downtown business district, and all traffic will be retarded, including that of jitneys itself. Thus it will lose a portion at least of what is now its chief asset—fast speed.

At the intersection of Travis and Franklin the 146 street car movements through this intersection will require 1,946 jitney movements per hour to give the same passenger capacity. The present vehicular flow at this intersection is 1,314 per hour. By combining the two, 3,260 vehicular movements result. This will give a fair idea of conditions that will pertain to this and the other downtown corners under the jitney method.

On the other hand, properly to care for the jitney passengers in addition to its present patronage, it will be necessary to place in daily operation twenty-eight additional cars.

The cost of the improvements as specified in our report to the Mayor and Commission Council, submitted Nov. 5, 1923, and the establishment of the bus line to Southmore, is estimated to be \$438,000. Concerning the other extensions of service that may be desirable, the cost and effect upon the company's net earnings must be given consideration, as capital expenditure must not be allowed to expand too rapidly.

The time required to obtain new cars, construct the additional track and remodel the present equipment, recommended in our report, will require from six to eight months. As these are necessary to the complete carrying out of the revised plan, the full benefit resulting from the operating economies cannot be obtained until this is done. Therefore, steps should be taken to secure these improvements forthwith.

Since 1913, the net income has not been what it should be to insure the perpetuation of the system as the relation of capital to operating revenues and net earnings fails to follow proportionally the investment as shown in the record cost, and which it must do if the system is to continue to remain self-sustaining.

In making all future additions to the plant and equipment and extending the service, we cannot emphasize too strongly that extreme care must be exercised by the city to see that the capitalization of the company is not unduly expanded; this is especially true in connection with the building and operating of the extensions. At present the company is operating nineteen lines. Twelve of these lines are not self-sustaining. Six of these lines are operating in sparsely settled districts; some of them have been losing money for years, and many undoubtedly will continue to do so indefinitely.

The remedy, as we have already pointed out, lies in combining and co-ordinating the two methods into one comprehensive plan of transportation. These two forms of transportation should not be competitive and destructive, so that one system breaks down the other, but in every case the method best suited to the requirements of the section to be served should be employed. Thus under proper regulation a broad and constructive policy may be adopted, making practical economical and efficient operation of this important public utility. This will build for permanency and future development of the city's transportation requirements.

Should the city see fit to adopt the suggestions we have made, and relieve the railway of the jitney competition, then there will rest upon the company a most sacred duty to furnish rapid, ample efficient service, commensurate with the traffic demands of this city. Failure upon the part of the company to do this will invite a return of jitney competition and will constitute on the company's part a flagrant violation of the solemn obligation which it owes the public.

Reading Rejoices



READING TRANSIT & LIGHT COMPANY'S CONTRIBUTION TO THE RECENT CELEBRATION COMMEMORATING THE ONE HUNDRED AND SEVENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE CITY OF READING, PA.

The recommendations for additional street car service in the event jitney traffic is discontinued include increased service by large one-man cars on the West End-Pierce, Heights-South End and Harrisburg and Central Park lines and by small one-man cars on the North Main-Leeland, Woodland-La Branch and Mandell-North Main lines. This would add twenty-six cars and 204 car-hours to the daily schedule.

The estimated cost of improvements which, it is asserted, should be made right away, is given as follows:

Building 3.66 miles of track with necessary connections and special work, \$163,000.
Purchase of fifteen double-truck one-man cars, \$180,000.

Remodeling platforms and doors of fifty-three cars to permit separate entrance and exit of passengers, \$45,000.

Purchase of five modern buses with garage facilities, \$50,000.

Only an Eight-Cent Fare Will Save Buffalo Company

Unless the International Railway, Buffalo, is permitted to charge an 8-cent fare on its local lines, the company will face a deficit of \$145,900 the next fiscal year. Witnesses for the railway testified to this effect before the Public Service Commission at the resumption of hearings on its plea for a higher rate of fare in Buffalo. It was testified that if an 8-cent fare is charged in 1924 the net income of the International would be \$419,000. The present fare of 7 cents, or four tokens for 25 cents, would yield the International, it was testified, an operating income of \$10,935,700, while an 8-cent fare would yield an operating income of \$11,530,900. Gross income on the present 7-cent fare next year was estimated at \$1,383,000, as against \$1,958,400 on an 8-cent fare.

Additional evidence tending to support the company's claim that its system is valued at \$98,000,000 was presented by expert witnesses for the railway. A. E. Hibner, valuation manager of the International, and W. K. Meyers, vice-president of finance of the Philadelphia (Pa.) Rapid Transit Company, were among the witnesses. Mr. Hibner testified that the reproductive cost of the entire International system, including interurban lines, would exceed \$100,000,000.

One-Man Cars and No Transfers Saves Brooklyn Line

The Transit Commission, acting under the authority of Chapter 748 of the Laws of 1923, has issued a special permission to the Nassau Electric Railroad of the B.-M. T. system to operate the Park Avenue Line, in Brooklyn, without transfers, for another year from Nov. 2, 1923.

Last year, acting under authority of a legislative act of 1922, the commission authorized the company to reopen the line for service after a shutdown of about two years, following the strike of 1920. Receiver Garrison was directed by the courts not to resume operation of some of the deficit-making lines. Hence the Park Avenue line was shut down until legislative enactment permitted its resumption with one-man cars without the extra expense of a widespread transfer system.

The line begins at Central Avenue and Cooper Street and terminates at

the Sands Street, Brooklyn, end of the Brooklyn Bridge. It issues and accepts transfers good across the Brooklyn Bridge, a total ride of about 6 miles from Manhattan to the Bushwick terminus.

Freight Service to Be Continued by Wisconsin Road

The Eastern Wisconsin Electric Company will continue to furnish freight and express service between Neenah and Fond du Lac in connection with its interurban passenger service. This service, recently established, aroused the ire of business men and residents of the city to ask the Council for its abolishment on the score that further operation of this service through the main business district was detrimental to the well being of the city and lowered abutting property values. Representatives of business houses suggested that the company build a suitable terminal in the outskirts.

Urges Washington Traffic Study

Appearing before the United States Senate committee on traffic of the District of Columbia on Nov. 20, J. Rowland Bibbins, consulting engineer, Washington, D. C., recommended that a thorough engineering survey of traffic and transportation in the district be made. The object would be to determine basic facts now entirely unavailable which would be obtained to inform Congress and the District of the need for improvements and for use in working out a definite program fundamentally sound as well as flexible. A similar recommendation had already been made to the committee by W. F. Ham, president Washington Railway & Electric Company. Mr. Bibbins urged that this survey should be made under the jurisdiction of the engineer-commissioner of the District so that the fund of engineering data already in the hands of the commission could be utilized and continuity of effort thus be secured.

Mr. Bibbins urged that Washington should take the lead in solving its traffic problems as it has been looked upon as the model city of America. In common with all other cities, Washington is faced with the necessity of devising ways to speed up the movement of street cars and vehicles generally.

Rail Service Replaced by Bus

At a recent meeting of the City Council of Streator, Ill., the Public Service Company of Northern Illinois was granted permission to cease railway operation and tear up the tracks of the Illinois Light & Traction Company. As stipulated in the agreement the Public Service Company guaranteed satisfactory bus service for the next five years. At the same meeting an independent company, known as the Yellow Bus Company, was authorized to take up operation with a view toward supplying the citizens with adequate bus serv-

ice. If this company fails in its attempt, the Public Service Company of Northern Illinois will see to it that some other bus operator gives service in the community. The railway in Streator is one of the oldest in Illinois. It established service thirty-three years ago.

Bus System Proposed for Jersey Shore Towns

Application has been made to the Board of Commissioners for permission to operate a \$200,000 intercity bus system at Asbury Park. The applicant was George B. Cade, assistant to the secretary of the Atlantic Coast Electric Railway, operating from Pleasure Bay to Sea Girt and the belt system at Asbury Park. The application was made for the Atlantic Coast Transportation Company, a subsidiary of the Atlantic Coast Electric Railway, the officers of which will comprise the personnel of the new concern. It is said that the plans for operating buses include four intercity systems. Mr. Cade said that operation of the railway belt line service in Asbury Park may be suspended during the winter months and buses substituted.

Use of Bus Planned by Hartford & Springfield Line

J. T. Hambleton, general manager of the Hartford & Springfield Street Railway, has asked the city transportation board of Springfield, Mass., for a franchise to operate buses from that city to Suffield, Conn., in place of trolley cars, operation of which it is proposed to discontinue north of Suffield. This is said to be the first step in a plan for the installing of buses over the entire west side route of the Hartford & Springfield, thereby enabling the company to end the railway service and remove the tracks and wires which furnish connections between the Springfield Street Railway and the lines of the Connecticut Company on the west side of the river.

Mr. Hambleton told the transportation board that the entire equipment on the west side was becoming unfit for use and that the company had no funds for replacements. Earnings of the company so far this year are only 70 per cent of the earnings last year. He asked for a quick decision by the city.

The proposed arrangement is subject to approval by the receiver, H. B. Freeman, Hartford, and the bondholders, but no objections are anticipated from these sources. The Springfield Street Railway has indicated that it will not object to the proposed bus service provided it does not offer competition with that company between Springfield and Suffield.

Mr. Hambleton has received encouragement from the Springfield authorities, and he believes the Agawam, Mass., and Suffield, Conn., Selectmen will give their approval, in which event it is hoped the bus service can be started by Dec. 1.

Personal Items

H. C. De Camp Leaves Dayton

Former Assistant General Manager to Devote Himself to Promotion of One-Man Car Operation

H. C. De Camp, the work for which he went to Dayton, Ohio, completed, has resigned as assistant general manager of the City Railway to promote the efficient and economical operation of one-man cars. The Dayton work consisted of converting the system there to 100 per cent one-man operation, with double-truck cars. Upon it Mr. De Camp entered in July, 1921, and physically the change had been made by June of this year, but a few touches still remained then to perfect operation with the new equipment.

SERVICE SAVED TO DAYTON

Between the dates mentioned more than twenty-six cars were rebuilt, and all other details were worked out successfully which go with a physical change of this magnitude. Economies in management had to be introduced if the City Railway and a 5-cent fare were to be saved to the people of Dayton. Through the change to one-man operation it was possible to reduce the number of trainmen from 240 to 126, replace all regular runs on a car-for-car basis and add trippers so that service to the public actually was bettered.

The story of this change in equipment to one-man operation as carried out at Dayton is a mighty interesting one. Mr. De Camp himself was induced to tell it for the benefit of others in an illustrated article which appeared in the *ELECTRIC RAILWAY JOURNAL* for Nov. 10, page 809.

Before going to Dayton Mr. De Camp had been with the railway department of the Westinghouse company in the Cincinnati office for eleven years. So long had he been engaged in production that even those who knew him well had come to look upon Mr. De Camp primarily as representing the sales end of the business.

MR. DE CAMP AN AUTHOR

As a matter of fact the transportation end of the business has always had a strong appeal for him, and he has a fund of both railway operating and selling experience at his command. He started with the General Electric Company several years ago, but later went over to the operating end, serving with the old Utica & Mohawk Valley Railway, the Brooklyn Rapid Transit and the Third Avenue Railway. Then followed his long sales connection. During all that time, however, Mr. De Camp kept up his interest in the operating field, particularly along the lines of efficiency in management.

Mr. De Camp has never lost the common touch, as Mr. Kipling puts it. He has always felt that the trainmen have received less attention than they deserved and so he wrote a series of "Letters of a Retired Motorman to His Son." If it is a test of literature to strike a sympathetic chord, then these letters come pretty close to being literature. Ever since he has been in the Central West Mr. De Camp has been active in the affairs of the Central Electric Railway Association. At the 1920 cruise of the association he was "parson," and at the meeting last January he presented the paper "Emer-



H. C. De Camp

gency Stops," which resulted in the tests made later near Indianapolis and reported in the *ELECTRIC RAILWAY JOURNAL*.

A. S. Coleman, manager of the Alabama Power Company's office in Gadsden, has become district manager at Montgomery. He has been succeeded at Gadsden by J. O. Henkel, Jr., who has been manager of the eastern division at Anniston.

George W. Scott has succeeded Ralph Chandler as second vice-president of the Phoenix Railway, Phoenix, Ariz. L. M. Ford is now treasurer, replacing A. D. Haskell, acting in that capacity. Both officials are located in Los Angeles.

Charles B. Cooke, Jr., has succeeded Franklin P. Jones as president of the West Chester Street Railway, West Chester, Pa. Thomas L. Hodge has been made treasurer, replacing M. G. Woodside.

Robert J. Costigan is claim agent of the Trenton & Mercer County Traction Corporation, Trenton, N. J. The duties of claim agent were formerly performed by Edward J. Peartree, general manager.

John N. Duerr, North Tonawanda, has been promoted to the position of gen-

eral superintendent of the Buffalo-Lockport interurban division of the International Railway, Buffalo. Mr. Duerr has been in the employ of the International for twelve years. For some time he has been assistant superintendent of the Buffalo-Lockport division.

W. H. Evans, Wilkes-Barre, has been selected as the general superintendent of the Williamsport Passenger Railway and the Jersey Shore Street Railway. The position has been vacant more than three months.

W. Stewart has been made assistant treasurer of the Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

M. J. Binkley has been made secretary of the Buffalo & Lake Erie Traction Company, Erie, Pa.

F. A. Clark will resign as superintendent of power of the City Light & Traction Company, Sedalia, Mo., to take a position in the construction department of Henry L. Doherty & Company at Washington, Pa.

Douglas Shaw, Madison, treasurer of the Wisconsin River Power Company, Madison, formerly vice-chairman of the accounting division of the Wisconsin Utilities Association, was elected chairman of that division at the closing session of a two-day conference of heads of accounting departments, held in Madison, on Oct. 23 and 24. He succeeds Emil Jorgenson of the Wisconsin Gas & Electric Company, Racine, who recently tendered his resignation.

Rawson Collier, for some years prominently connected with the Georgia Railway & Power Company, but for the past two years with the Hudson River Gas Company, Poughkeepsie, N. Y., has resigned the latter post and will return to Atlanta as representative for Dwight P. Robinson & Company. He is a brother of Charles Collier, sales manager for the Georgia Railway & Power Company.

Obituary

Edward C. Crosby, former builder of street railways in Vermont and Massachusetts, died in Brattleboro, Vt., on Nov. 2. He was born in Marlboro, Vt., in 1846. In 1895 he built the Brattleboro Street Railway and in 1897 the Springfield (Vt.) Street Railway. In the early '90s he took a leading part in the building of lines from Northampton to Amherst and Greenfield, Mass. When several of these roads were combined in the Connecticut Valley system he became chairman of the board of directors. He represented Brattleboro in the Legislature in 1912 and was elected State Senator last year.

James W. Sale, president of the Marion & Bluffton Traction Company since 1914, died recently at Easthaven Hospital, Richmond, Ind. He was sixty-five years old. Aside from his con-

nection with the Marion & Bluffton Traction Company, Mr. Sale was prominently identified with other business enterprises throughout the state and was active in politics.

Samuel W. McCall, ex-Governor of Massachusetts and a member of the board of public trustees of the Eastern Massachusetts Street Railway, died recently at Winchester, Mass.

William J. Lloyd, general superintendent of the West Lynn works of the General Electric Company, died suddenly on Oct. 28 in an automobile as he and friends were entering the grounds of the Tedesco Country Club. For several years he was connected with the Westinghouse Company, but for the past twenty-five years he had been with the General Electric Company, four years of this period being spent at the plant of the British Thomson-Houston Company at Rugby, England. Mr. Lloyd for several years was at the Pittsfield works of the General Electric Company and about twelve years ago was transferred to Lynn. He assisted in establishing a plant of the company in Australia about four years ago, returning again to the Lynn works. In July, 1922, he was made general superintendent of the West Lynn works.

Clifford Thorne, noted attorney and authority on railroad subjects, died in London on Nov. 13. Mr. Thorne was a member from 1910 to 1917 of the Iowa Board of Railway Commissioners and chairman for the last five years of his service. He was president of the National Association of Railway Commissioners in 1914 and 1915. He was a member of the American Bar Association, of the American Economics Association and the American Academy of Political and Social Science. Mr. Thorne's expertness in questions of economics brought him into prominence as a contributor to various magazines.

Changes Proposed in New York Rapid Transit Routes

The Board of Estimate of New York has before it a proposal for changes in the route of the West Side extension of the Brooklyn-Manhattan Transit Corporation subway that have been adopted by the Transit Commission. If the board approves the modifications the new subway will be constructed under Central Park instead of under Central Park West, and will go north between 110th and 125th Streets under Eighth and St. Nicholas Avenues instead of under Manhattan Avenue. It is estimated that the change will result in a saving of \$2,500,000 to the city. The Transit Commission has also modified the West Side route so that it will extend from its original terminus, 162d Street, under St. Nicholas Avenue to Fort Washington Avenue at West 175th Street. The line will have four tracks and be under ground all the way. To be effective, these changes must be ratified by the Board of Estimate, which is expected to act on the new proposals some time next week.

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

Railway Supply Manufacturers Will Hold Convention

At a meeting of the executive committee of the Railway Supply Manufacturers' Association, held in conjunction with the American Railway Association, mechanical division, Master Car Builders-Master Mechanics, held in New York City on Nov. 8, 1923, it was mutually arranged that a convention and exhibition would be held in Atlantic City, N. J., June 11-18, 1924.

Slack Demand for Steel Castings

October bookings of steel castings by companies representing more than two-thirds of the commercial-castings capacity of the United States amounted to 37,446 tons, as against 47,574 tons in September. The accompanying table shows the bookings of commercial steel castings for the past ten months by sixty-five identical companies, with a monthly capacity of 96,900 tons, of which 38,300 tons are usually devoted to railway specialties and 58,600 tons to miscellaneous castings.

Month 1923	Total		Railway Specialties	
	Net Tons	Per Cent of Capacity	Net Tons	Per Cent of Capacity
January.....	100,605	103.8	47,879	125.0
February.....	90,152	93.0	39,845	104.0
March.....	143,564	148.2	76,409	199.5
April.....	90,968	93.9	39,610	103.4
May.....	89,493	92.4	38,788	101.3
June.....	84,878	87.6	42,773	111.7
July.....	52,066	53.7	16,741	43.7
August.....	50,515	52.1	18,332	47.9
September....	47,574	49.1	21,685	56.6
October.....	37,446	38.6	9,840	25.7

* Two companies with a capacity of 785 tons per month on miscellaneous castings now out of business.

October Cement Output Sets Record

The production of portland cement in the United States during the month of October was greater than in any other month this year or during 1922. Compared with the same month a year ago, the figures were 13,350,000 bbl. for 1923 and 12,287,000 bbl. for 1922. In fact, the total production for the first ten months of 1923 is very nearly equal to that for the whole of the year 1922.

Heavy Shipments of Paving Brick Continue

According to the National Paving Brick Manufacturers' Association the paving season is running later in the fall this year than is customary. This is indicated by the continued heavy shipments of vitrified paving brick for the month of October, which were 34,287,000 as against 34,761,000 for September. Total number of brick manufactured was 34,317,000 for Octo-

ber and 34,457,000 for September. Stock on hand was reported at 76,613,000 for October as against 86,530,000 for September. It is thought that this unusual fall activity is the result of a wet spring and a late start to the paving season.

Maintains Carbolineum Is Always Available at Fair Price

The Carbolineum Wood Preserving Company, Milwaukee, Wis., has written the editors of the JOURNAL commenting that it was gratifying to note in the report of the American Electric Railway Engineering Association wood preservation committee, published in the JOURNAL, that the committee confirmed the report of the previous committee in acknowledging carbolineum as the most suitable preservative for brush treatment of wood poles. The manufacturer wished to differ, however, with a subsequent statement made by the committee that carbolineum was not always obtainable at a reasonable cost.

The manufacturer states that, calculating at the highest prices for carbolineum and labor, the cost of brush treating a pole is not more than 50 cents. When it is considered that the pole costs from \$7 to \$10, at present, and that the brush treatment will give an additional life of at least 100 per cent under the most severe exposure, the 50 cents extra cost for brush treatment, even at highest prices, is certainly justified. The manufacturer says that it is difficult to understand why any one should try to economize in this process by using a cheaper material. It is claimed that in many years' experience customers of this company have rarely objected to the price. In ninety cases out of a hundred they have simply asked for the manufacturer's standard material.

Metal, Coal and Material Prices

Metals—New York		Nov. 20, 1923
Copper, electrolytic, cents per lb.....		13.00
Copper wire base, cents per lb.....		15.50
Lead, cents per lb.....		6.90
Zinc, cents per lb.....		6.25
Tin, Straits, cents per lb.....		44.875
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.....		\$4.425
Somerset mine run, Boston, net tons.....		2.375
Pittsburgh mine run, Pittsburgh, net tons..		1.925
Franklin, Ill., screenings, Chicago, net tons..		1.45
Central, Ill., screenings, Chicago, net tons...		0.85
Kansas screenings, Kansas City, net tons...		2.00
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.....		\$6.50
Weatherproof wire base, N. Y., cents per lb.		16.50
Cement, Chicago net prices, without bags..		\$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.....		\$0.94
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots.....		11.25
Turpentine, (bbl. lots), N. Y., per gal.....		\$0.94

Rolling Stock

Schenectady Railway is overhauling most of its equipment. Many cars are in the shops being entirely rebuilt except for the steel underframe. New bodies will take the place of the old.

Southwestern Traction Company, Temple, Tex., has remodeled its passenger cars, converting them into one-man cars with a pay-as-you-enter feature. The converted cars were put in operation on Nov. 5.

Des Moines City Railway will receive in December the first of the twenty-five new steel cars ordered some time ago.

Montreal Tramways has purchased fourteen one-man Birney safety cars from the F. B. Cutter Company, New York City. These cars are the first of this type to be put in service in Montreal.

Department of Street Railways, Detroit, has placed orders for 100 new Peter Witt type cars which are to be equipped with safety car devices and are generally similar to the other cars of this type recently purchased for Detroit. The order has been divided equally between the McGuire Cummings Manufacturing Company and the Osgood Bradley Car Company. Delivery starting Feb. 28, 1924, is specified. The principal specifications follow:

Seating capacity	52
Boister centers, length	23 ft. 9 in.
Length over all	48 ft. 5 1/2 in.
Width over all	8 ft. 4 1/2 in.
Height, rail to trolley base	10 ft. 9 3/4 in.
Body	Semi-steel
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Air brakes	Not settled
Car signal system	Faraday
Control	K-35
Curtain fixtures	Curtain supply No. 88
Curtain material	Double-faced Pantasote
Destination signs	Hunter
Door-operating mechanism	Safety Car devices
Door engines	National pneumatic
Door signals	National pneumatic safety interlocking
Fenders or wheelguards	H. B.
Hand brakes	Peacock staffless
Heater equipment	Gold nichrome wire
Headlights	H.D.B.-96 Root type
Lighting	Center with Electric Service
Motors	Four G. E. 35 hp.
Paint	Pratt & Lambert
Sanders	Osgood Bradley
Sash fixtures	O. M. Edwards
Scrapers	Root No. 7 air operated
Tail lights	Nichols Lintern duplex
Trolley catchers	Ohio Brass No. 13141
Trolley base	Ohio Brass Company
Thermostat	Railway Utility
Trucks	Taylor
Ventilators	Railway Utility
Wheels	Rolled steel
Watt-hour meter	Sangamo

International Railway, Buffalo, has equipped 100 passenger cars on its local lines with scrapers or small snow plows which can be lowered to the rails during the winter as necessity arises. Announcement of this valuable addition to the company's snow-fighting equipment was made by Herbert G. Tulley, president of the International. Each line will be equipped with its share of these cars, so that the scrapers can be brought into play immediately snow starts to fall. The company's snow-fighting equipment, in addition to these

cars, consists of fifty-four plows and sweepers. These have been thoroughly overhauled and are now assigned to the various carhouses throughout Buffalo for immediate service.

Track and Line

Philadelphia Rapid Transit Company has placed an order with the Union Switch & Signal Company for the material required for installation of an electro-pneumatic interlocking plant at Fortieth Street, on the Market Street Elevated Line. The interlocking consists of a crossover layout with complete signal protection and automatic stops involving eight working functions. Two of the signal levers will be equipped with Mercury automatic time releases to provide automatic time locking.

Southern Public Utilities Company, Winston-Salem, N. C., is making an extension from the end of the West Highland line to the Richard J. Reynolds High School.

New York, N. Y.—The Transit Commission has received bids for the construction of the tracks in the Jerome Avenue yard of the Interborough Rapid Transit Company near Jerome Avenue and Moshulu Parkway. The Slattery Engineering & Construction Company was the low bidder, offering to do the work at \$59,879.

Jackson Railway & Light Company, Jackson, Tenn., has spent \$70,000 this year in improving its track, buying new equipment and laying extra heavy rails. The East Jackson line, from Royal and Main Streets to the end of the line on East Preston, has been completely rebuilt. Extra heavy rails have been laid on Arlington Avenue from Highland to Prospect and a new curve has been built into the line at the corner of Arlington and Prospect. The North Royal line was also completely rebuilt. The superintendent recently announced that all track improvements for the year had been completed.

Power Houses, Shops and Buildings

West Jersey & Seashore Railroad, Camden, N. J., will purchase power hereafter from the Philadelphia Electric Company. Electricity generated in Philadelphia will be turned into the West Jersey & Seashore Railroad's third-rail line between Camden and Atlantic City early in December. Railroad officials more than a year ago found it would be cheaper to purchase power from the Philadelphia Electric Company, convey it to New Jersey over high-tension lines on the Delair Bridge and run it through substations to the railroad line than it would be to continue the generation of electricity at Westville, N. J. Part of the Westville plant will be used as a substation.

Trade Notes

Templeton, Kenly & Company, Ltd., Chicago, almost immediately after the quake had subsided, received cablegrams to rush to Japan quantities of No. 329 Simplex pole-pulling and pole-straightening jacks, which they were partially able to do through the stock maintained at San Francisco and by borrowing from the stocks of the Western Electric Company and other jobbers on the coast. Additional quantities were immediately dispatched from Chicago to San Francisco, and it is safe to predict that the telephone and power lines will be quickly restored through these first-aid tools.

William Porter White has been appointed to act as personal assistant to M. O. Troy, new executive assistant manager of the central station department of the General Electric Company. His headquarters will probably be at Schenectady in common with Mr. Troy. Mr. White is a graduate of Clemson College, class of 1906, whence he entered the student test course at the Pittsfield works of the General Electric Company. In 1908 he started work in the transformer engineering department there, where he received a thorough training in designing. In 1911 he was transferred to the transformer sales department at Schenectady and, in 1912, was placed in charge of exploitation and sale of feeder voltage regulators and generator voltage regulators. He received another promotion in 1913, taking charge of commercial engineering work in the transformer sales department at Pittsfield.

Bridgeport Brass Company announces the appointment of E. E. Helm as district manager at Detroit. Mr. Helm comes from Akron, where for two years he was manager of the Industrial Bureau of the Akron Chamber of Commerce. He is particularly well known in rubber and automobile trade circles by reason of his connection for five years with the Goodyear Tire & Rubber Company in publicity work.

New Advertising Literature

International Steel Tie Company, Cleveland, has issued a thirty-two page booklet on "Joints." It gives the laboratory and service data on the strength of rail joint on steel twin ties. The articles contained in the leaflet are reprinted from a recent issue of the ELECTRIC RAILWAY JOURNAL.

United Electric Company, Canton, Ohio, has issued a pamphlet, "Vacuum Cleaning Data for Architects and Engineers." The pamphlet states that the lack of a ready reference work on vacuum cleaning has been felt by architects and engineers. The demand for this compilation of information is evidenced, in the opinion of the company, by the fact that this pamphlet has reached its fifth edition.

After the limit of piston stroke is reached—

What then?

It may be due to slack in the rigging, or perhaps it's worn brake shoes. But whatever the cause, there sometimes comes a situation where you have to set the hand brake to hold the car. Multiply the length of piston stroke (plus a little extra) by the various leverage ratios and it makes a lot of chain for the hand brake to wind up. Ordinary brakes will simply jam.



That is the time when

Peacock Brake "Capacity" insures safety of passengers and car

Peacock Staffless Brakes have almost unlimited chain-winding capacity

Hand brakes for modern cars are just as important today as they were before the days of air brakes. If installed at all—(and who would send out a car without emergency hand brakes)—they should be adequate to meet whatever emergency may arise.

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“Resiliency” the ① Principle

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

“It was agreed that a substitute tie should meet the following requirements:

- | | | |
|--|---|---|
| 1. Resiliency. | → | The fundamental principle of the DAYTON RESILIENT TIE. |
| 2. Hold rail to gage. | → | Held securely by bolts accurately located in steel cross members. |
| 3. Provide sufficient bearing area. | → | By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface. |
| 4. If expected to last for more than one set of rails, that easily renewable fastenings be provided. | → | Readily accessible bolt fastenings provide for rail renewal. |
| 5. Be easily installed by ordinary track workers. | → | Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day. |
| 6. Cost installed should be reasonable. | → | Dayton Resilient Tie Track costs \$2,000 per mile less than wood ties in gravel ballast. |

DAYTON

Fundamental of the Dayton Tie

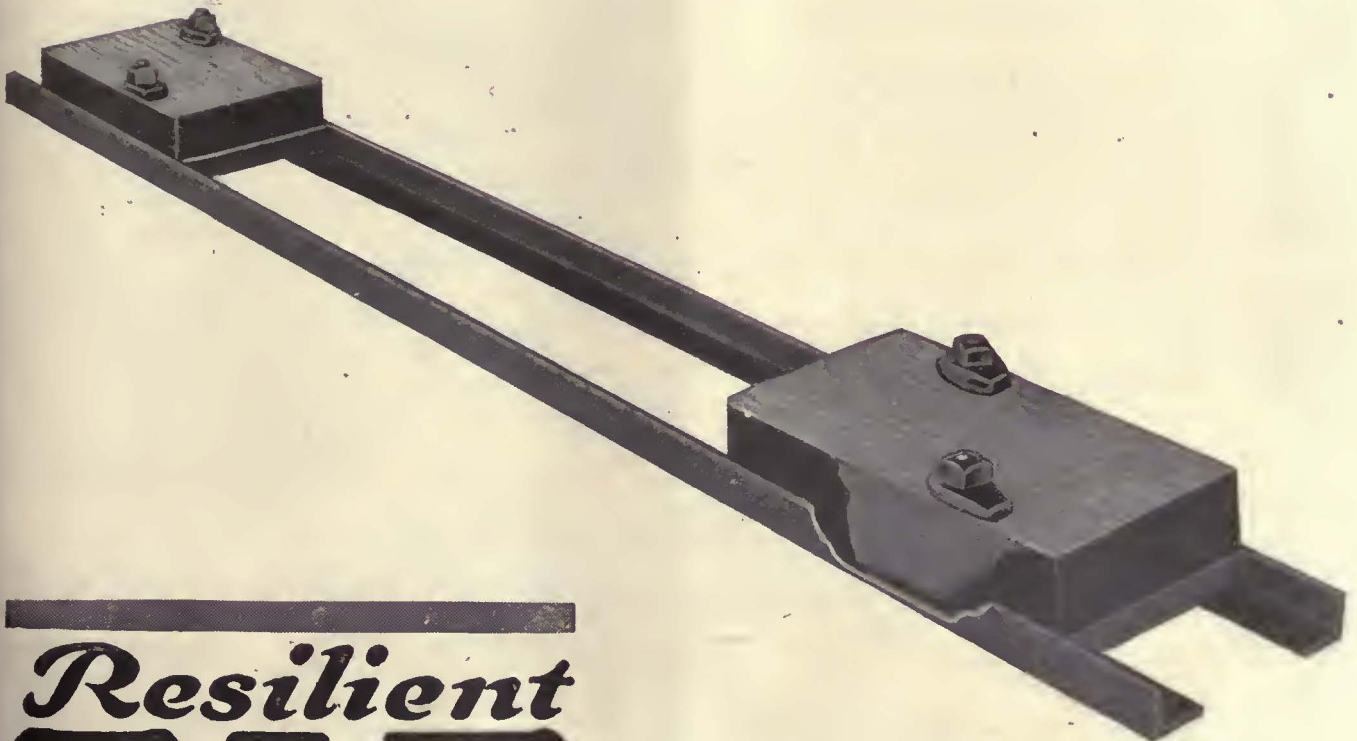
The Way Committee of the A. E. R. A. reported that a substitute tie should meet six requirements, the first of which, **Resiliency**, is the fundamental principle of the Dayton Tie.

Resiliency means "shock absorption," and is obtained in the Dayton Tie by the use of asphalt and wood, made in combination with steel and concrete.

The vibrations which are set up by a moving car and transmitted to the rail, are absorbed by the wood and asphalt, preventing the foundation from disintegrating.

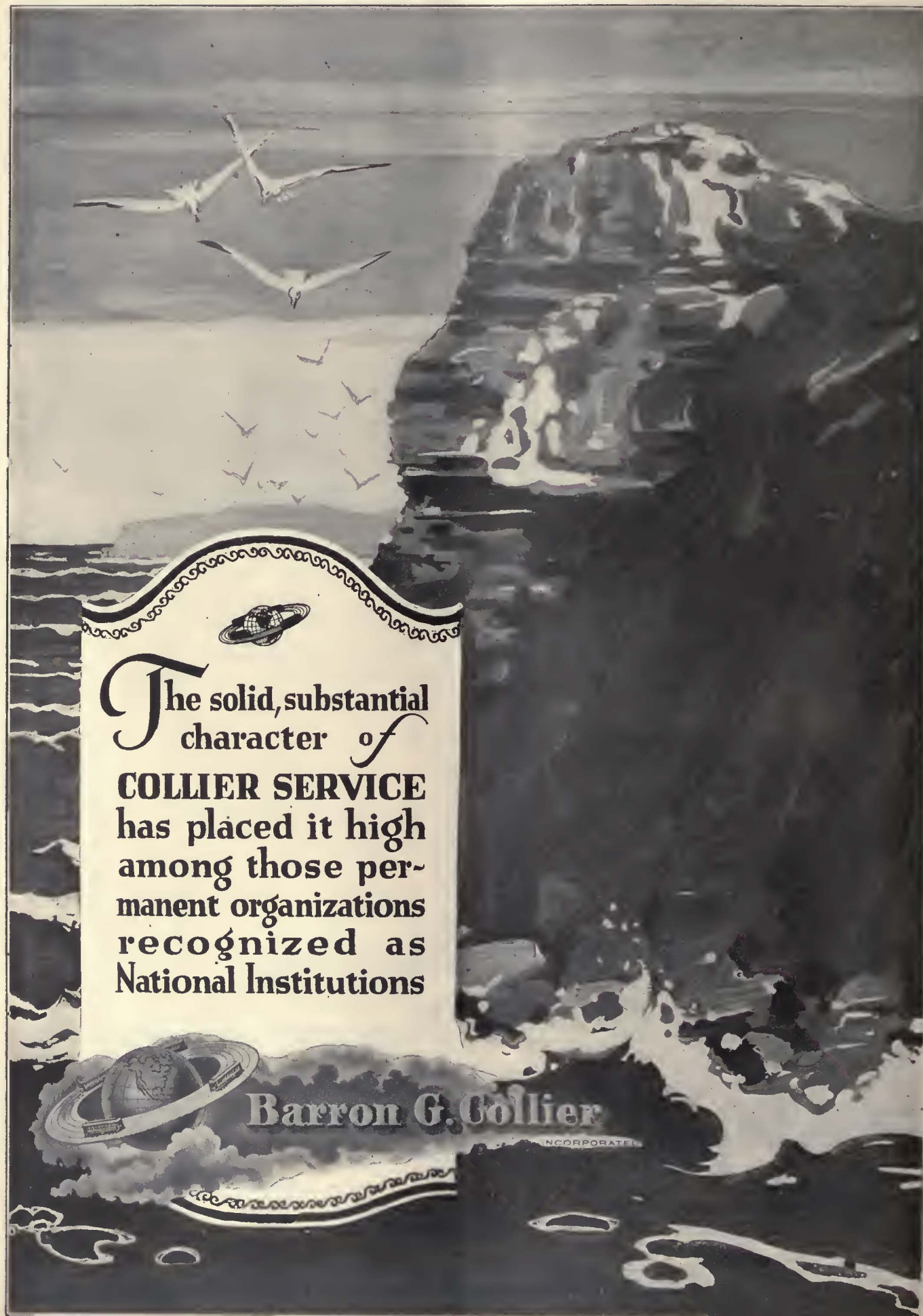
A concrete foundation is far better than stone or gravel when it is protected from the vibration of the cars, transmitted through the rail. Stone or gravel, under heavy loads, will soon disappear in the subsoil, thus leaving low places in the track. Concrete, however, with Dayton Ties, provides, with the street paving foundation, a slab construction that is protected against disintegration through its shock-absorbing qualities.

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"hold the rails to gage." Don't miss it!*



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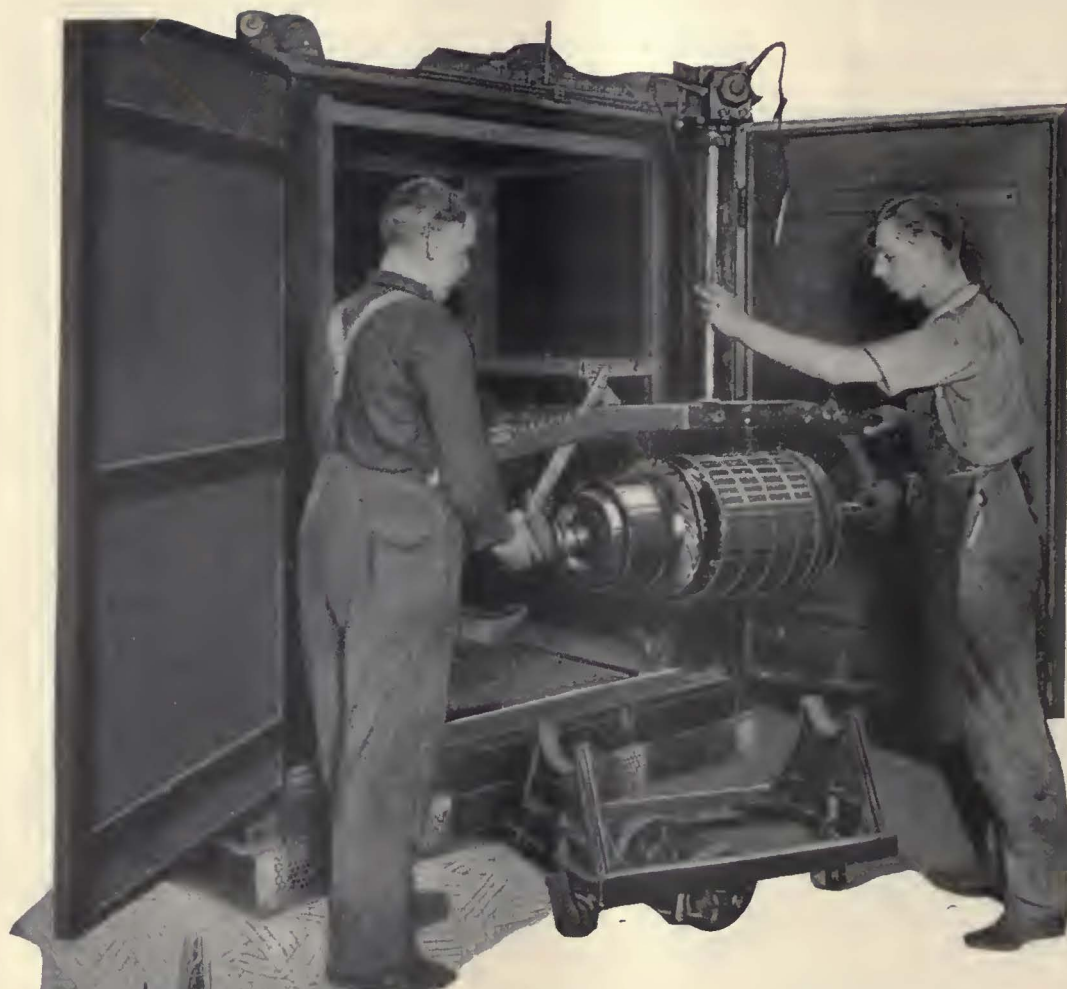
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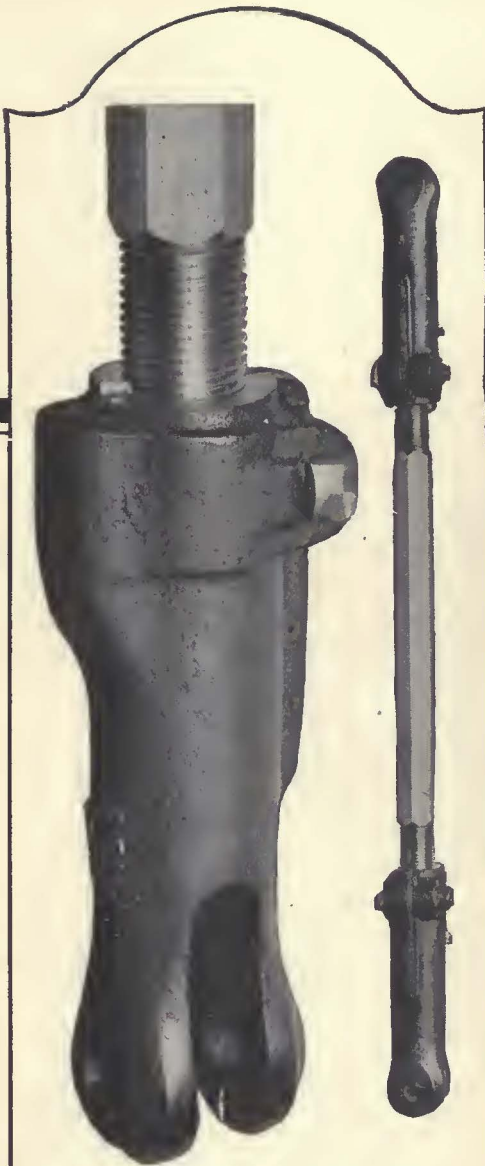
tion lines, will be glad to make recommendations for the proper lubrication of your entire equipment. Then, when you order your supply of Standard Lubricants, your shops at different points receive their supply from our warehouse in the same town. Our trucks deliver the iron-barrels and pick up the empties. This service saves you hauling charges. Only enough lubricants to supply your immediate wants need be carried in your stock.

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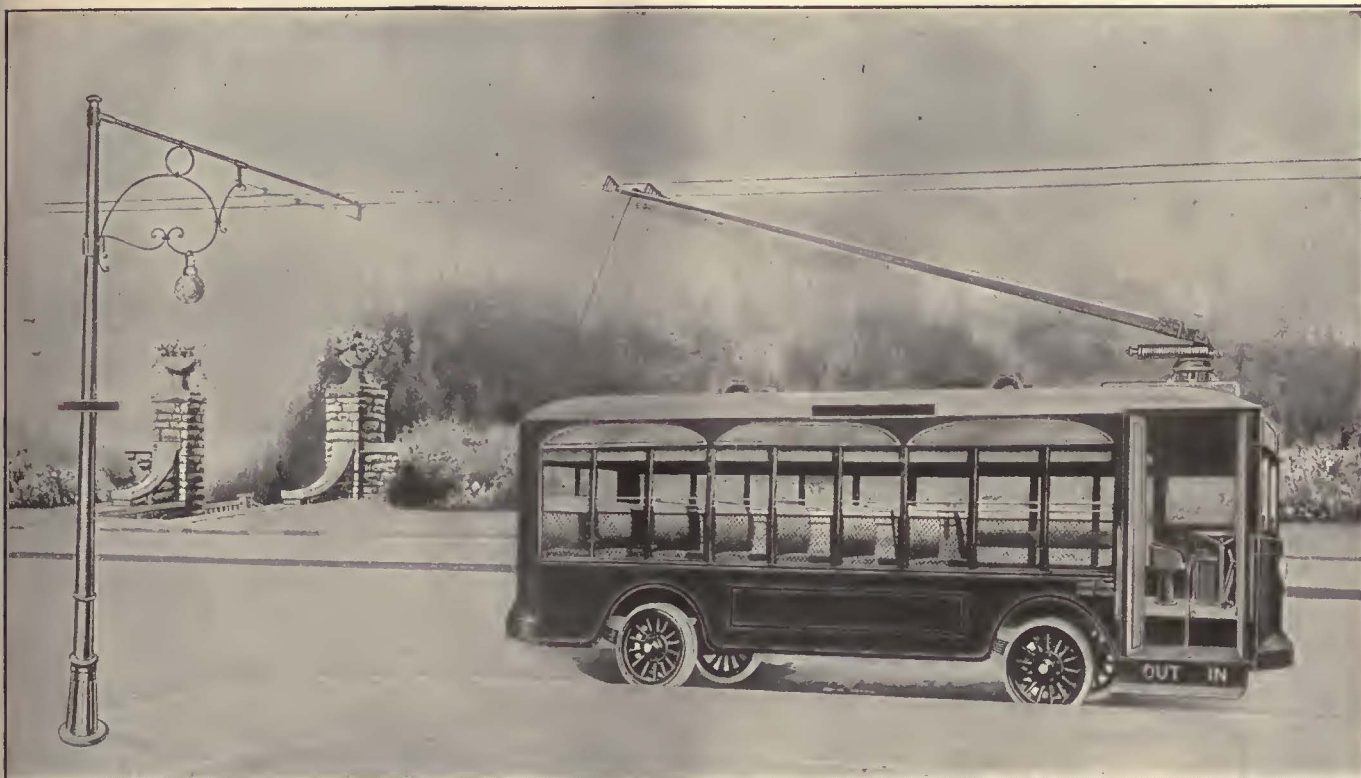
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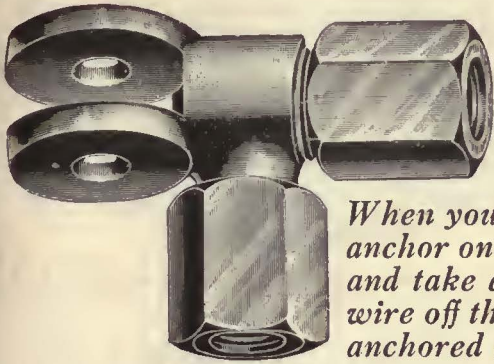
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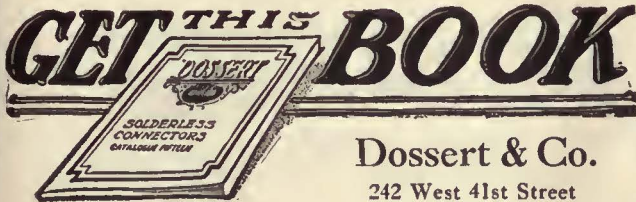


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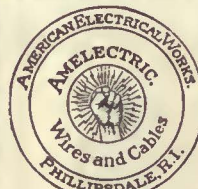


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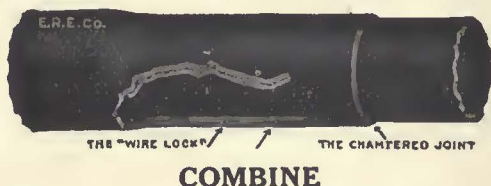
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for single track block signal protection

United States Electric Signal Co.
West Newton, Mass.

**ANACONDA
TROLLEY WIRE**

ANACONDA COPPER
MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN
BRASS COMPANY
General Offices: Waterbury, Conn.



**Peirce Sign Hangers
For Span Wires**

The hinged joint keeps the sign in position
at all times, regardless of the twisting of
the span wires.

HUBBARD & COMPANY
PITTSBURGH CHICAGO

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

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SPECIALISTS

in the

**Design and Manufacture
of**

***Standard—Insulated—and
Compromise Rail Joints***

The Rail Joint Company
61 Broadway, New York City

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Special Trackwork
For Street and Steam Railways

Steel Castings

Gas Cylinders

ORIGINATORS OF
Manganese Steel Trackwork

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Tioga Steel & Iron Co.,
Philadelphia, Pa.

Philadelphia Roll & Machine Co., Philadelphia, Pa.

Metal Safety Railway Tie Co.

522 North American Bldg., Philadelphia, Pa.

All-metal cross ties

Types for open and closed tracks
"More flexible than wood"

See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. Prices upon application.

AUTOMATIC SIGNALS

**Highway Crossing Bells
Headway Recorders**

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

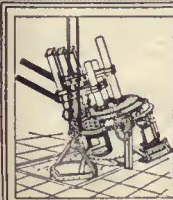
**The Differential
Steel Car Co.**
Findlay, Ohio



BUCKEYE JACKS

High-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
Alliance, Ohio



**Moore Rapid
Electric Furnaces**
Ten Standard Sizes 1½ to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
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Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.

RAMAPO AJAX CORPORATION

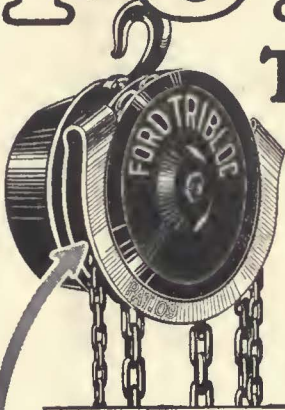
Ramapo Automatic
Return Switch
Stands
for Passing
Sidings



RACOR Tee Rail
Special Work.
Manganese
Construction

GENERAL OFFICES: HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
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FORD TRIBLOC



Look for
the *Green*
Loop Guide

A speedy and highly efficient chain hoist.
Built in capacities from $\frac{1}{4}$ to 20 tons.
Write for Catalog 6-B containing complete information.

FORD CHAIN BLOCK CO.
2nd and Diamond Sts., Philadelphia, Pa.
Overseas Representation: Allied Machinery Company of
America, 90 Wall Street, New York, N. Y.

2234-D

CHAIN HOISTS

BECKWITH-CHANDLER RAILWAY VARNISHES



Railway Pale Durable Body
Inside Car Finishing Varnish
Cane Seat Varnish
Truck Enamel
(black or colors)
Canvas Roof Paint
Railway Outside Enamels
(all colors)
Railway Inside Enamels
(white and colors)

Finishes for Brush or Spray application—Flat Color and Varnish Systems—Enamel Systems and Color Varnish Systems—for Railway Car Interiors and Exteriors.

*The Beckwith-Chandler organization
is at your service.*

Beckwith-Chandler Company
193-211 Emmett St., Newark, N. J.
320 Fifth Ave., New York

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of
Water Tube Boilers
of continuing reliability

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CLEVELAND, Guardian Building
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Bayonne, N. J.
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Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

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SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
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SAN JUAN, PORTO RICO, Royal Bank Building

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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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MILWAUKEE, WIS. U.S.A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.



Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois



Ohmer Indicating and Recording Fare Registers

are especially well adapted for use in one-man cars, either for city or interurban service.

The operation is quick and snappy. Each fare is clearly indicated and a correct printed record made of it.

Ohmer Fare Registers offer the only means of placing fare collecting on an absolutely correct business basis.

OHMER FARE REGISTER CO.
Dayton, Ohio



CLEVELAND FARE BOXES

always

Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

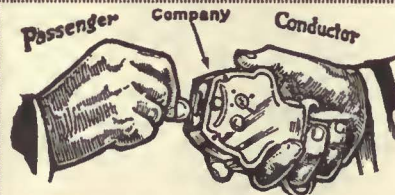
Heywood-Wakefield CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.

Factory at Wakefield, Mass.

Offices at New York, Chicago, San Francisco



Direct Automatic Registration
By the
Passengers
Rooke Automatic Register Co.
Providence, R. I.

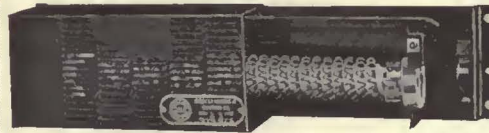


Gets Every Fare **PEREY TURNSTILES or PASSIMETERS**

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
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THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia

Offices: New York, Chicago, St. Louis, Washington, San Francisco



"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request

The Oskel Equipment Co.
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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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KALAMAZOO, MICH., U. S. A.



SHOCKS have little effect on AJAX CHECK PLATES

because
these plates are made from
Ajax Perfecto Bronze

The strongest and toughest metal on the market. They will bend before they will break and give longest possible service.

The Ajax Metal Company

Established 1880

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NEW YORK

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Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER
SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.

Newtonville, Massachusetts

B. A. Hegeman, Jr., President Charles C. Castle, First Vice-President
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W. C. Lincoln, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., N. Y.

BRANCH OFFICES:

Munsey Bldg., Washington, D. C.; 100 Boylston St., Boston, Mass.; Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

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Pittsburgh Forge & Iron Co.'s	Meters
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Anglo-American Varnish Co.,	Spring
Varnishes, Enamels, etc.	C-H Electric Heaters
National Hand Holds	Gariand Ventilators
Drew Line Material & Railway	E-Z Car Control Corp. Safety
Specialties	Devices
Genesco Paint Oils	Lind Aluminum Field Cols
Turnstile Car Corporation—Turn-	Flaxlinum Insulation
stiles	National Safety Car Equipment
Economy Electric Devices Co.	Co.'s One-Man Safety Cars
Anderson Slack Adjusters	

Advertisements for the Searchlight Section

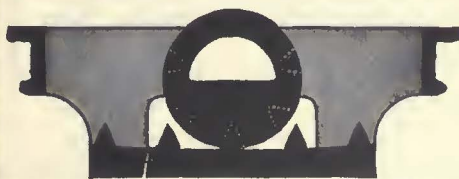
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Railway Journal
until 10 a. m.



Wednesday

For issue out Saturday

0220



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

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N-L VENTILATORS

for Electric Railways and Motor Buses.
Unexcelled for ventilation and appearance.

Write for new catalogue

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7960 Lorain Ave., Cleveland, Ohio

N-L Products manufactured and sold in Canada by
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USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

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Proposals, 40 cents a line an insertion.

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

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Rates for larger spaces, or yearly rates, on request.
In advertising such is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS VACANT

ROADMASTER wanted for electric road in the East. Must be thoroughly efficient in the handling of material and labor and competent in the maintenance of city and interurban track. State experience, salary expected and when available. P-622, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SHOP foreman wanted to take charge of car shop on interurban line operating ten cars. State experience and salary expected. P-621, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ELECTRIC arc welder, experienced in joint welding, bonding and surface work. Can furnish good references. Open for immediate employment. PW-618, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

ELECTRIC freight; position wanted by American man with eight years' experience in all positions. Fully capable of taking charge. Age 45. At liberty Jan. 1st. PW-624, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade references as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-617, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

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WANTED position by master mechanic, 18 years' electric railway maintenance, rebuilding cars, track, trolley and rewinding armatures. Best of reference. PW-620, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

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ROLLED STEEL WHEELS

50 to 100 used 36-in. or 37-in., not less than 34-in. diameter.

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Clinton and Chestnut St., Ft. Wayne, Ind.

FOR SALE

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

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

A

"Searchlight"

Ad

Costs Little

and is

Quick Acting

0231

RAILS

Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morse standard gage Gasoline
Motor Car; seats 34 people.

WALTER A. ZELNICKER SUPPLY CO.
St. Louis, Mo.

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1—Double truck express car with snow plow ends. Operated by air. Brill truck. Complete equipment overhauled.

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

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320 LEWIS & FOWLER FARE REGISTERS

FS-626, Electric Railway Journal
10th Ave. at 36th St., New York City.

FOR SALE

5 INDIANAPOLIS WELDERS

All in first class condition.

Will be sold at attractive prices.

FS-625, Electric Railway Journal
10th Ave. at 36th St., New York, N. Y.

Used One-Man Birney Safety Cars

IMMEDIATE DELIVERY

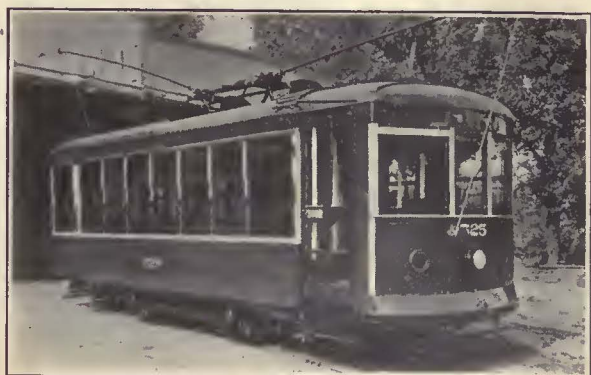
Operated about 40,000 miles or less than 2 years. Excellent condition. Write or wire for complete specifications and prices. Only a limited number remaining.

F. B. CUTTER COMPANY

50 Church St., New York City, N. Y.

Steam & Electrical
Machinery

Cars and
Equipment



WHAT AND WHERE TO BUY

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

- Advertising, Street Car
Collier, Inc., Barron G.
- Air Receivers & Aftercoolers
Ingersoll-Rand Co.
- Anchor, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools
Elec. Service Supplies Co.
- Automatic Return Switch
Stands
Ramapo Ajax Corp.
- Automatic Safety Switch
Stands
Ramapo Ajax Corp.
- Axles
Bemis Car Truck Co.
St. Louis Car Co.
- Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
- Babbitt Metal
Ajax Metal Co.
- Badges and Buttons
Elec. Service Supplies Co.
International Register Co.,
The
- Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Bearings, Center and Boiler
Side
Baldwin Locomotive Works
Stucki Co., A.
- Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.
- Boilers
Babcock & Wilcox Co.
- Book Publishers
McGraw-Hill Book Co., Inc.
- Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
- Bonds, Rail
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
- Brackets and Cross Arms
(See also Poles, Ties,
Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.
- Brushes, Graphite
U. S. Graphite Co.
- Brush Holders
Anderson Mfg. Co., A. &
J. M.
- Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
- Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
- Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Cables. (See Wires and
Cables.)
- Cambric Tapes, yellow and
black varnished
Irvington Varnish & Ins. Co.
- Carbon Brushes (See Brushes,
Carbon)
- Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
- Car Lighting Fixtures
Elec. Service Supplies Co.
- Car Panel Safety Switches
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.
- Cars, Passenger, Freight, Ex-
press, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
- Cars, Gas, Rail
St. Louis Car Co.
- Cars, Second Hand
Cutter Co., F. B.
- Electric Equipment Co.
Transit Equipment Co.
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General Electric Co.
- Car Signal System
Fahnestock Elect. Co.
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or Copper
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Anderson Mfg. Co., A. &
J. M.
- Castings, Gray Iron and Steel
Bemis Car Truck Co.
St. Louis Car Co.
- Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.
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Trolley
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Ohio Brass Co.
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- Catenary Construction
Archbold-Brady Co.
- Change Carriers
Cleveland Fare Box Co.
- Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for
Wires and Cables
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J. M.
Dossert & Co.
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Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers Track
(See also Snow-Plows,
Sweepers and Brooms)
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St. Louis Car Co.
- Clusters and Sockets
General Electric Co.
- Coal and Ash Handling (See
Conveying and Hoisting
Machinery)
- Coil Banding and Winding
Machines
Elec. Service Supplies Co.
- Coils Armatures and Field
General Electric Co.
Westinghouse E. & M. Co.
- Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
- Coin Sorting Machines
Cleveland Fare Box Co.
- Coin Wrappers
Cleveland Fare Box Co.
- Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Truing Devices
General Electric Co.
- Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
- Compressors, Air Portable
Ingersoll-Rand Co.
- Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
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Irvington Varnish & Ins. Co.
- Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.
- Connectors, Trailer Car
Consolidated Car Heat'g Co.
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Ohio Brass Co.
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St. Louis Car Co.
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Wood Co., Chas. N.
- Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Cranes
Allis-Chalmers Mfg. Co.
- Cross Arms (See Brackets)
- Crossing Foundations
International Steel Tie Co.
- Crossing, Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
- Crossing, Manganese
Ramapo Ajax Corp.
- Crossings
Ramapo Ajax Corp.
- Crossings, Track (See Track,
Special Work)
- Crossings, Trolley
Ohio Brass Co.
- Curtains and Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
- Dealer's Machinery
Elec. Equipment Co.
Toledo & Indiana R.R. Co.
Transit Equip. Co.
Zelnicker Supply Co.,
Walter A.
- Derailing Devices (See also
Track Work)
- Derailing Switches
Ramapo Ajax Corp.
- Destination Signs
Elec. Service Supplies Co.
- Detective Service
Wish-Service, P. Edward
- Door Operating Devices
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.
St. Louis Car Co.
- Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
- Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
- Drills, Rock
Ingersoll-Rand Co.
- Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
- Dryers, Sand
Elec. Service Supplies Co.
- Ears
Ohio Brass Co.
- Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.
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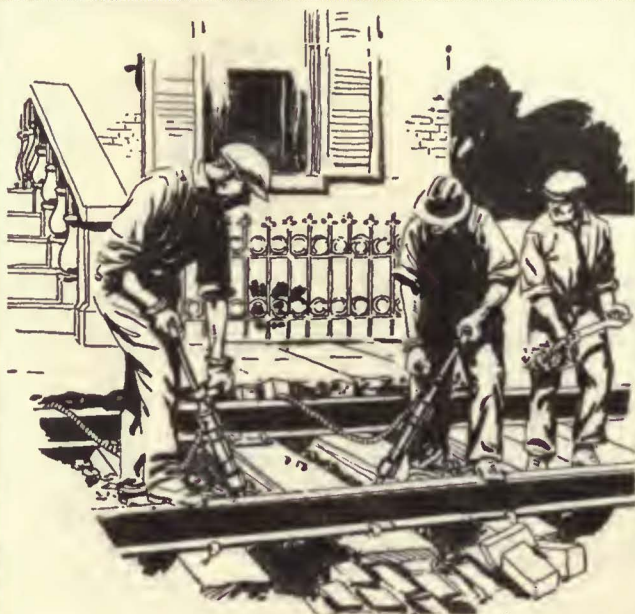
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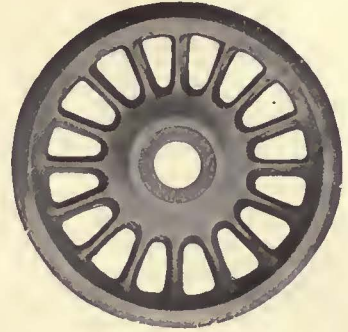
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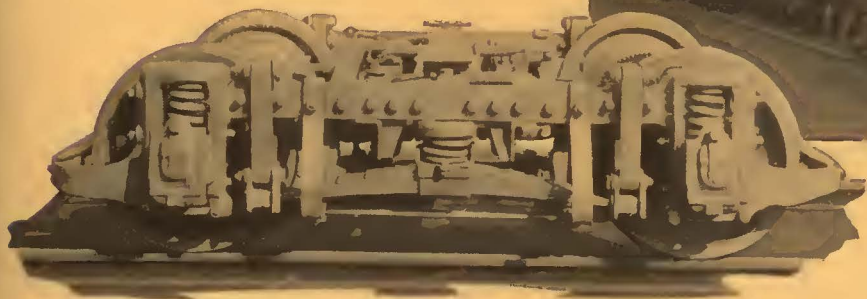
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Brill Low-level 77-E Truck Assures Most Comfortable Riding and Low Maintenance

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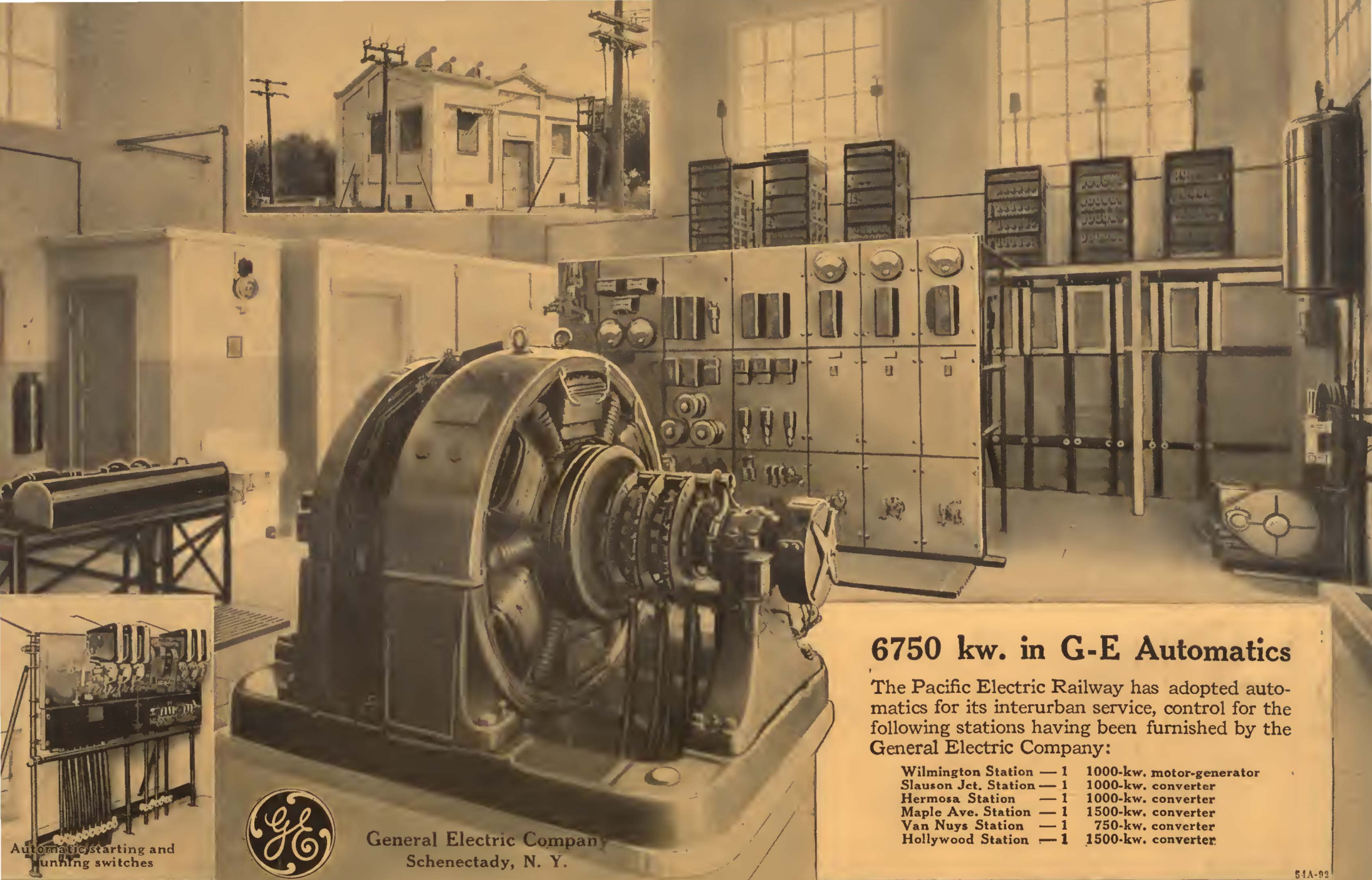
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6750 kw. in G-E Automatics

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Wilmington Station	— 1	1000-kw. motor-generator
Slauson Jct. Station	— 1	1000-kw. converter
Hermosa Station	— 1	1000-kw. converter
Maple Ave. Station	— 1	1500-kw. converter
Van Nuys Station	— 1	750-kw. converter
Hollywood Station	— 1	1500-kw. converter



General Electric Company
Schenectady, N. Y.

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