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BOSTON AND THE MID-YEAR MEETING

Boston is a particularly appropriate place for the meeting of the American Electric Railway Association which will be held there next Friday. In that city and vicinity are being threshed out some of the most important financial problems of the industry. During the few years just past the Boston Electric Railway and the Bay State Street Railway have faced some very difficult situations. They have, while trying on one hand to control expenses at the same time furnishing adequate service, endeavored to impress on the public the necessity for financial relief. Of course, these conditions are confronted in many other communities but they are peculiarly acute in Boston now. Fortunately the local regulative authorities appreciate in a large degree the strenuous nature of the task before the railway managers and are affording some measure of relief. An example is the finding, abstracted elsewhere in this issue, of the special commission appointed by the legislature to consider the Elevated situation. This commission has endeavored to find ways of ameliorating conditions for the company without increasing the rate of fare. The result is encouraging as an augury of future additional relief. In view of the sympathetic attitude of the authorities the fact that representatives of the Commonwealth of Massachusetts and the City of Boston will speak at the meeting adds to the interest of the occasion. The diplomatic crisis which shadows all individuals and gatherings throughout the country will also tend to render this a most impressive meeting.

THE ELECTRIC RAILWAYS' SHARE IN WAR

Now that a definite possibility of war confronts the nation it is natural that each red-blooded individual and organization should turn to consideration of how best to "do his bit." For the electric railway industry as a whole the character of the "bit" is perhaps most readily outlined by an explanation of what the American Electric Railway Association has in hand, and the duties of the railways are happily covered with the admonition merely to co-operate promptly with the simple plan that is now under way. A telegram from General George H. Harries, printed on page 249 of this issue, tells how the electric railways can assist the government to the best advantage. In brief, the association has appointed a committee whose members are assigned to districts embracing the whole of the Atlantic and Pacific coasts. Each committeeman is to prepare a complete map of electric railways within his district marked to show the physical characteristics of each property and its equipment. This will indicate at a glance such details as width of gage, wheel-flange dimensions, height and type of couplers, maximum clearance lines, actual and possible physical connections with steam railroads, and other information regarding the possibility of using any line for through routing of troops and munitions. When all coastal districts have been completely mapped (and this should take but a short time with proper co-operation) attention will be turned to the interior railways, and there will be available for the War Department a comprehensive enumeration of all facilities that exist in the electric railway field. These facilities, as well as everything else in war time, may be requisitioned by the government, and the government will, with the new map, be in position to pick out that which it can use to best advantage. Here, at least, is a definite duty for the electric railway industry to perform. When the requests for data from the district committeemen are received it is up to each company to answer and to answer at once. After that, all that needs to be done is to obey orders.

ADVERTISING IN RAILWAY COMPANY PUBLICATIONS

A notice in the monthly just started by the Georgia Railway & Power Company for distribution among employees, officers and owners is headed "No Space for Sale Here." The announcement then goes on to say that even if the King of England or the Emperor of Germany were to beg until tears rolled down their cheeks for advertising space in the publication, they couldn't buy so much as half an inch of a single column. "Our space is not for sale to anybody for any purpose. No, sir!" says the company. We are glad to see this clear-cut statement. Sentiment on the ethics as well as the business policy which should govern electric railway companies in soliciting advertising for their publications seems to be consolidating. Four prominent managers wrote us letters which appeared in our issues of Jan. 13 and Jan. 20 indorsing the position which we took in our issue of Jan. 6, condemning on ethical grounds all solicitation of advertising by a railway company from manufacturers who hope to do business with it. A letter from another prominent manager, just received, says: "I object to that form of graft very strenuously." We believe that many others agree with him. There is no such thing as "honest graft." The excuse that the plan is not ideal but "we need the money" is equivalent to a confession of the impropriety —to use no stronger word—of the whole proceeding. We have not criticised the solicitation of advertising from local merchants for company publications, simply from concerns with which the company is doing business or may do business in the future. Nevertheless, we are glad to see that no advertising of any kind is

carried in the two company publications beginning during the past two weeks, namely the Atlanta paper just mentioned and that of the Public Service Corporation of New Jersey.

INTERURBAN FINANCIAL REPORTS

Mr. Doolittle has presented to the industry this week, in his second article on interurban railways, a valuable compilation of interurban financial data. In addition, he has showed in a clear way the question that must be answered in order to ascertain the causes of the present showing and to find what, if any, remedy is needed. He has, therefore, treated our readers to more than is required by the primary subject, the anatomy of the interurban report, for this means simply a dissection or study of the structure of such a report. The advanced material we shall pass over with the comment that it is well worth the serious consideration of electric railway officials. We now desire to emphasize simply one point—that the structure of most interurban financial reports is queer. Mr. Doolittle in kindness has presented a sort of composite anatomical picture, made up from various sources, so that the deformities of particular reports are not visible. That these exist, however, is uncontrovertible. Some annual reports seem nothing more than a skeleton with scarcely a backbone left. In other words, they consist of only an abridged income statement and a balance sheet, often distorted from their proper official form, and carrying with them none of the other parts and general information that go to make up a well-rounded flesh-and-blood report. This applies, of course, to reports of city railway companies as well as to those of interurban lines, for electric railways as a whole fail to pay sufficient attention to the structure of these statements. Mr. Doolittle's present article mentions various points that ought to be answerable from a report. It will be a good test of the proper structure of yours. Try it.

KEEPING THE TRACKS CLEAR

Street car tracks were not laid for trucks, automobiles and other vehicles, in spite of what the unsophisticated backwoodsman might think if he watched the traffic on an ordinary city thoroughfare for a few minutes. It is difficult, however, to make the public take seriously any plea of the railways for an unrestricted use of their own facilities. The reason for this is that the average man, even when he is a passenger on a delayed electric car, does not visualize the conditions from the electric railway standpoint. He is much more apt to assume that the company is to blame because the cars are not going faster than to realize that every blockade of the tracks is a source of expense to the company in useless car-hours.

For these reasons, municipal authorities and public representatives would render an important service to all if they would help to bring this point more closely home to the public. An excellent example of public-spirited work along this line is the recent survey initiated by the Chicago *Herald* for the sole purpose of explaining to the public the real causes of car delays. The causes ascertained by ordinary reportorial diligence—*i.e.*, both an unnecessary usurpation of the car tracks by vehicular drivers and a forced use of such because of automobiles parked at curbs—are not new to our readers, but we wish to commend the enterprise with which they have been brought emphatically to the attention of Chicago citizens.

The problem involved is one, of course, that is up for solution not only in Chicago but also in other cities. The daily service reports of the Detroit lines, for example, are "alive" with instances of delays due to vehicular traffic, and the New York Railways has just issued a bulletin to show traffic conditions in the metropolis. In fact, never before has the subject of relief from traffic congestion in our larger cities required such urgent attention as at this time. The problem has been complicated, as the Chicago *Herald* intimates, by the enormous increase in the number of automobiles. New York City, for example, showed an increase in 1916 as compared to 1915 of from 86,000 to 116,000 pleasure automobiles and from 14,000 to 21,000 commercial motor vehicles. The automobile invasion has been particularly demoralizing in this city, where streets are already blocked with building operations, subway and pipe-line construction and repaving. Another complication, not so general, is the blockading of tracks after heavy snowstorms, for shortage in the municipal snow-fighting forces has resulted in automobiles and trucks taking advantage of tracks cleaned by the street railway's snow plows. Such a practice, for instance, after one recent storm was largely responsible for a 25 per cent reduction in the New York Railway's daily car mileage.

The alleviation of traffic congestion is a difficult task, but many are the suggestions as to the proper method to be used. Some proposals, such as widening streets by reducing the width of sidewalks in order to provide for two streams of vehicle traffic in the same direction outside car tracks, etc., need mature consideration owing to the expense involved. Other suggestions are more practicable. For example, one desirable improvement which could be widely and easily adopted, would be to increase the number of sections on important streets to be forbidden as parking places during rush hours. Vehicles at these points should not be allowed to stop longer than to discharge or take on passengers. Parking privileges limited to a short period, such as half an hour, are inadvisable because the duration of the privilege is likely to be abused. Street car operation could also be accelerated by closing crowded streets to trucks during rush hours. Moreover, co-operation between traffic officers in moving traffic in unison and the further adoption of the semaphore system of control, as on Fifth Avenue, New York, might be secured, although the latter practice is opposed by the Milwaukee police commissioner on the ground that traffic might be blocked if the officer left his post in case of an accident or other emergency.

Whatever one of these or other plans is adopted, however, it seems logical to place the business of traffic regulation in the hands of an expert body appointed

solely for the purpose of devising and considering plans to relieve congestion and enforcing these by means of co-ordination between the various city departments. The Chicago Traction and Subway Commission, the recently established Des Moines traffic bureau, and the traffic commission just proposed by Police Commissioner Woods of New York—these are good examples of the special traffic commission or bureau that it would seem advisable for each large city to appoint. Such a body, even more than an important newspaper, can give the desired stamp of authority to the genuineness of the railway burden.

APPLYING THE PRINCIPLES OF PUBLICITY

A friendly critic has directed our attention to the close parallel which exists between the service which the JOURNAL is giving and aims to give, and that which a public utility gives and aims to give. He suggests that undoubtedly many of the adverse financial conditions existing in the electric railway field at present, such as a stationary basis for receipts with increased cost of operation, must apply to the publishing business as well, that the cost of the improvement in service to its constituency during the past ten or twenty years, which he considers has been as marked in the case of this paper as with the electric railways, has further increased the expenses, and that in many other ways a close parallel exists. He goes on to say that the JOURNAL has long been urging the electric railways to use publicity to develop a spirit of co-operation between the public and themselves and that it is about time that we should "take our own medicine." We recognize the parallel and acknowledge the impeachment.

We believe that the first obligation of a newspaper like that of a public utility is service to its public, to quote Clause I of the Code of Principles adopted by the American Electric Railway Association at Atlantic City in 1914. In fact, most if not all of the articles in this code apply to newspapers just as well as to electric railways. Like the utility, the technical paper is bound to succeed or to fail on the basis of the service which it renders to its field. The obvious corollary to this, both in the railway business and in journals, is that co-operation on the part of the public served is necessary to good service. This, then, is the purpose of this editorial, namely, to take the advice which has been offered to us to say something about our policies and to ask, as every railway or newspaper should, for constructive criticisms and suggestions. If we are not doing all that we can we want to know it so that we may improve the paper.

As explanatory of the kind of service which we aim to supply we shall therefore briefly mention some of the things which the JOURNAL has done during recent years and some of its present aims.

The most important subject now before the electric railway industry, in our opinion, is publicity and the improvement of public relations, matters which this paper has long urged with all the resources at its command. We have shown our interest in the matter by publishing symposiums and single articles by experts on publicity and public relations, by running a series of cartoon editorials devoted entirely to these subjects, by reproducing notable newspaper and other advertisements and by editorial suggestions in nearly every issue. We intend to continue this campaign vigorously; and in doing so we solicit the support of those who agree with us that this is one of the "high spots" in the electric railway field.

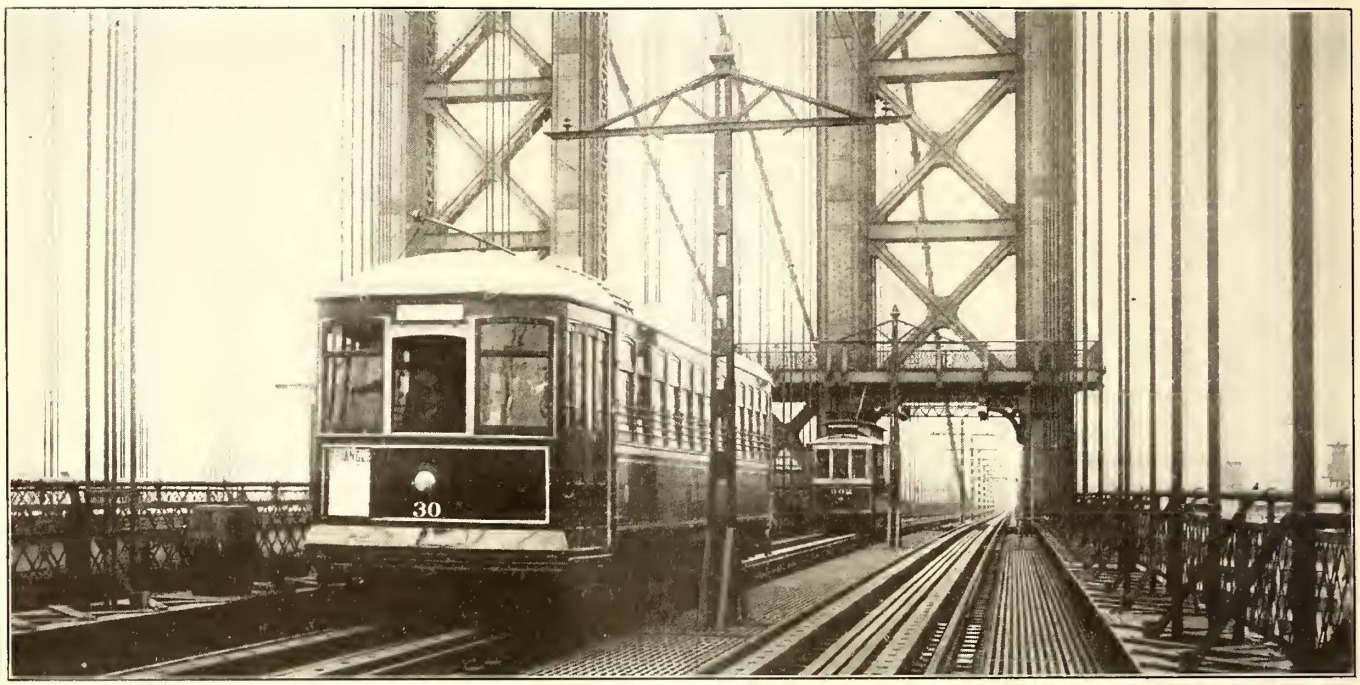
Another example of the service which can be performed by a paper able to carry a message promptly to all connected with an industry is furnished by the accident reduction agitation. In a letter recently received from one of the pioneers in safety work, the writer says: "The phenomenal growth of the movement was in large measure due to the generous and far-sighted support given to it by the ELECTRIC RAILWAY JOURNAL. The JOURNAL recognized the possibilities of the project as far back as 1907, when railway companies which had been appealed to for moral support had shown themselves indifferent." The JOURNAL supported this movement not only because it considered that it was right but also because it realized that the safety movement meant large direct and indirect savings to the railways. Both of these results have been proved by subsequent experience.

Another example of the service which this paper has given to the industry is shown by its articles on car design. This paper was an early advocate of steel cars for city service, not because of any expectation of their greater safety, but because it believed that steel cars could be made cheaper and better than wooden cars. It advocated this type of construction at a time when many if not most of the car builders were still recommending wooden cars. It also early favored a type of construction in which the strength of the steel car was provided in the side girders in opposition to the old style of construction which resembled "a house on a flat car," and it has seen this idea generally accepted. Still other recent instances of JOURNAL service will be found in its advocacy of a modification of the M. C. B. journal box for high-speed electric service, of standardization of car and truck design, of rational units in rating boilers, of higher rates of fare, of discontinuance of the soliciting of advertisements from manufacturers for company publications, of better training of employees, of military preparedness for electric railways, etc.

We are mentioning these points as examples, not with the idea of depreciating the constructive work of others along these lines or of arrogating to ourselves more than is our due. All have assisted, and this is the point which we want to make, namely, that just as the transportation utility in any city can be helped to give good service by the co-operation of all, so it is in journalism. The converse of this is equally true in journalism and railroading. This is that the welfare of the community concerned is correspondingly increased when it has a service broad and extensive enough to reach all who have occasion to use it. This, in the journalistic field, would include operator, manufacturer, regulator, investor and public.

Catenary Trolley Construction Used on Manhattan Bridge to Insure Safety

Security Against Damage to Bridge, Good Operating Features and Attractive Construction Obtained by Using Simple Catenary with 90-ft. Pole Spacing

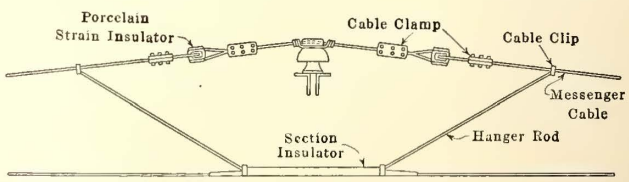


CATENARY TROLLEY CONSTRUCTION ON MANHATTAN BRIDGE—VIEW OF COMPLETED CONSTRUCTION AND FIRST TWO CARS TO CROSS BRIDGE UNDER NEW OVERHEAD WORK

THE Manhattan Bridge Three-Cent Line runs between the corner of Flatbush Avenue and Fulton Street, Brooklyn, N. Y., and the corner of the Bowery and Canal Street, Manhattan. The route is 2 miles long, about half the distance being over the Manhattan Bridge. This line had been operated on the lower-deck tracks of the bridge, but since these tracks were intended to be used by the rapid transit line connecting the subways in Manhattan and Brooklyn, it became necessary to operate the Three-Cent Line on the upper deck. This made it essential to adopt a method of supporting the trolley wire which would give the maximum degree of safety as well as good operating conditions. A construction which would not detract from the attractive appearance of the bridge was also desirable.

The use of the usual span-wire construction was not feasible in this case since a double row of trolley poles would be required and any method of supporting the trolley wire directly from span wires or from poles spaced say 50 ft. apart was considered unsafe since the copper wire, if broken, might come in contact with and burn to a dangerous degree some of the vital members of the bridge. The catenary construction shown in the accompanying illustrations was therefore decided upon, and it has been so installed that if the contact wire should break, the hangers are spaced close enough together to prevent the freed ends of the wire from coming in contact with the steel members of the bridge.

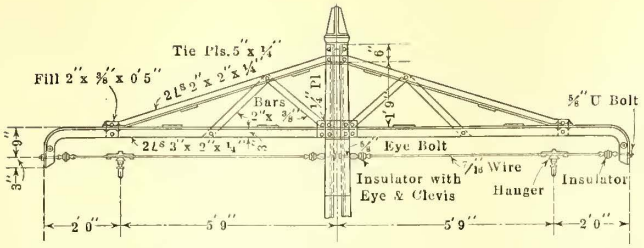
The average pole spacing is 90 ft., the height of the contact wire above the top of the rail is 16 ft., and the distance between the contact wire and the messenger wire at the insulators is 20 in. The details of the length and spacing of the hangers for a typical 90-ft. span are given by the diagram on the opposite page. A 7/16-in. Siemens-Martin double galvanized, seven-strand steel cable was used as a messenger wire. This was strung in the usual manner, and the sag adjusted so that the middle of each span was 16 ft. 10 in. above the top of the rail. Roebling Brother's No. 000, hard drawn, standard grooved copper wire was used for the contact wire. While stringing this wire it was



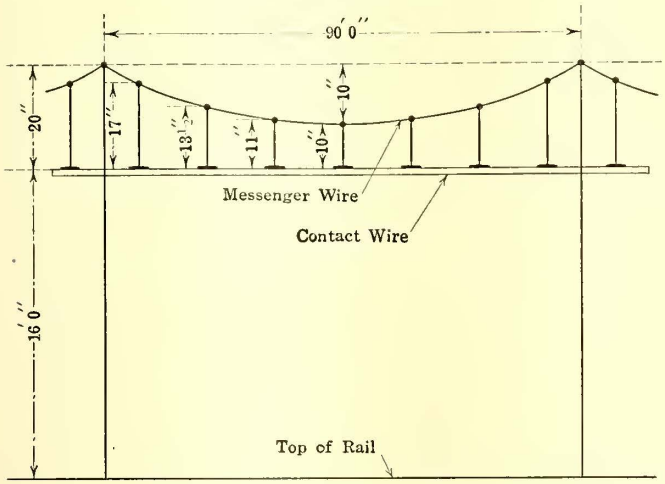
CATENARY TROLLEY CONSTRUCTION ON MANHATTAN BRIDGE—DETAILS OF INSULATED JOINT

allowed to rest at the ends of the crossarms, and as the hangers were attached the wire was slipped over the ends of the crossarms. One of the illustrations shows two gangs at work attaching the catenary hangers. The tower cars were made by erecting a scaffolding on an ordinary flat truck.

At the expansion joints of the bridge, steel bar construction is used in place of the catenary. The bar is



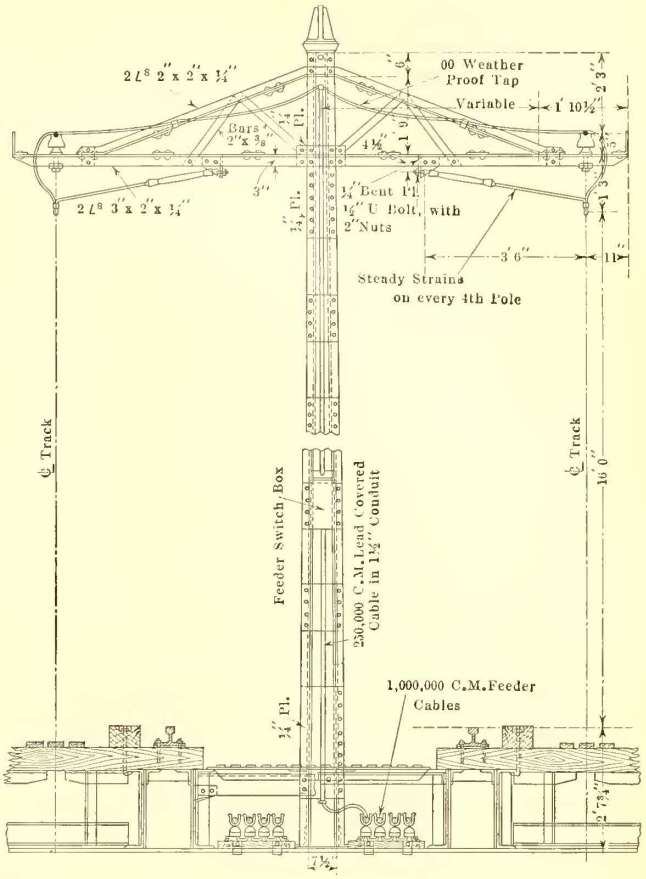
CATENARY TROLLEY CONSTRUCTION ON MANHATTAN BRIDGE—METHOD OF SUPPORTING TROLLEY WIRE ON BRIDGE APPROACHES WHERE CATENARY WAS NOT NECESSARY FOR PURPOSES OF SAFETY



CATENARY TROLLEY CONSTRUCTION ON MANHATTAN BRIDGE—LENGTH AND SPACING OF HANGERS FOR A TYPICAL 90-FT. SPAN

made in sections, the adjoining ends of which are far enough apart to allow for the expansion and contraction of the bridge. A bronze sleeve of ⅛-in. metal connects the ends of the steel bar and provides the bearing surface for the trolley wheel at these points. A wooden trough provides a suitable protection over the bar. This may be seen under the bridge tower in one of the illustrations.

CATENARY TROLLEY CONSTRUCTION ON MANHATTAN BRIDGE—CONSTRUCTION GANGS ATTACHING HANGERS BETWEEN MESSENGER WIRE AND TROLLEY WIRE



CATENARY TROLLEY CONSTRUCTION ON MANHATTAN BRIDGE—DETAILS OF STEEL POLE AND FEEDER CABLES

The drawing giving the details of the steel pole also shows the steady braces which are used at every fourth pole and the taps between the trolley wire and the eight 1,000,000-circ. mil, weatherproof cables which are supported on substantial feeders insulators on each side of the base of the pole. From these feeders, a 250,000-circ. mil, lead-covered cable in 1½-in. metal conduit leads to the feeder switch box, which is located at a convenient height on the pole and contains a 400-amp., quick-break disconnecting switch. The 250,000-circ. mil cable is continued from the switch box to the top of the pole, where it divides into No. 00 weatherproof cables, which connect with the contact wire. It was considered necessary to use lead-covered cable inclosed in metal conduit for the feeder connections on the pole in order to make them doubly safe from possible grounds to the steel poles. The trolley wire is divided into sections by insulated joints, and each section is fed by separate taps from the feeder cables so that each section is an independent electrical unit.

On the approaches to the bridge span-wire construction was used, since the catenary was not necessary for purposes of safety. The drawing in the top, left-hand corner of the page shows the details of this construction, which have been worked out by attaching the trolley wire in such a way as to make the appearance as attractive as possible and in harmony with the catenary construction on the bridge.

Since this construction has been in operation for some time without any trouble developing, it is good evidence that the requirements of safety have been well met. The construction above described was designed by the department of plant and structures, New York City, of which F. J. H. Kracke is commissioner and E. A. Byrne is acting chief engineer, and was built by Peet & Powers of New York.

Anatomy of the Interurban Report

Development of Electric Railway Accounting—General Characteristics of Typical Interurbans: Large Companies; Medium-Sized Companies with Less Than 20 Per Cent of Revenue From Freight, and Companies with More Than 20 Per Cent of Revenue From Freight — Sources of Information — Purpose and Scope of Analysis of Records—Methods, Limitations and Results of Analysis of Records

By F. W. DOOLITTLE

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IN a previous article* it was pointed out that many causes have been contributing during recent years to the difficulties of interurban electric railways. By no means all interurbans have been subject to these perplexities. A number of properties have been so fortunate as to avoid situations which have brought others to grave financial difficulties, and some companies have been in a position to meet and overcome the difficulties confronting them. It should not be necessary to point out that the general comments made here and elsewhere, while applying to the industry as a whole, are frequently far from true when applied to individual properties.

Each company has its peculiar elements of strength and weakness, and nothing short of a careful and critical studying of a property together with local conditions will suffice to serve as a basis of judgment. Certain facts concerning the industry as a whole can, however, be determined from an examination of existing records without a knowledge of conditions other than can be gained from published financial and statistical reports.

Electric railway accounting has developed rapidly in recent years and is now reaching a stage where cost analysis is possible. In this it follows the development which is taking place in steam railroad accounting. Originally the accounts of carriers served two purposes: The first was to account for all income and thus enable the officers and directors to explain to the stockholders why so small a part of the gross earnings was available for dividends. The second purpose was to enable each superior officer to present to the men under his jurisdiction a statement of the expenditures of their departments, with a request for an explanation of any changes from the preceding month and the same month of the preceding year. It happened that for many years the train-miles and miles of track of most railroads increased regularly, and each department found in this a ready explanation for increased costs. As a result, railroad accounting systems developed a departmental classification, and "train-miles" and "track-miles" became the almost universal units with which costs were measured.

*See "The Present and Future Development of Interurban Railways," ELECTRIC RAILWAY JOURNAL for Sept. 2, 1916, page 392.

FINDING THE REMEDY

"The question 'What can be done to correct unfavorable features of interurban operation?' cannot be answered from data contained in published reports. Only careful study by capable men can result in the best plans for the future. It is possible, however, to obtain some idea as to the likelihood of improvements from examining the following points:

"1. Is the revenue received for present business at a rate above or below the average?

"2. Is the present cost of operation above or below the average cost?

"3. Does the present volume of traffic appear to be normal for the communities served;

"4. Do the communities served appear to be developing so as to furnish more business in the future?"

"The third and fourth questions refer to what is probably the most important single factor in judging the future. The important thing is the relation between the ratio of gross revenue to investment today and the possible future ratio of gross revenue to investment."

Electric railways naturally followed as closely as practicable the accounting classification of steam railroads, and interurban properties, developing originally from urban properties, have used the same system.

Owing to their isolation and to the fact that they serve usually but one state, electric railways have been slower in reaching uniformity of accounting procedure than have steam roads. Since 1908, however, the adoption of a standard system has progressed rapidly owing to the study of this matter by the American Electric Railway Accountants' Association and the several commissions, as well as because of the authority of the Interstate Commerce Commission and other commissions to prescribe an accounting system. The present standard system was promulgated by the federal commission in 1914 and is therefore used by all interstate electric railways. A number of state commissions have adopted this classification as standard (sometimes slightly modified in form), and the American Electric Railway Accountants' Association at its convention in 1914 also adopted it.

The 1914 classification of operating expenses differs in several important particulars from its predecessor.† It has been in use too short a time to have resulted in a body of statistics of sufficient size to permit its use at present. Therefore, in the following paragraphs where figures of electric railway operation are cited they have been taken from reports made under the earlier (1908) classification.

In the previous article, in the issue of Sept. 2, 1916, comment of a general nature was made on the status of electric interurban transportation. It is now proposed to supplement this by an analysis of available reports of operating companies with the idea of illustrating the customary methods of analysis used in such cases, as well as the structure of such reports and the general results of operation as disclosed by the data contained in them.

THREE HYPOTHETICAL INTERURBAN PROPERTIES

As a preliminary to this study, three properties have been assumed based on an analysis of the published re-

†For a discussion of the changes made, see ELECTRIC RAILWAY JOURNAL for June 13, 1914, page 1321.

ports of 145 interurban electric railways operating over 13,000 miles of single track in about twenty states. The three companies are purely hypothetical, but represent the normal characteristics of a large number of companies of the same class. They may be described as follows:

The first is a large company whose characteristics are a composite or average of those of six of the largest interurbans in the United States.

The second is a company of average size whose characteristics are a composite of those of 128 companies, none of which has freight earnings in excess of 20 per cent of its operating revenue.

The third is a company of average size whose characteristics are a composite of those of seventeen companies, none of which has freight earnings amounting to less than 20 per cent of its operating revenue.

Tables I to IV show respectively the principal characteristics, the income statement, the operating revenues and the operating expenses of these three hypothetical properties. These tables, together with Table V, a condensed balance sheet, contain the data usually available from public sources.

In selecting the data used in computing these tables care was used to exclude all companies having any considerable part of their operation in cities. In many cases a knowledge of the property served to assist in the interpretation of the published figures, and in a few cases data were rejected because of obvious inconsistencies. In this study the most frequent sources of information were the statistical and financial reports published by the various state commissions. Those who are interested in the analysis of interurban reports, however, usually find one of the chief difficulties to be the fact

TABLE I—PRINCIPAL CHARACTERISTICS OF THREE HYPOTHETICAL INTERURBAN RAILWAYS

	Composite of Six Large Companies	Composite of 128 Medium-sized Companies—Freight Revenue Less than 20 Per Cent of Total Revenue	Composite of Seventeen Medium-sized Companies—Freight Revenue More than 20 Per Cent of Total Revenue
Miles of single track operated	475.53	89.8	89.8
Revenue cars available for service:			
Passenger	248	83	29
Express, etc.	41	3	10
Freight	340	23	232
Total	629	109	271
Car miles operated per year:			
Passenger	9,363,750	2,848,000	1,042,000
Other	1,755,537	148,900	483,000
Total	11,119,287	2,996,900	1,525,000
Revenue passengers carried per year	25,470,671	8,635,000	1,350,000
Miles per car per year:			
Passenger	37,700	33,700	24,250
Other	4,610	5,750	2,140
Total	17,750	27,700	5,300
Miles per hour:			
Passenger cars	16.74	12.10	12.61
Freight cars	6.00	6.23	3.05
Total	13.05	10.25	6.78

TABLE II—INCOME STATEMENT OF THREE HYPOTHETICAL INTERURBAN RAILWAYS

	Composite of Six Large Companies		Composite of 128 Medium-Sized Companies—Freight Revenue Less Than 20 Per Cent of Total Revenue		Composite of Seventeen Medium-Sized Companies—Freight Revenue More Than 20 Per Cent of Total Revenue	
Item	Amount	Per Cent of Revenue	Amount	Per Cent of Revenue	Amount	Per Cent of Revenue
Operating revenue	$3,388,500	100.0	$689,500	100.0	$488,000	100.0
Operating expenses	2,202,000	65.0	446,200	64.7	314,000	64.3
Net operating revenue	$1,186,500	35.0	243,300	35.3	173,000	35.7
Non-operating income*	303,840	9.0	48,250	7.0	13,680	2.8
Gross income	1,490,340	44.0	291,550	42.3	187,680	38.5
Deductions from income	1,701,550	50.4	230,610	33.4	205,290	42.0
Taxes†	154,730	4.5	45,700	6.6	23,850	4.9
Rentals	515,570	15.4	43,400	6.3	4,570	0.9
Interest	1,015,200	30.0	139,500	20.2	172,500	35.3
Miscellaneous	16,050	0.5	2,010	0.3	4,370	0.9
Net corporate income	(d) 211,210	6.4	60,940	8.9	(d) 17,610	3.5
Dividends	226,000	6.7	55,000	8.0	3,030	0.6
Other appropriations	5,201	0.1	.....	...	.....	...
Surplus or deficit for year	(d) 442,410	13.2	5,940	0.9	(d) 20,640	4.1
Operating ratio	.650	....	.647	...	.643	...

(d) Deficit.

* For the use of railways operating other utilities as gas, telephone, etc., "Auxiliary Operations" accounts are provided. Net revenue-auxiliary operations precedes non-operating income in the income statement.

† Later classifications provide for deducting railway taxes directly from net operating revenue.

TABLE III—OPERATING REVENUES OF THREE HYPOTHETICAL INTERURBAN RAILWAYS

	Composite of Six Large Companies		Composite of 128 Medium-Sized Companies—Freight Revenue Less Than 20 Per Cent of Total Revenue		Composite of Seventeen Medium-Sized Companies—Freight Revenue More Than 20 Per Cent of Total Revenue	
Item	Amount	Per Cent of Revenue	Amount	Per Cent of Revenue	Amount	Per Cent of Revenue
Total operating revenue	$3,388,500	100.0	$689,500	100.0	$488,000	100.0
1 Passenger revenue	2,836,980	83.7	608,500	88.3	309,400	63.0
2 Express	94,480	2.8	9,400	1.3	7,020	1.4
3 Milk	28,880	0.9	3,450	0.5	4,620	0.9
4 Freight	311,870	9.1	41,590	6.0	126,450	26.1
5 Switching	2,870	0.1	260	0.1	4,810	1.0
6 Other train	15,380	0.5	4,420	0.6	7,100	1.4
7 Other transportation	5,420	0.2	750	0.1	12,000	2.5
8 Other operating	92,620	2.7	21,130	3.1	16,600	3.4
Total 2 to 5 inclusive	438,100	12.9	54,700	7.9	142,900	29.4

TABLE IV—OPERATING EXPENSES OF THREE HYPOTHETICAL INTERURBAN RAILWAYS

	Composite of Six Large Companies		Composite of 128 Medium-Sized Companies—Freight Revenue Less Than 20 Per Cent of Total Revenue		Composite of Seventeen Medium-Sized Companies—Freight Revenue More Than 20 Per Cent of Total Revenue	
Item	Amount	Per Cent of Revenue	Amount	Per Cent of Revenue	Amount	Per Cent of Revenue
Total operating expenses	$2,202,000	65.0	$446,200	64.7	$314,000	64.3
Way and structures	404,350	12.0	75,550	10.9	57,200	11.8
Equipment	299,520	8.9	53,800	7.8	43,300	8.9
Traffic	34,970	1.0	4,350	0.6	8,900	1.7
Power	375,390	11.0	70,600	10.4	51,900	10.7
Conducting transportation	750,790	22.2	181,000	26.2	101,900	20.8
General and miscellaneous	336,980	9.9	60,900	8.8	50,800	10.1

that information from these sources is out of date before it is published. This criticism applies also to the reports of the Census Bureau. The latter reports do not separate data so as to show the results of city, suburban and interurban operation. While in the past there has been little need of any separate showing, the increasing tendency of regulating bodies to base rates on costs is creating a demand for more detailed information. This will no doubt be reflected in the future studies prepared by the Census Bureau.

TABLE V—CONDENSED BALANCE SHEET OF THREE HYPOTHETICAL INTERURBAN RAILWAYS

Composite of Six Large Companies: Assets		Liabilities	
Property, plant and investment	$40,866,000	Securities	$43,000,000
Material and supplies	55,000	Special accounts.	1,677,500
Bills receivable and miscellaneous assets	49,000	Bills payable and miscellaneous liabilities	3,758,500
Reserve, sinking and special funds	6,950,000	Unfunded reserves	1,564,000
Cash	1,545,000		
Deficit	535,000		
	$50,000,000		$50,000,000
Composite of 128 Medium-Sized Companies—Freight Revenue Less Than 20 Per Cent of Total Revenue:			
Property, plant and investment	$6,400,000	Securities	$6,000,000
Materials and supplies	7,500	Special accounts.	550,000
Bills receivable and miscellaneous assets	62,500	Bills payable and miscellaneous liabilities	450,000
Reserve, sinking and special funds	452,000	Unfunded reserves	43,500
Cash	150,000	Surplus	28,500
	$7,072,000		$7,072,000
Composite of Seventeen Medium-Sized Companies —Freight Revenue More Than 20 Per Cent of Total Revenue:			
Property, plant and investment	$8,000,000	Securities	$6,750,000
Materials and supplies	9,500	Special accounts..	925,000
Bills receivable and miscellaneous assets	50,000	Bills payable and miscellaneous liabilities	1,445,000
Reserve, sinking and special funds	1,120,000	Unfunded reserves	225,000
Cash	295,500	Surplus	130,000
	$9,475,000		$9,475,000

For a number of years the *McGraw Electric Railway Manual* furnished the most accurate and complete data on electric railways. This publication has not appeared since 1914. Unfortunately the reports of electric railways to the Interstate Commerce Commission are not published in detail, although they represent a considerable part of the industry and are more complete than some of the reports published by state commissions. In 1913 a total of 310 operating electric railways having total operating revenues of approximately $160,000,000 reported to the Interstate Commerce Commission. The Census Bureau in 1912 found 975 operating companies with operating revenues of $570,000,000.

For current reports the ELECTRIC RAILWAY JOURNAL and other publications devoted to this industry serve as the best sources, and information can also be obtained from the *Wall Street Journal, The Commercial and Financial Chronicle*, and other similar publications. All of the foregoing sources have been drawn upon for data for use in connection with the present studies.

QUESTIONS TO BE ANSWERED

While there is often much detail involved in making a study of a railway property, the customary method of procedure may be described as consisting of obtaining answers to the following questions:

1. What is the amount of the several classes of outstanding securities, and the order of their participation in the earnings of the company?
2. What is the amount of earnings available for return on the several issues of securities?
3. What is the margin of safety for each class of securities?
4. Is the situation showing improvement or otherwise?
5. What are the causes of the present situation and the apparent tendencies?
6. What can be done to correct unfavorable features?

The first three questions can be answered without difficulty from an examination of the usual published financial reports, but the others present difficulties which frequently cannot be overcome by means of information contained in published records.

THE ELECTRIC RAILWAY ACCOUNTING SYSTEM

Before examining into these various questions in the case of the three hypothetical interurban railways described above, it is desirable to review briefly the accounting system which is generally in use by electric railways, and which furnishes the basis of their records and reports. In every accounting department there are numberless details which must be taken care of, and many of the items which appear so clearly and definitely in the annual reports represent the results of whole series of special accounts which must be kept in considerable detail for the purpose of meeting the problems of management rather than from accounting necessity. For the present the records may be classified as (1) operating statistics and (2) financial data. The former consist of records of miles of track, car-miles, car-hours, number of passengers, tons of freight, ton-miles of freight, etc. The latter consist of the income account, profit and loss account, property and plant account, special accounts and balance sheet.

The income account represents the results of business for a given period, which in published statements is usually the fiscal year of the company. In it in more or less detail will be found the items listed in Table II.

The profit and loss account is provided for the purpose of adjusting gains and losses without affecting the income account in such a way as to render its use unreliable for comparative purposes. The principal items in the profit and loss account are as follows: (a) surplus or deficit at the beginning of the year; (b) surplus from operation during the year; (c) other credits arising from miscellaneous adjustments; (d) total credits; (e) deficit from operation during the year; (f) other debits arising from miscellaneous adjustments; (g) total debits, and (h) surplus or deficit at the end of the year. Some accountants carry net corporate income to item (b) of this account instead of bringing over surplus or deficit after dividends and other appropriations. They then include these items—dividends and appropriations—as additional debits in the profit and loss account.

The appropriations referred to may be of several sorts. Formerly accounts were set up and credited in this way for depreciation, accident, insurance and other reserves, but amounts for these items are now usually charged currently to operating expenses and placed in special funds which in turn are drawn upon for expenditures that otherwise would appear in operating expenses when and as made. Appropriations may also be made for the purpose of temporarily financing additions or betterments, pending more favorable conditions in the money market. It is not always possible to distinguish between appropriations of income as an item in the income account and a charge in the profit and loss account, or between additions to income and credits in the profit and loss account. Many accountants are, therefore, abandoning the separate profit and loss account and carrying adjustments directly to the income account.

The property and plant account contains in greatly varying detail the expenditures made for the various

TABLE VI—COST OF ELECTRIC RAILWAY TANGIBLE PROPERTY PER MILE OF SINGLE TRACK
(Average of Eighteen Urban Companies)

Item	Dollars per Mile of Single Track	Per Cent of Total—Average	Per Cent of Total—Maximum*	Per Cent of Total—Minimum*	Dollars of Tangible Property per Dollar of Operating Revenue per Year
(a) Land	$4,810	5.50	14.85	0	....
(b) Transmission and distribution	20,150	22.90	29.30	4.51	....
(c) Buildings and miscellaneous structures	12,170	13.85	15.32	0	....
(d) Plant equipment	15,450	17.60	50.00	0	....
(e) General equipment	14,460	16.45	30.53	0	....
(f) Roadway	20,800	23.70	75.00	11.82	....
Total	$87,840	100.00	....	....	4.71
(Average of Nine Interurban Companies)					
(a) Land	$2 060	5.48	10.42	0.83	....
(b) Transmission and distribution	6,950	18.47	29.50	8.48	....
(c) Buildings and miscellaneous structures	1,860	4.95	8.85	3.58	....
(d) Plant equipment	5,280	14.05	17.95	9.40	....
(e) General Equipment	4,420	11.75	15.25	8.15	....
(f) Roadway	17,100	45.30	61.20	38.60	....
Total	$37,670	100.00	....	....	7.28

*The items below bear no relation to each other, as they are derived from different companies.

items of real and personal, tangible and intangible property, plant and equipment. It should show the cost at the first of the year, and the cost of property retired and the cost of that added during the year, and the resulting cumulative cost at the end of the year. Special fund accounts are not usually shown in detail in published reports, only the balance at the end of the year being carried into the balance sheet as of that date.

WHAT THE BALANCE SHEET CONTAINS

In its condensed form the balance sheet will appear somewhat as shown in Table V, and will give the status of the several accounts as of that date. It will be found upon examination of railway reports that a variety of items is included in the balance sheet and that frequently it is impossible to judge of the status of the business without an explanation of these entries. Under ordinary circumstances the income account is of greater usefulness than the balance sheet because it does not contain as many items which require special analysis. No attempt can be made at this time to discuss all of the items which will be found from time to time in the balance sheet, and references will be confined to five general classes of assets and liabilities.

The first balance sheet group on the asset side, property, plant and investments, represents the book value of the property and should contain all amounts expended for the tangible and intangible elements. The following items come under this classification: Railway physical property, non-operating property, franchises and securities owned. The last item is usually set out separately from those preceding, though frequently not in detail. The items which go to make up railway physical property will be found to be lacking from most published reports. Securities owned usually represent the amounts paid for securities and therefore give little assistance in judging the assets of the company. Those properties which have been built up by the purchase and combination of smaller ones frequently find it impossible to show in detail the items of property and plant of the companies taken over and therefore only totals are included, the purchase price becoming the book value. If this is the case only the first of the two following questions can be answered: (1) Is the cost of property and plant as shown in the balance sheet reasonable in view of the size of the property? (2) Which items, if any, appear to be out of line?

The classification of property as prescribed by the Interstate Commerce Commission contains fifty items grouped under four heads as follows:

I.	Way and structures	Accounts 501-529 (29 items)
II.	Equipment	Accounts 530-538 (9 items)
III.	Power	Accounts 539-544 (6 items)
IV.	General and miscellaneous	Accounts 545-550 (6 items)

Some of the state commissions have prescribed classifications which in most cases are in less detail than the one outlined above. The Wisconsin Railroad Commission in a number of valuation proceedings made public its findings in the following form of summary which follows the general divisions of that commission's classification of tangible property accounts: Land; transmission and distribution; buildings and miscellaneous structures; plant equipment; general equipment, and roadway. The results of the valuation referred to above are shown in Table VI, the various property values being shown in dollars per mile of single track so that the figures may be used comparatively.

Table VI-A deals with capitalization rather than with value of tangible property, but in itself it permits an interesting comparison between various industries.

The second general class of assets listed in the balance sheet is materials and supplies. Two questions naturally suggest themselves in connection with the figures shown under this heading: (1) Is the amount commensurate

TABLE VI-A—RELATION BETWEEN INVESTMENT AND EARNINGS IN ELECTRICAL, STEAM RAILROAD AND MANUFACTURING INDUSTRIES

	Investment Capitalization	Persons Employed	Annual Sales or Earnings	Investment per Dollar Earnings	Investment per Employee	Earnings per Employee
*Electrical Industries:**						
Central electric stations	$3,038,000,000	104,000	$403,300,000	$7.53	$29,200	$3,875
Isolated electric stations	1,519,300,000	52,000	201,600,000	7.53	29,200	3,870
Electric railways—power	5,363,600,000	330,000	701,000,000	7.60	16,140	2,125
Electrified steam roads	204,700,000	15,000	30,300,000	6.76	13,650	2,019
Telephone	1,262,760,000	237,000	329,900,000	3.84	5,320	1,390
Telegraph—land and marine	231,600,000	44,000	75,300,000	3.07	5,260	1,712
Electrical machinery	469,100,000	185,000	383,300,000	1.225	2,539	2,070
Electrical dealers	15,000,000	50,000	120,000,000	0.125	3,000	2,500
Electrical jobbers	25,000,000	6,000	80,000,000	0.313	4,170	13,340
Total electrical industries	$9,929,060,000	1,023,000	$2,324,700,000	$4.27	$9,680	$2,270
Manufacturers:†						
Total manufactures (1914)	$22,790,880,000	8,265,426	$24,246,323,000	$0.938	$2,755	$2,935
Automobile industry (1909)	173,837,111	75,721	249,202,075	0.697	2,293	3,291
Railroads:‡						
Total steam railroads (1915)	$15,703,081,000	1,506,433	$2,941,567,000	$5.33	$10,420	$1,954

*From *Electrical World*, Sept. 2, 1916. †From United States Census. ‡From Interstate Commerce Commission reports.

TABLE VII—EARNINGS FOR A TYPICAL MANUFACTURING CONCERN

Amount available for interest and dividends	$120,000
Bonds: $1,000,000.	
Interest requirements at 5 per cent	50,000
Times interest earned—2.4	
Balance available for dividends	$70,000
Preferred stock: $200,000	
Dividend requirements at 7 per cent	$14,000
Including prior requirements	64,000
Times earned—1.88	
Balance available for common stock dividends	$56,000
Common stock: $800,000	
Dividend requirements at 6 per cent	$48,000
Including prior requirements	112,000
Times earned—1.07	

with the size of the property and the extent of its operations? (2) Is the figure shown taken from an inventory of material stocks or is it a storekeeper's balance?

The third item, bills receivable, includes all the miscellaneous amounts owed the company, either on account or on notes. The principal question in connection with these figures is as to whether or not these amounts can be collected. Bad debts should be written off currently through the profit and loss account, and the inclusion under this general heading of items which are not collectible serves to indicate a surplus not in accord with the facts.

Funded appropriations represent amounts set aside out of cash and represented by cash, certificates of deposit or securities. These funds are not often shown in such detail that judgment can be formed as to the company's ability to realize quickly the sums so shown. In these funded appropriations there should be included amounts set up for the purpose of making renewals of property. It is now generally considered good practice to invest a part of such funds in extensions to the property, but no information showing the amount of such reinvestment has been discovered in published reports.

The fifth item, cash, needs no comment. It represents those assets immediately available, but it must not be confused with the item of surplus on the liability side. The amount of cash is frequently less than the book surplus, but it may be greater where cash is being accumulated immediately prior to the payment of large sums for taxes, interest, etc.

The first item of the liability side of the balance sheet is securities issued. This should include all securities that have been issued and are outstanding, although some of them may have been reacquired by the company. The totals are usually shown separately for bonds and stock. The detail of the usual condensed balance sheet is insufficient to indicate the order of participation of the several securities in the earnings. The additional information necessary for this purpose will be discussed in a later paragraph.

The special accounts contain the credit balances in the various accounts which cannot be closed out currently. Unfunded appropriations or reserves are usually amounts set aside out of surplus for the purpose of meeting future expenditures for such items as taxes, interest and the replacement of property. It is well to note in any case how the amount of quick assets compares with the unfunded reserves.

Bills payable and surplus need no comment except that surplus is not surplus if the assets are overstated or the liabilities understated. While this observation is elementary, it is nevertheless overlooked often enough to justify its repetition.

EXAMINING THE OUTSTANDING SECURITIES

To return now to a more general survey of the situation, the first question to be answered relates to the outstanding securities. Table VII shows for a typical manufacturing concern the securities, the amount of earnings available for meeting the requirements of the several issues, and the margin of security afforded for each, thus covering questions 2 and 3 as well as question 1. For this assumed case, which represents a moderately successful manufacturing company, it appears that there is in earnings an ample margin over the requirements of bond interest, and that the preferred stock would not suffer unless the earnings decreased by nearly one-half. A decrease in earnings of more than 7 per cent, however, would encroach upon the common stock requirements. Data for the three hypothetical interurban railways, similar to those given in Table VII, are presented in Table VIII.

FINDING OUT WHETHER THE SITUATION IS IMPROVING

The fourth question may now be considered: Is the situation showing improvement or otherwise? The single test usually used is a comparison for a number of years of the margin of earnings over interest and dividend requirements. This test is necessary but not sufficient. In addition, it is essential to know whether the amounts shown as net earnings are really earned; that is, whether they are over and above all costs of operation, including proper maintenance charges, an adequate accumulation of funds for making renewals and a sufficient provision for the amortization of bond discount, cost of limited term franchises and other expenditures which should not be carried permanently in capital account. To determine these facts requires the making of engineering and accounting examinations and the drawing of conclusions embodying the soundest judgment available.

If time and opportunity for such procedure are lacking, recourse may be had to ratios which may be determined from the usual published reports. The three

TABLE VIII—INTEREST AND DIVIDENDS OF INTERURBAN RAILWAYS
(Participation in earnings of various security issues)

Item	Composite of Six Large Interurban Companies		Composite of 128 Medium-sized Companies—Freight Revenue Less than 20% of Total Revenue		Composite of Seventeen Medium-sized Companies—Freight Revenue More than 20% of Total Revenue	
Amount available for interest and dividends		$793,990		$200,400		$154,890
Bonds outstanding:	$21,600,000		$3,000,000		$3,450,000	
Interest requirements	4.7%	1,015,200	4.65%	139,500	5%	172,500
Times interest earned	0.78		1.5		0.90	
Balance available for dividends				60,900		
Preferred stock:	3,900,000		1,000,000		1,150,000	
Dividend requirements	5.8%	1,241,200		194,500		235,750
Including prior requirements		226,000	5.5%	55,000	5.5%	63,250
Times earned	0.64		1.07		0.66	
Balance available for common stock dividends				5,940		
Common stock:	17,500,000		2,000,000		2,150,000	
Dividend requirements						
Including prior requirements						
Times earned:						
Bond interest earned	3.5%		4.65%		4.8%	
Preferred stock dividend earned	None		5.5%		None	
Common stock dividend earned	None		0.3%		None	

units most commonly used are: (1) capitalization per mile of track. (2) Gross revenue per mile of track per year. (3) Operating expenses (including taxes and depreciation) per mile of track per year. The first two may be combined to give (4) gross revenue per year per dollar of capitalization, and the third and fourth to give (5) net revenue per year per dollar of capitalization.

If (4) gross revenue per year per dollar of capitalization is remaining constant or decreasing, an unhealthy condition of affairs is indicated, as it means that the investment cost per dollar of new business is increasing. If (5) net revenue per year per dollar of capitalization is increasing it may mean (a) the addition of more profitable business, (b) the increase of efficiency in operation, or (c) a decrease in charges for maintenance, renewals and depreciation. The first two results are highly favorable indications, but the third is not to be accepted as favorable without further examination to determine whether the decreased charges are caused by more efficient maintenance or by a lower standard of maintenance.

The usual way to form an opinion on this matter is to separate operating expenses into two groups: (1) Conducting transportation, general and miscellaneous expenses, and taxes; and (2) maintenance, renewals and depreciation charges. It is a fairly safe assumption that any material decrease in the second item indicates a lowering of maintenance standards, although since many of these costs may be postponed temporarily without great harm it is well to make the test by measuring maintenance, renewals and depreciation charges in terms of gross revenue and comparing the annual ratios of percentages over a period of several years.

In Tables IX and X are given values for the several items referred to above for the three hypothetical interurban railways already mentioned, for all electric railways reporting for the 1912 census, and for a group of important steam railroads, the data for which were taken from various reports of companies to the Interstate Commerce Commission.

The use of figures for the year ended June 30, 1915, is not satisfactory, as that period was less favorable for many companies than the average of several years preceding. Both 1916 and 1917 will show better results for the majority of companies. The figures cited, however, are only for purposes of illustration, and will not be assumed to represent other than average values for the periods to which they refer.

The Causes and the Tendencies

This brings the investigator to the fifth general question—the causes of the present situation and its apparent tendencies. Here the investigator finds less help from the published reports, although some indication of the answers to the following questions will be found therein. It is pertinent to inquire first as to the revenues. Are they what they should be? A clearer idea of the situation will be obtained if the following questions are answered:

1. What is the passenger revenue per passenger car-mile?
2. What is the freight revenue per freight car-mile?
3. What part of the total revenue comes from freight?
4. What are the transportation revenues per mile of track?
5. What is the passenger revenue per passenger-mile?
6. What is the freight revenue per ton-mile?
7. What is the revenue per thousand population served; and
8. Is the situation in respect to the seven preceding items improving or not?

As to operating expenses, the following questions may be asked:

1. What are the operating expenses per dollar of operating revenue?
2. What are the transportation costs per car-mile?
3. What are the equipment maintenance costs per car-mile?
4. What are the maintenance-of-way costs per track-mile?
5. What are the general and miscellaneous costs per dollar of other operating expenses?
6. What is the average speed of cars?
7. What is the number of car-miles per mile of track per year?
8. What is the average annual mileage per car?

Table X—Apportionment of Operating Expenses—Costs Per Mile of Single Track

	Conducting Transportation, General Expenses and Taxes		Maintenance, Renewals and Depreciation	
	Per Mile of Single Track	Per Dollar of Operating Revenue	Per Mile of Single Track	Per Dollar of Operating Revenue
Composite of six large interurban companies	$3,470	$0.488	$1,480	$0.207
Composite of 128 medium-sized interurban companies—freight revenue less than 20 per cent cent of total revenue	4,050	0.526	1,460	0.188
Composite of seventeen medium-sized interurban companies—freight revenue more than 20 per cent of total revenue	2,640	0.487	1,120	0.206
Electric railways (composite of all operating companies):				
1902	6,090	0.492	1,340	0.122
1907	6,200	0.490	1,750	0.143
1912	7,030	0.497	2,100	0.152
Steam railroads (composite of six representative companies):				
1912	4,080	0.437	3,030	0.281
1915	4,470	0.426	3,020	0.295

Table IX—Comparative Units of Operation and Capitalization

	Capitalization per Mile of Track	Gross Revenue per Mile of Track	Operating Expenses (Including Taxes and Depreciation) per Mile of Single Track	Gross Revenue per Dollar of Capitalization	Net Revenue per Dollar of Capitalization
Composite of six large interurban companies	$90,300	$7,750	$4,950	$0.0858	$0.0350
Composite of 128 medium-sized interurban companies—freight revenue less than 20 per cent of total revenue	66,800	8,220	5,510	0.1232	0.0592
Composite of seventeen medium-sized interurban companies—freight revenue more than 20 per cent of total revenue	75,200	5,600	3,760	0.0744	0.0278
Electric railways:					
1902	96,287	11,640	7,430	0.1209	0.0481
1907	100,495	12,610	7,950	0.1255	0.0489
1912	104,930	14,500	9,130	0.1383	0.0581
Steam railroads:					
1912	56,500	10,100	7,110	0.1786	0.0586
1915	56,200	10,240	7,490	0.1823	0.0482

These questions are but a few of those suggested by an examination of the report of an interurban electric railway. Neither the extent of information which can be obtained in this way nor its pertinence can be foretold, and frequently the investigator will meet with but slight success in attempting to reach conclusions by this method. There is, however, much to be learned in this way if one is willing and able to recognize negative results—that is, that the figures prove nothing. Average values for certain of the foregoing items are shown in Table XI.

One most important item will frequently be obtained only with difficulty, *viz.*, the relative profitableness of the various classes of freight and passenger business, since the classification of accounts does not lend itself readily to the determination of these costs. The advent of regulation of rates on the cost basis makes such determination of increasing importance, as it is no longer considered a justification of any individual rate that the combined revenue from all rates is approximately what it should be. In every case it is of great importance to know the tendency of the units and ratios suggested above, and it is only by examining these suggested details that the causes of the tendencies shown in the corporate income account can be known.

TABLE XI—COMPARATIVE UNIT COSTS FOR INTERURBAN RAILWAYS

	Composite of Six Large Interurban Companies	Composite of 128 Medium-Sized Companies—Freight Revenue Less than 20 Per Cent of Total Revenue	Composite of Seventeen Medium-Sized Companies—Freight Revenue More than 20 Per Cent of Total Revenue	Steam Road Composite of Six Companies
Passenger revenue per passenger car-mile	$0.303	$0.214	$0.297	$0.208
Freight revenue per freight car-mile	0.250	0.367	0.296	0.105
Per cent of freight revenue to total revenue	13.1%	7.9%	29.4%	67.2%
Transportation revenue per mile of single track	$6,820.00	$7,440.00	$5,270.00	$9,900.00
Passenger revenue per passenger mile	....	....	....	0.0193
Freight revenue per ton mile	....	....	....	0.0073
Operating expenses per dollar of operating revenue	0.650	0.647	0.643	0.693
Transportation costs per car-mile	0.1006	0.0838	0.1003	0.0450
Equipment maintenance per car-mile	0.0268	0.0179	0.0284	0.0227
Maintenance of way per mile of single track	848.00	842.00	647.00	1,265.00
General and miscellaneous expenses per dollar of operating expense	0.1525	0.1365	0.1620	....*
Average speed of cars (miles per hour)	13.05	10.25	6.78	....
Car-miles per mile of single track	23,500	33,350	16,950	77,800
Miles per car per year—total	17,750	27,700	5,330	10,010
Passenger	37,700	33,700	24,250	58,600
Freight	4,610	5,750	2,140	8,650

*Cannot be obtained on a comparable basis.

It should be emphasized that efficiency of management cannot be judged by this means alone. No class of men can come nearer to working miracles than the railway operators of to-day, but they must work with conditions as they find them. Results cannot be more uniform than conditions, nor can there be earnings without traffic.

One is tempted, in examining the unit costs disclosed by answers to the preceding questions, to compare them with similar units determined from the records of other properties. Such procedure is not particularly profitable, although it will result in fixing attention on items which show some divergence. For example, wages of trainmen per car-mile may appear to be substantially the same for two companies, one operating in the intermountain region and the other in the South Atlantic district, and so pass with little notice. At least three factors are involved here, each of which must be known before the suggestion of equal efficiency of operation can be accepted. These are (a) the hourly rate of wages, (b) the speed of cars and (c) the number of trainmen per car. It is because of the complexity of the problem that attempts to decide as to the efficiency of operation and the soundness of the business on the basis of published reports alone are distinctly hazardous. In addition, average or normal revenues and costs mean very little. The road with the highest earnings is not content until it has bettered its own record, and the road with the lowest costs will likewise attempt to make them lower still. But while there is and can be no absolute standard, comparative figures frequently suggest the line of investigation which yields the answer to the question, "What are the causes of the present situation?"

WHAT REMEDY CAN BE USED

The sixth question, "What can be done to correct unfavorable features?" cannot be answered from data contained in published reports. Only careful study by capable men can result in the best plans for the future. It is possible, however, to obtain some idea as to the likelihood of improvements from examining the following points:

1. Is the revenue received for present business at a rate above or below the average?
2. Is the present cost of operation above or below the average cost?
3. Does the present volume of traffic appear to be normal for the communities served?
4. Do the communities served appear to be developing so as to furnish more business in the future?

The first two questions dealing with operating revenue and operating expenses may be answered by expressing revenues and expenses in terms of car-miles. When the transportation of freight is involved the revenue per passenger car-mile and that per freight car-mile should be shown separately, and by a proper allocation of direct charges and apportionment of common charges, the costs of freight and passenger business should be determined. This will permit of an examination of net earnings as well as gross, and will indicate, when the scale of rates is compared with those of other companies, something as to the relative profitableness of the various lines.

The third and fourth questions refer to what is probably the most important single factor in judging the future. It cannot be determined from the ordinary published records, or in every case from direct examination of the property. This factor will be termed "development" and defined as the relation of present business to possible future business. Stated more definitely, the important thing is the relation between the ratio of gross revenue to investment to-day and the possible future ratio of gross revenue to investment. The bonds of a property which earns twice its fixed charges in a fully developed field may be less desirable than those of a company which now earns only a little more than its fixed charges, but which operates in a field which is under-developed and capable of large expansion. This one ratio, that of investment per dollar of gross revenue together with the knowledge of possible development as above defined, will tell more about the worth—that is the soundness of any property—than volumes of unit

costs will. Is the field a potential market of importance? If not, the industry is likely to be unsound, even though the present earnings may be sufficient to pay a profit.

Present-day inefficiency in operating may be corrected by painstaking care, and potential markets may be developed by wise and persistent effort, but the field must have possibilities or the future can yield nothing but disappointment. It may be urged that the utility which has attached the most business to itself is penalized on this basis by comparison with one less fully developed; but if it has been developed at a capital expenditure such as to maintain at its original value the ratio of the investment to gross earnings, then it is not so attractive a property as one which has possibilities of growth before it.

For National Defense

General Harries Explains How the Electric Railways Can Help

TELEGRAM (WESTERN UNION)

E. B. BURRITT, OMAHA, NEB., Feb. 7, 1917.
Secretary, American Electric Railway Association.
NEW YORK.

Responding to your telegram this date I would say that the most important field of usefulness of electric railways in the matter of aiding in national defense is in connection with transportation of men and material from and to standard steam lines to our coast artillery posts. Of course there will be other opportunities for co-operation in connection with transportation to and from mobilization camps throughout the country, these latter, however, almost invariably as distributers to and from standard steam roads.

The first thing of value which can be done by the electric railways will be to contribute promptly and fully all information called for by the Committee on Co-operation with the War Department. Without the necessary data it will be impossible to create any workable plan.

The problem of effective partnership between the steam and electric roads will be by no means capable of easy solution. The desire of the association's committees is to find out how many electric roads are in shape to handle without breaking bulk the heavy material which may be conveyed to junction points by steam and how many others there are which could be rapidly made fit for such service. Motive power, track curvature, clearances and bridges have to be primarily considered. In the many cases where electric roads will be unable to handle steam rolling stock we must be informed as to the usable equipment which can be depended upon, so that there will be no guesswork as to the number of troops or the tonnage of supplies that could be successfully handled in the shortest practicable period of time.

To attempt to set forth just now the questions which the committee may find it necessary to ask is neither practicable nor necessary. Every operating official can easily visualize the situation and will appreciate the difficulties which with the assistance of the federal government may have to be met and overcome.

Very few of our coast defense posts are without electric railway connection with near-by towns. Very few of these posts have anything like direct steam connection. What we therefore desire to know is the physical relationship of steam and electric carriers, the ability or inability of the several electric roads to maintain effective transportation communication with steam roads and then we must have the facts as to the manner in which men and supplies can be handled either regularly or in time of emergency.

The best service which can now be rendered by member companies will be the speediest possible reply to any inquiries sent out by the committee and by volunteering such suggestions or information as will be calculated to assist the committee in doing its work.

GEORGE H. HARRIES,
Chairman of Committee on Co-operation with the War Department.

Temporary Relief for Boston Elevated

Special Commission Recommends Sale of Cambridge Subway to State, Graduated Rental for Dorchester Tunnel, Reduction in Compensation Tax, Increase of Prepayment Areas and Other Measures to Relieve Present Situation—Fare Increase or Transfer Charge Is Not Favored Now, but Further Investigation of the Company's Administration Is Recommended

THE SPECIAL RECESS COMMISSION now reporting to the Massachusetts Legislature on the financial condition of the Boston Elevated Railway was organized about the middle of 1916 by legislative resolution as a result of the railway's plea for relief. The commission was composed of the Lieutenant-Governor of the State as chairman, the President of the Senate, the Speaker of the House, two members of the Senate, four members of the House, and the full boards of the Public Service Commission and the Boston Transit Commission.

After long and careful consideration of the company's brief, abstracted in the ELECTRIC RAILWAY JOURNAL of Sept. 30, the commission has recommended that the Legislature grant certain measures of relief which do not involve any direct burden on the public, as described below. The commission considered the question of a fare increase but noted certain objections to it and recommended that action in this matter be deferred for the present. It suggested that the Public Service Commission investigate and report by Feb. 1, 1918, upon the company's efficiency of management and that the Boston Transit Commission should report at the same time upon the prospective rapid transit needs for the next decade. [EDITORS]

IN an exhaustive report dated Feb. 1 the special legislative commission investigating the financial needs of the Boston (Mass.) Elevated Railway recommends various measures for the temporary relief of the company and advocates an additional investigation during the coming year by the Massachusetts Public Service Commission of the general efficiency of the road's administration. As has been forecasted in this journal, the company's suggestions relative to fare increase and transfer charges are not favored by the commission at this time. The sale of the Cambridge subway to the State and certain reductions in taxation burden, however, are favored as the means of providing the company with funds which cannot now be obtained on account of its inability to issue further securities.

The commission points out that the company cannot issue additional necessary capital for the equipment of the tunnels and rapid transit lines now in the course of construction and for other improvements required. The floating debt of the company on Jan. 17, 1917, was $3,260,000. To raise by short-term loans the amount of additional capital which will be urgently needed within the near future would probably be impossible. Even if it were done, it would probably be at excessive cost and would leave the company at the mercy of changing financial conditions. The commission emphasizes the vital need for new capital if the community served is not to stagnate, and holds it probable that from $5,000,000 to $7,000,000 new capital will be needed in the near future for rapid transit line improvements alone. This does not include additions and improvements to the surface system or new subways and tunnels.

While the company would not have to pay for these latter structures, the report points out that it cannot be expected to lease them upon terms which would further imperil its ability to earn a fair return for its stockholders. The situation, whatever its causes may be, is said to be one which calls for definite action in the public interest.

The commission states that there is no "water" in the capitalization of the system, and that the return received by the stockholders has not been excessive. Furthermore, it states that the evidence justifies the conclusion that the company has endeavored in a spirit of co-operation to meet the demands of the public for rapid transit facilities, although the cost has been far greater than anyone would have ventured to predict when the company was organized; that the facilities now offered are immeasurably superior to those formerly enjoyed, and that the company has, especially within the last few years, been subjected to heavy additional burdens. Not only have the stockholders not of late received a fair return upon their actual cash investment, but this return is likely to decrease in the immediate future. The present stoppage of new capital will, unless the impediments are in some way removed, create at no distant date intolerable transportation conditions within the metropolitan district.

RELIEF NOT IMPOSING ADDITIONAL BURDEN UPON PUBLIC

The commission recommends without hesitation all the proposed measures of relief which do not impose an additional burden upon the public. The first of these is the return of the $500,000 guarantee fund deposited with the State at the time of the company's organization. Second is the purchase of the Cambridge subway by the State, which the commission favors rather than its purchase by a municipality outside of Boston. The cost of the Cambridge subway proper, exclusive of the Boston underground connection, was about $9,000,000. This sale would provide the company with additional capital at a lower cost than by the issuance of its own securities, if this could now be done. It would not reduce existing charges, because the cost of the Cambridge subway is represented by outstanding capital which could with difficulty be retired. It would merely provide the company with new capital at a lower rate of interest. The commission recommends instalment payments to the company under the direction of the Public Service Commission, and urges that authority be given the company to make loans or advances to the West End Street Railway from the money received to provide the latter with capital.

In regard to the enormous cost of subways and tunnels in comparison with ordinary facilities for surface transportation, the report points out that while such structures, if operated with a train service, with stops not too close together and with a dense traffic, and if accompanied by a corresponding decrease of surface car mileage run, do make possible a material decrease in operating cost, much time elapses before traffic can be adjusted to the new routes and the full saving realized. Furthermore, it is always desirable to build subways with an eye to the future and to provide a capacity much greater than would be required during the first few years of operation.

In view of this, the report states, the suggestion that

the company be relieved, during the early years of operation of a subway, of a certain portion or the whole of the rental, making these amounts up in subsequent years, with interest, is entitled to consideration. Under the present practice on a certain day a subway is not in operation and no rental is being paid for it. On the very next day it is put in service, and the full amount of the rental begins to accrue, although the traffic which it carries at the beginning is for the most part not new traffic but business diverted from other lines. There is no sudden increase in the total traffic of the system. The burden thus imposed is very great. When the Dorchester tunnel, for example, is opened, the company will immediately become subject to a rental of about $441,000 per year, equal to nearly 2 per cent on its capital stock. The commission is strongly inclined to the belief that in leases of future subways it would be wise to arrange a graduated rental, with provision for ultimate full compensation including interest.

This simply means, if the initial rental is less than the interest charges paid by the city, charging the cost of the subway with not only the interest during construction but the interest, or a portion thereof, during the early years of operation. The report points out that it is universally the practice and sound financially to charge interest during construction to the capital account, for it is as much a part of the cost of the work as money spent for steel, concrete or engineering services. It is only a step further and merely a difference in degree to charge to capital some part of the interest during the period before the work is self-supporting. The principle has in effect been recognized by the Massachusetts Legislature in allowing the use, without rental charge, of a portion of the Dorchester tunnel in advance of the completion of the whole. In industrial financing it is frequently necessary to pay some portion of interest out of the capital account after the work has been put into service. Many undertakings, the report states, could not be carried out unless this were done, for few or no properties, unless financed largely by stock issues, can fully earn fixed charges immediately upon being put into use. The commission recommends that a gradual rental be allowed for the Dorchester tunnel either by application of proceeds from the sale of the Cambridge subway or proceeds of bonds to be issued by the company in excess of the present legal limit, subject to the regulation of the Public Service Commission and with a graduated period not exceeding three years from the tunnel opening.

Temporary Capitalization of Replacements

If it were not for the present abnormal level of equipment prices, probably $3,000,000 or $4,000,000 could be spent immediately to good advantage by the company in buying additional rolling stock and substituting new cars for old. There is reason to believe that the resulting saving in operating expenses would cover the interest on the investment and also amortize the cost of the abandoned cars within a short period of years. Even with cars at their present prices, the report says, a substantial investment of this nature is distinctly desirable. If the company had a depreciation fund large enough for such replacements, its position would be very favorable, but on June 30, 1916, only $444,263 was in this fund, an amount insufficient for the purpose. Under Chapter 671 of the Acts of 1914 street railways may, with the approval of the Public Service Commission, issue bonds beyond the ordinary limit to fund the cost of replacing or reconstructing their property, provided they are retired from earnings within ten years. The Boston Elevated Railway cannot take advantage of this statute with respect to surface cars, as these belong to the leased West End company. The commission recommends that a portion of the funds received from the sale of the Cambridge subway be authorized for the purchase of new equipment, or that rehabilitation bonds be permitted. On account of the high price of equipment a fifteen-year period is recommended, subject to the approval of the Public Service Commission.

Construction of Prepayment Areas

If additional inclosed areas can be provided at important transfer points so that paper transfers may thereby be eliminated, the total volume of transfers will be so reduced that an effective auditing system may be introduced. This is in the public interest, in the opinion of the commission, and the report recommends that the company be given the right of eminent domain to take private property for such transfer areas, with approval of the Public Service Commission. When such areas legitimately form a part of a subway line, they should be constructed subject to the approval of the Boston Transit Commission, and the cost of their construction charged to the cost of the subway.

Measures Imposing Additional Burden on Public

The foregoing measures will, if adopted, make it possible for the company to obtain, at a low rate of interest, all the capital needed within at least the next three years, and for the most part would be desirable and in the general interest were the company prosperous. These measures, however, will not in the immediate future effect any permanent improvement in the position of the company's stockholders. It has been strongly urged that some more fundamental and more positive form of relief should be provided for in the way of further contributions from the public to the company to the end that transportation development in the Metropolitan district may in no way be imperilled. Two general methods exist for accomplishing this. First, remission, either temporary or permanent, of taxes or other similar burdens placed upon the company; and, second, an increase in the rate of fare.

Abolition of the Compensation Tax

This tax consists of seven-eighths of 1 per cent of the gross earnings of the company, with the proviso that if the company pays dividends in excess of 6 per cent a sum equal to such excess shall be paid as a part of the compensation tax, in addition to the percentage of gross earnings. This amounted to $160,786 in 1916. The report states that when the stock of a public utility is worth less in the market than the amount of its cash investment, as is the case in Boston, the franchise value has for the time being ceased to exist. The company has agreed to assume additional heavy expenses for paving and street surface maintenance. The commission recommends that the compensation tax of seven-eighths of 1 per cent of gross earnings be abolished, but that the provision of the statute requiring a sharing with the public of dividends above 6 per cent remain in force.

The Problem of Increased Fares

A fare increase, introduction of a zone system or transfer charge, it is said, would violate the company's contract with the State. The commission is of the opinion that a fare increase would probably not produce additional net revenue in proportion to the increase. Furthermore, a zone system would be impracticable. Such a system would require an interior zone of about 4.75 miles from the urban center, with one or more outer zones. It would be necessary to include the terminals

of the rapid transit lines within the interior zone, as the expense and inconvenience of attempting to collect additional fares on rapid transit trains would render such collection impracticable. Moreover, the zone system would be open to the objection that the territory served by the company has been developed, values have been fixed and homes established on the basis of a uniform fare.

The suggested charge for transfers appears difficult in application to Boston. The arrangement of the system requires a transfer in the vast majority of rides. A penny charge for a transfer at such points as Park Street, Dudley Street, Sullivan Square, etc., would assume the character of a 6-cent fare upon the entire system or else would throw a burden upon the surface lines which they are not adapted to bear. There appears no reason to recommend a transfer charge on the surface system at this time, in view of the fact that transfers are frequently given, not to increase the length of ride, but, for the sake of economy, to avoid the running of through cars.

Further Remission of Taxes

The commission investigated at considerable length a plan for the remission of the company's so-called franchise tax (amounting in 1916 to $403,149), under the general supervision of the Public Service Commission. It recognizes that every city gains largely, financially and otherwise, by every extension of its transportation facilities, and particularly by the construction of rapid-transit lines. This consideration may justify a municipality in bearing some share of the cost of providing these traffic facilities, as in New York and Philadelphia. Nevertheless, while the plan devised by the committee of the commission for making good possible future deficiencies in earnings by a temporary remission of taxes has favorably impressed many of the commission, the latter concludes after careful study that action along these lines is not desirable at present.

Further Investigation Necessary

The report states that a more thorough investigation of the company is required than time has so far permitted, before the adoption of any relief measures in the way of further taxation reduction or fare increase. It must be shown that the necessary revenue cannot be secured by further gains in operating efficiency, including improvements in equipment and in methods of car operation, the reduction of relative operating cost through the diversion of traffic to rapid transit lines, etc. Under present abnormal conditions, traffic and earnings are increasing at present more rapidly than ever before in the history of the company and at a rate faster than that on which its forecast of future financial results was based. Positive knowledge of the financial conditions of the future is not available, however, and the commission feels that more adequate information as to the probable outlook is needed. It is also advisable that a thorough investigation be made to determine whether the company can increase its net earnings through more efficient or economical methods of management and operation. Supplementing this investigation may properly come a parallel investigation of the desirable development of transit facilities during the next decade. The commission recommends that the efficiency investigation be conducted by the Public Service Commission and the transit development investigation by the Boston Transit Commission, both to report to the 1918 Legislature by Feb. 1 next.

In deferring definite action upon the more radical measures for relief, the commission feels that no sacrifice of the public interest is in any way involved. The minor measures of relief recommended will relieve the present stoppage of capital supply and will enable the company to complete the work to which it is already committed, and to make the additional improvements which are in its own and the public's interest. At the end of another year it will be possible to determine what further action, if any, is desirable in the public interest, the conditions upon which it should be based and the safeguards by which it should be surrounded.

President Brush's Comments

Commenting upon the report of the commission, President Brush said:

"The measures proposed by the commission will temporarily, at least, and to some extent, put the company in a better position to meet the demands of the public. The company is gratified that the members of the special commission are unanimously of the opinion that the company should have some financial relief. In view, however, of the increase in the cost of labor and materials and the enormous cost of additional rapid transit facilities, the company is firmly convinced that it will be necessary either that the communities bear a portion of the burden of additional rapid transit facilities, as is now done in New York and is proposed in Philadelphia, or else that there be an increase in fares.

"We understand that the possibility of this is recognized by the members of the special commission in view of the fact that they have referred the question of further relief to the Public Service Commission for further investigation and recommendation and the question of additional rapid transit facilities to the Boston Transit Commission. It scarcely seems necessary to state that in so far as any measures adopted by the Legislature will enable it to do so, the company will promptly avail itself of the means afforded to buy additional cars and otherwise to improve and extend its service."

Cedar Pole Market Steady

Northern White Cedar Association Discusses Business of Past Year

The twenty-first annual meeting of the Northern White Cedar Association was held at the Radisson Hotel, Minneapolis, Minn., Tuesday and Wednesday of this week. It was attended by about fifty representatives of the leading pole producers of the country. No set papers were read, the sessions being devoted to discussions regarding the economical production and sale of cedar poles.

In his annual address the president, H. L. Partridge, stated that one of the most important features of the work done during the year was the advertising campaign that had been conducted through the technical papers. The anticipated volume of business had not been realized during the year 1916, but this was due to the unsatisfactory condition of the metal market which held up temporarily the big construction work that is contemplated. Other speakers discussed the subjects of insurance and of surplus stock, attention being called to the fact that the year's shipments of 20-ft. poles closely approximated the average sales for the five years preceding, and that poles 25 ft. and longer were but 35,000 less than the same average. Emphasis was laid upon the necessity of being able to furnish, at close intervals, inventories in order that production and consumption demands could be more accurately gaged.

At the election of officers for the ensuing year J. C. Kirkpatrick of Escanaba, Mich., was made president; J. E. Gerich, vice-president; and L. A. Furlong and T. M. Partridge, directors. W. B. Thomas was continued as treasurer, and N. E. Boucher as secretary.

Strike Restriction Plan Opposed

Labor Will Fight Plan of New York Commission or Any Bill to Prevent Strikes—Utility Managers Say Plan Will Not Be Effective

During this week the Public Service Commission for the First District of New York has been conducting a series of hearings on its tentative plan for restricting strikes on electric railways in New York City. The full text of this plan was published in the ELECTRIC RAILWAY JOURNAL of Jan. 27. Thus far the hearings, which will be continued next week, have served only to develop the fact that public representatives are inclined to look favorably upon the plan as a proper protection of the paramount right of the public to continuity of service, but that organized labor is unqualifiedly opposed to any wage system or strike-prevention scheme that is not based upon the entirely voluntary act of employer and employee. As for the utilities concerned, these doubt the possibility of success for the proposed plan and prefer to be left to adjust matters with their employees without interference from outside parties.

In opening the hearings on Feb. 6, Oscar S. Straus, chairman of the commission, explained the plan and laid particular emphasis upon the provision for a wage board, composed half and half of company representatives and employees. He thought that such a board would settle disputed questions regarding wages, hours and working conditions without the bitterness that usually arises when the company and the main body of employees reach the crucial point in their direct negotiations. The question as to whether there should be one wage board for the entire State or one for each railway system had been left open, Chairman Straus said, and no opinion on this would be formed until all parties had been heard.

The speakers at the first hearing were Albert Shaw, editor *The Review of Reviews*, and Delos F. Wilcox, franchise expert, New York, N. Y. Mr. Shaw, after explaining the growth of public interest in municipal transportation, said that the plan suggested seemed fair to employees and they should be willing to accept it. Mr. Wilcox stated that the wage-board representatives of the unorganized men should be selected by the commission, so that the company with its half membership on the wage-board might not easily control the board through the unorganized men. He also thought that there should be provision for appeal by either side to the commission, if the finding of the wage board was not unanimous.

During the colloquy with Mr. Wilcox, Chairman Straus explained that the plan is not claimed to be an absolute preventive of strikes but that it will restrict them to only a very small percentage of cases. The plan provides that no strike shall be instituted pending the decision of the wage board or commission, and after such finding is made the employees would be in honor bound by a previously required consent to abide by any decision reached. Should they repudiate this consent and strike, the act would not be considered a penal offense but they would be subject to the force of public opinion and would have no further standing before the commission.

At the hearing on Feb. 7 the only speaker was Samuel Gompers, president American Federation of Labor, who vehemently opposed any legislative action for the restriction of strikes. He admitted that he would favor the commission's plan if it were voluntarily adopted by employers and men, but said that no legal restrictions would be of any avail in prohibiting employees from quitting work if they so desired. Mr. Gompers averred that no strike-prevention laws anywhere in the world had accomplished their stated purpose. He denied that machinery set up according to the commission's plan would have provided the benefits that were secured by workers in the past through strikes and arbitration compromises. In closing he stated the general position of organized labor in these words:

"We will oppose the proposal step by step and will not yield one inch in opposing it during all its progress. We will fight it in the courts, and, if beaten there, we will exercise our God-given natural right, the law notwithstanding. You may make us lawbreakers possibly, but you are not going to make us slaves."

The hearing on Feb. 8 was given up to utility representatives. E. A. Maher, Sr., president Third Avenue Railway, stated that he personally was in favor of collective bargaining, but that he did not believe in bringing outside interests into the question, *i.e.*, foreign labor leaders and others not interested in railway operation, as are the companies and the commission. He told how his company expects to broaden the scope of its employees' mutual benefit association so the employees can take all questions up with the management and reach an adjustment. Mr. Maher said that the wage-board plan would not prove successful unless the decision of the board were final, for the employees would insist on an appeal in every case. Moreover, he felt that the matter of wages would better be left entirely to the company, and the commission from its records could easily check the company's veracity if it asserted at any time that it could not afford to pay higher wages.

John Beaver, receiver Second Avenue Railroad, thought that employees would strike, law or no law, if they so desired. T. S. Williams, president Brooklyn Rapid Transit Company, was not able to attend the hearing, but he stated in a communication that the plan of the commission would result only in unrest and dissatisfaction, for it did not presuppose a natural and spontaneous co-operation between management and men but tried to create concord by legislative fiat. Had the proposed plan been in effect last summer at the time of the metropolitan strike, Mr. Williams said, the company could not have maintained such peaceful relations with its men as it did simply through its policy of intelligent and fair co-operation.

In a similar communication T. P. Shonts, president Interborough Rapid Transit Company and New York Railways, stated that he believed in the right of the public to continuous service, the right of collective bargaining, the right to use contracts of service, the right to prohibit strikes pending investigation, the right of the company to maintain discipline and the right of individual employees to leave the service before the end of their contracts with the consent of the company or at the order of the commission. He thought, however, that collective bargaining through the company's internal brotherhood was more in the public interest and the employees' interest than bargaining through outside unions. Furthermore, he did not believe that the commission should control wages, hours and working conditions, for it would be both public prosecutor and judge in any case. The adjustment of grievances, he thought, should be left entirely to the company and the employees' organization. In regard to stopping work, Mr. Shonts suggested that if any considerable number of employees give written notice to quit or to demand changed conditions or wages, or if the employer gives written notice of an intention to change wages or conditions, the Public Service Commission should forthwith ask the Appellate Division to appoint three arbitrators to determine the controversy, the commission to appear on behalf of the public. The decision, when confirmed, should be binding for a period of from one to three years, and severe penalties should be inflicted upon the side disregarding the finding.

COMMUNICATIONS

Reuse of Existing Rail

American Railways Company
Philadelphia, Pa., Jan. 31, 1917.

To the Editors:

I wish to emphasize, if possible, the importance of the matter covered in the article by M. E. Stark, appearing in the issue of the Electric Railway Journal for Jan. 13, page 80, under the caption "Prolonging the Life of Old Rail." In this article he took up the possibilities of reusing existing rail in track reconstruction.

At the present time many small properties find it impossible to get new rail at any price, and Mr. Stark's article opens up a line of thought which cannot but be advantageous even to larger railways. We are undoubtedly required to do a great deal of work which present market conditions and prices make burdensome. If a careful study is made it will often be found possible to reuse rail where such reuse in normal times would not be advisable.

The very general use of welders and grinders, and the improvements in joint and tie-plate practice also change the aspect of this particular problem. The problem seems to be to get 100 per cent wear, not only from our track materials but from all of the items that go to make up a railway property.

Economies worked out to-day under necessities of abnormal conditions cannot but produce still greater savings when conditions return to normal.

C. G. Keen,
Engineer of Way and Structures.

Classification of Motor Trucks

Bay State Street Railway Company
Boston, Feb. 6, 1917.

To the Editors:

It has been recognized for some time that a standard classification for trucks and car bodies, as well as for motors and other equipment, would be very desirable if it could be brought about. For this reason I am much interested in the article by Mr. Bullock in your last week's issue. In my opinion this is a subject which could very properly be taken up for consideration by the A.E.R.E.A. jointly with the manufacturers.

E. W. Holst,
Mechanical Engineer.

Pittsburgh Railways Company
Pittsburgh, Pa., Feb. 7, 1917.

To the Editors:

In the article by S. A. Bullock of the Baldwin Locomotive Works advocating the use of a uniform system of symbols for defining the various classes of electric railway trucks, there has been opened up a subject which is timely and of interest to all equipment men. Mr. Bullock's proposed plan of classification at least provides a nucleus about which may be built a system which should include all types, classes and manufacture of trucks. Whether the three subdivisions of the proposed classification include all the essential characteristics necessary to designate properly all types is debatable, but this criticism is merely a question of detail and not fundamental. To illustrate, would it not be as desirable to differentiate between the equalizer-bar type, arch-bar type and plain yoke type as well as to express the characteristics outlined by Mr. Bullock? On the other hand, if all of the outstanding characteristics of the multitudinous design of trucks we have now with us are included in the same system of classification, it then may become so cumbersome as to defeat the purpose for which it was designed.

However, the need of a suitable system of classification must be apparent to all, and I believe the equipment committee of the Engineering Association could, with profit to all, include the study of such a system among its assignments of subjects.

F. R. Phillips,
Superintendent of Equipment.

Compulsory Investigation Favored

Committee of National Chamber of Commerce Reports Almost Unanimous Vote on Its Strike Referendum

At the fifth annual convention of the Chamber of Commerce of the United States, which was held in Washington on Jan. 31 and Feb. 1-2, the three main topics were the railroad situation, national defense and preparation for conditions after the war. The first topic was of most direct interest to electric railways, on account of the presentation of a committee report in favor of compulsory investigation of labor disputes on interstate carriers prior to strikes or lockouts. Strong action, however, was taken along other important lines, for the convention endorsed preparedness, the Webb bill and daylight saving, reaffirmed its stand for a national budget and pledged the business interests of the country to support the President in any eventuality.

The railroad committee reported on Jan. 31 that since its appointment in November, 1916, it had studied the Towne plan, which, as noted in the Electric Railway Journal of Sept. 30, 1916, page 692, contemplates taking from employees by contract all right to strike under any circumstances; and also the McClellan plan, indorsed by the Seattle Chamber of Commerce, which seeks to establish a wage-fixing board. The committee stated that it recognized as a matter of principle that when a man enters the railroad service, he by that act should surrender the right to join in concerted action to paralyze that service. It hoped for the ultimate adoption of this principle, but for the present it limited its recommendations as set forth in its referendum.

The major proposal covered by the referendum to members of the Chamber of Commerce provided for a full public investigation before any strike or lockout should be attempted on interstate railroads. To this were added two proposals designed to render the first more effective—*i.e.*, that upon any investigation or arbitration board the employers and employees should have equal representation and the public a majority representation, and that a permanent statistical division of the Interstate Commerce Commission should be established to compile statistics on labor and other subjects for the use of arbitration boards in future railroad controversies. The vote on these questions, which closed Jan. 30, 1917, was in no case less than 94 per cent favorable. This was the largest affirmative vote ever reported by the Chamber of Commerce.

At the same session W. D. Hines, chairman of the board of directors Atchison, Topeka & Santa Fé Railway, stated in an address that continuity of transportation cannot be relied upon so long as the government permits service to be interrupted at the pleasure of the railroad brotherhoods. Mr. Hines said that the present absence of strike talk on the part of the brotherhoods is merely temporary, in the hope that Congress may be induced to let the session end without legislation to protect the public's interest. After the Con-

gress closes and the Supreme Court decides the Adamson act test case, the country will wake up to the purpose of the brotherhoods to have their own way or paralyze interstate transportation.

In a notable address on "Industrial Relations" on Feb. 1, Harry A. Wheeler, first president of the national chamber, took the point of view that the present industrial situation is a condition involving the conflict of two forces; that a complete adjustment between these forces should not be expected, and that the conflict will be carried on by both sides with increasingly efficient organized forces. This being so, Mr. Wheeler stated that in the interest of national safety these forces must come under some measure of control, for while the law may be powerless to harmonize conflicting human relationships, it can and must control the operations of known forces which, if allowed to continue without restraint, will trespass upon public rights and affect the public welfare. The action of organized labor heretofore has been within the trade or community or limited geographical area, but during the summer of 1916 it laid bare its claim to national influence and made apparent the necessity for national regulation. The public interest, as a third and now expressable interest in industrial disputes, said Mr. Wheeler, was born last summer and will hereafter demand its rightful voice in every national controversy.

Besides the report of the railroad committee, constructive reports were submitted along various lines. For example, the committee on daylight saving recommended that clocks in the United States be set one hour ahead of the standard time. If that plan should not prove feasible, it proposed that the clocks should be advanced one hour on April 1 each year and turned back on Nov. 30. Whichever plan should be adopted, however, the committee believed that the change should occur simultaneously in all parts of the country and that Congress should act in the matter. The committee on commerce proposes the addition of four closely related new functions in the Department of Commerce, as follows: To find out what it costs to do business in the United States; to deduce from collected facts sets of reasonably attainable standards for the various items of expense in different lines of business; to circulate information concerning the methods of the more efficient, and to work out better methods than those actually found in use. The committee on statistics and standards recommended the creation of a federal commission for the survey of all census statistics, and a resolution to this effect was adopted.

The main resolution passed at the end of the convention related to preparedness and the pending revenue bill. It approved the program of preparedness, as indorsed by the chamber's referendum and by various resolutions, and also pledged the support of the chamber to any just and reasonable taxation to support preparedness. It protested against the inequitable and discriminatory taxation of the pending revenue bill providing for a tax on corporations and co-partnerships, and, finally, declared that the business men of the country would approve of any bill drawn along the lines of fairness "so that every citizen would pay his just share of the tax."

Position-Light Signals

At a meeting of the New York Section of the Illuminating Engineering Society, held on Feb. 8, 1917, A. H. Rudd, signal engineer Pennsylvania Railroad, presented a paper on "Position-Light Signals for Railroad Service." He described the development and application of position signals and told especially of many difficulties encountered with position-light signals on the company's experimental line from Philadelphia to Paoli, and how they were overcome. One difficulty was to devise a means to maintain the lamp in a position so that the filament would have an exact relation to the lens. Another difficulty was to secure lenses that would not reflect the sunlight at certain times in such a way as to give false indications. The speaker said that enginemen were now almost unanimous in their preference for these signals and that he believed they would come into more general use since they fulfill very satisfactorily the requirements peculiar to the lines where they are installed.

AMERICAN ASSOCIATION NEWS

Manufacturers and Railway Men Confer on Overhead Specification

A sub-committee of the line material section of the Associated Manufacturers of Electrical Supplies and a sub-committee of the committee on power distribution of the Engineering Association met in Chicago, Feb. 6 and 7. The conference was for the purpose of harmonizing the differences between the Engineering Association's specifications for overhead material, as set forth in the 1916 report, No. 304, and the products of the several manufacturers. The two days were consumed in the consideration of malleable fittings, and agreement was reached on practically all differences. A second meeting to revise the specifications for bronze castings, wood and porcelain strain insulators, pole-line fittings, etc., will be held in Chicago on Feb. 26 and 27.

At the conference the Engineering Association was represented by E. J. Blair, Chicago, chairman; R. H. Rice, Chicago; A. Schlesinger, Indianapolis, Ind. The manufacturers' representatives were C. C. Peck, Ohio Brass Company, Mansfield, Ohio, chairman; James H. Drew, Indianapolis, Ind., and William Schaake, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Section No. 11 Organized in Toledo

A statement regarding the proposed organization of a four-sided joint company section on the property of the Toledo Railways & Light Company was given in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 20. The section was organized as scheduled on Jan. 23 under the chairmanship of H. H. Ross, railway engineer, starting with an enrollment of ninety-eight men. The first speaker on the program was F. R. Coates, president of the company, who delivered an address in which he promised active co-operation with the new section. The Rail-Light Band, organized under the direction of S. J. Derge, assistant general manager, then played several selections.

Talks were given by out-of-town visitors. E. B. Burritt explained the ideas and ideals of the American Association. He was followed by G. B. Muldaur, field secretary National Electric Light Association, who spoke on "The Function of a Company Section." E. J. Blair, electrical engineer Chicago Elevated Railroads, represented the committee on company sections and individual membership, bringing greetings from his own section. Finally, D. H. Daskill, secretary National District Heating Association, addressed the section on public and interdepartmental relations.

Secretary H. Friede reports a fine spirit at the opening meeting, which took tangible form in the large enrollment mentioned.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Utica Interurban Car with Air Operated Doors—Is There a Perfect Trolley Wire?—Trolley Wire Erection Costs, III—Ballast-Unloading Trestle Made of Ties—New Apparatus and Useful Suggestions

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.)

Quick-Loading Interurban Cars

On the Utica Lines of the New York State Railways Equipment for Six-Car Train Service Has Been Designed with Inclosed Vestibules and Drop Platforms

BY J. R. AYERS
Master Mechanic New York State Railways, Utica Lines

The New York State Railways, Utica Lines, has recently placed in service twelve single-end interurban cars that were specially designed to give entrance and exit facilities equivalent to those commonly obtaining with city cars. Drop platforms with folding doors and steps have been provided at both ends of the car, and bulkheads have been omitted. This arrangement was adopted to permit rapid loading and unloading at points of congested traffic, the service involving a run of about 10 miles without stop to a point where more than 60 per cent of the passengers are discharged. The cars are run in trains varying in length from two to six cars, the composition of each train varying from all motor cars to half motor cars and half trailers.

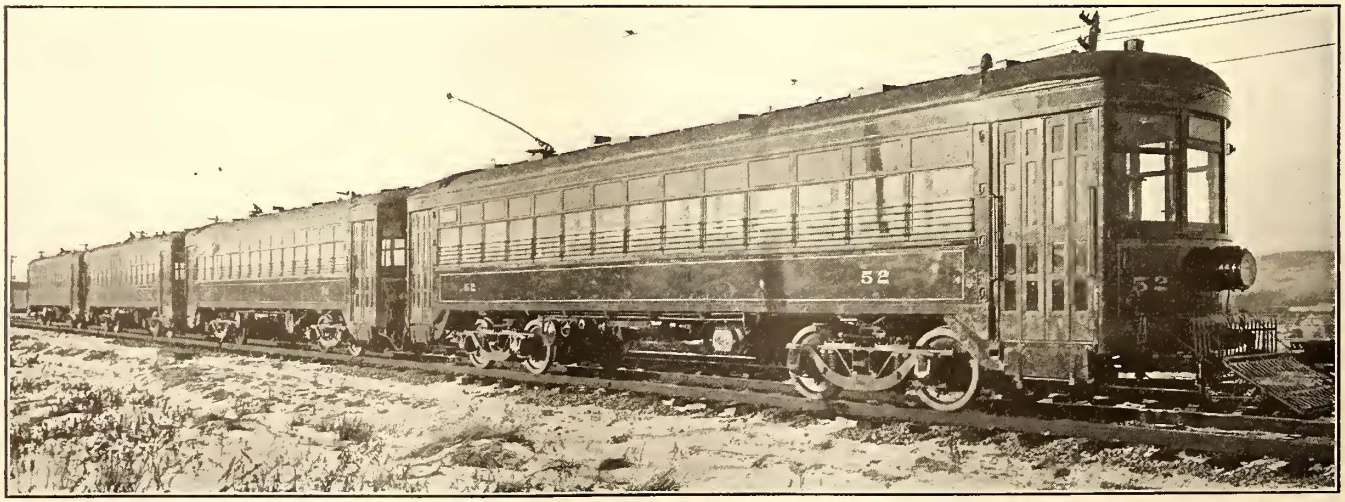
An all-steel, arch-roof design was adopted in accordance with the general tendency toward these features displayed in modern car construction, and the bodies, which were built by the Cincinnati Car Company, possess several novelties in detail in addition to those already outlined. The general dimensions are as shown in the accompanying table.

Length over all	49 ft. 8 in.
Length over dash	48 ft. 8 in.
Length over body	38 ft. 8 in.
Extreme width at belt rail	8 ft. 5 in.
Height from rail to trolley boards	12 ft. 1½ in.
Height from rail to first step	16½ in.
Height from first step to platform	14 in.
Height from platform to car floor	11 in.
Height of coupler center from rail	20 in.
Post centers	32 in.
Width of entrance door opening	38½ in.
Truck centers	26 ft. 8 in.
Width of seats	38 in.
Width of aisle	21 in.
Seating capacity	56
Weight ready for service	54,000 lb.

INTERIOR VIEW OF INTERURBAN CAR WITHOUT BULKHEADS

Inside of the car body all panels are insulated with cork covered with linoleum. Front and rear dashes have cork insulation only, with interior paneling of steel to form window pockets. The roof is steel riveted to the one piece T-iron carlines which also form the side posts. This surface which is finished white forms the inside finish of the car. The outside of the steel roof is insulated with 1-in. cork, covered with 6-ounce duck. Two thicknesses of 13/16-in. yellow pine, covered with ¼-in. Battleship linoleum make up the floor.

A Peter Smith forced-ventilation hot-air heater, which has a cold air intake arranged so as to take air



FOUR-CAR TRAIN FOR INTERURBAN SERVICE REQUIRING RAPID-LOADING FACILITIES

from an opening in the bottom of the vestibule, is installed, and the interior lighting system comprises one circuit of six 94-watt Mazda lamps arranged with a selector switch.

The seats, which were designed to the railway company's specifications and manufactured by the Hale & Kilburn Company, are of the non-reversible type, with removable backs and Pantasote upholstering.

Other specialties are combination ventilating and lighting fixtures, illuminated roller signs, Ohmer registers, combination arc and incandescent headlights, Peacock staffless brakes, Root air-operated snow scrapers, Eclipse Frisco-type fenders, and Westinghouse 6-T signal switches for train operation. The passenger signal push button is of the trigger type.

At the forward end of the car the doors, which are operated by the motorman, are inward folding and work in conjunction with the step. At the rear the folding doors are operated by Chicago Pneumatic door engines. These doors also are inward folding, and the control mechanism is so arranged that the doors can be operated by the conductor from any point in the car. This is done by a control rod which runs the full length of the car in the same bracket as the bell cord, whistle cord, register cord, etc. As before mentioned, there are no bulkheads in the car, the motorman being amply protected from the light at night by means of three curtains.

During train operation the front vestibules are used by passengers as standing room. Therefore provisions are made, by means of small steel box, to lock up fuses, controller key, brake-valve handle, coupler unlocking valve handle and air-scraper handle. These operating accessories are locked up at all times, except in the cab of the motorman actually operating the car. As the box is provided with standard switch lock, all motormen and conductors have keys to it.

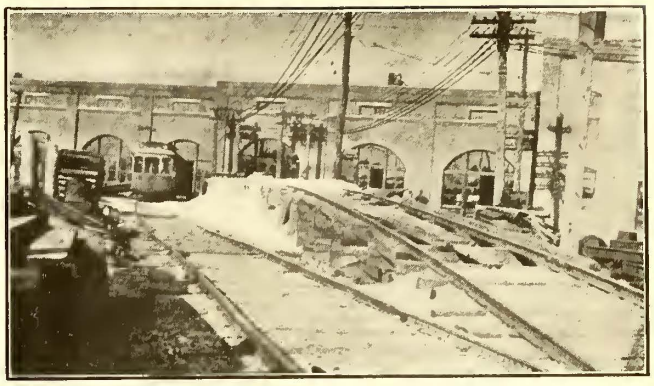
TRUCKS, BRAKES AND ELECTRICAL EQUIPMENT

Standard Baldwin trucks equipped with M.C.B. journal boxes, EB axles, and inside hung motors are used, but the height of the underside of the floor above the rail of 40 in., together with 35-in. wheels and the requirements of 33 ft. radius curves, made it necessary to design a special central brake beam.

Westinghouse AMM brake equipment with D-2-H compressor and M-22-A brake valve have been provided, this brake valve permitting six-car train operation. Westinghouse G-2 automatic car and air couplers also are used. For these couplers the uncoupling valves are located in each end of the car. The valve is so designed that it can be operated only by a specially shaped handle, and the latter can be removed only when the coupler valve is in the coupled position, this handle being always kept in the lock box in the cab.

The electric equipment consists of four Westinghouse 306-CV motors arranged for ALM control. As this type of control requires only seven-wire control cable for operation, the nine-wire train and jumper cable, which is standard on this property, permits operation of the signal switch wire, and the feed wire for lights and heater in trailers without any additional receptacles and jumpers.

The cars were equipped by the railway company's force, and special attention was paid to accessibility for inspectors to all parts of equipment. Everything that would have a tendency to reduce maintenance was given careful consideration. For example, valves that are liable to give trouble and can be repaired or cleaned by inspectors, have been arranged with unions on both sides so that they may be easily removed when this is necessary in order to make repairs.



GENERAL VIEW SHOWING INCLINE OF BALLAST UNLOADING TRESTLE

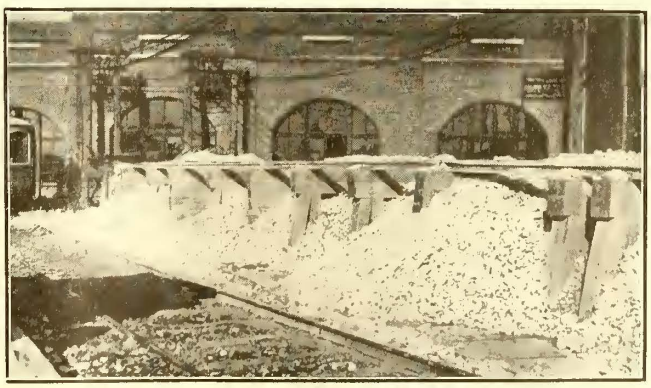
Temporary Unloading Trestle to Facilitate Handling of Ballast

BY E. R. DIKE
Engineer Maintenance of Way Chattanooga Railway & Light Company, Chattanooga, Tenn.

On nearly all of the construction and reconstruction work done by the Chattanooga Railway & Light Company, Chattanooga, Tenn., during the past six or eight years it has been practicable to pull the hopper cars in which the crushed limestone ballast was shipped to the point of use and to dump the ballast in the track, thus avoiding handling. On a recent job on Oak Street, however, which involved the reconstruction of 1 mile of double track and the use of 3000 cu. yd. of ballast, this was impossible because the ballast cars could not be pulled for several miles through the residence section of the city, and in addition a ten-minute to five-minute headway of passenger traffic gave insufficient time for unloading. This necessitated the dumping of the cars in the yard and reloading the ballast into work cars for final distribution.

To dump this ballast upon the ground or onto a platform level with the rail and to attempt to handle the ballast with reasonable cost and speed was impossible and gave rise to the scheme pictured herewith. The ideal system would be to erect a suitable trestle over storage bins and to have track for work cars near the bins. Such an installation was not practical in this instance for lack of space for the trestle and overhead room beneath the cables from the near-by power house.

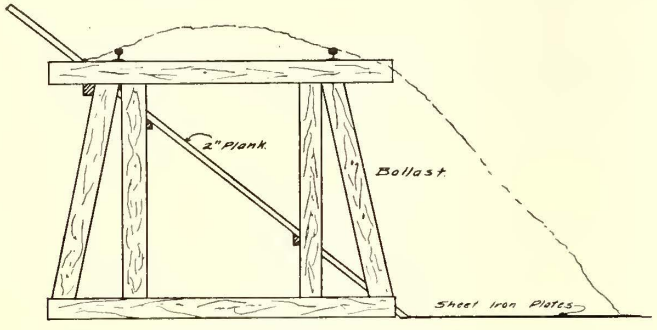
In the plan worked out and used with great success two tracks practically parallel were selected and one of them was raised by trestle bents made of ties to an elevation of about 6 ft. above the other track. Then a sloping floor, having a pitch of about 45 deg. and made of 2-in. oak plank, was constructed under the elevated track. The space from the toe of the slope to the other



CLOSE VIEW OF BALLAST IN STORAGE SPACE

track was floored with sheet iron covered with some old scrap plates such as are sometimes fitted to crossings. The grade of the incline was made about 5 per cent, and the work cars used to haul the ballast cars had no trouble in setting the latter upon the trestle.

As the dump doors on the cars are let down, the ballast runs out and assumes a position where it can easily be handled by the work-car crews. The empty



ELEVATION OF UNLOADING TRESTLE ARRANGEMENT

cars are switched out by gravity. The space for ballast holds about eight carloads of 25 yd. each, or approximately 200 yd. When six or eight cars a day or even more were being set into the yard, this arrangement made possible their immediate disposal, while by the ordinary method of unloading it would have been necessary to hold some of these cars until demurrage was due. This arrangement also made it possible to load and deliver the ballast to the work more quickly.

The Ideal Trolley Wire

The Author Reviews the Qualities of Different Materials and Outlines the Proper Service for Each

BY G. H. McKELWAY
Engineer of Distribution Brooklyn Rapid Transit System

It might just as well be said at the beginning that the ideal trolley wire is like the old countryman's "gi-raf-fee." "There ain't no such animal." The ideal wire should be low in first cost, should never wear out or break, should have a salvage value when taken out of service equal to that of new wire, and in addition, its conductivity should be 100 per cent. It is self-evident that no wire can fulfill all of these requirements, and the most that one can hope for is a wire that will approach them.

Properties of Metals Used for Trolley Wire

Only two metals can be seriously considered for trolley wire, viz., copper and iron. Other metals are used in the manufacture of the wire, but they are used only in the making of alloys of which the base is copper or iron. In practice the number of kinds of wire can be reduced to four; viz., copper, steel, bronze, and copper-clad, a physical combination of copper and steel. While "bronze" and "copper-clad" are sometimes considered as trade names by certain manufacturers, it should be understood that these names in this article do not specify particular makes of wire.

Although there is no wire that approaches steel in low first cost, it must be remembered that it is often the custom to use a steel wire of greater cross-section than would be considered for any of the others. Hence, while the cost per pound may be very low, the cost per foot is higher than if the usual cross-sectional area was used, although not as high as that of the other kinds of wire. It would be the most expensive per foot if of the same conductance as the other types, for a 1,000,000-circ. mil steel wire would be needed to take the place of a No. 0 copper wire. Such a wire is never used, however, the largest steel trolley wire that has ever been drawn, to the knowledge of the writer, being No. 000000, and the usual size is No. 0000. When the price of metals again becomes normal the prices per pound will approximate the following: Bronze, 21 cents, copper, 18 cents, copper-clad, 18 cents and steel, 7 cents.

It might be supposed that the values of the metals as salvage would be a certain proportion of their first cost, but this is not true. The copper and bronze wire decrease but little in value while the other two kinds lose in a much greater ratio. Copper scrap and bronze will be worth about 14½ cents, copper-clad wire only about 4 cents, while ½ cent will be a good price for the steel.

In ease of installation the copper wire is found to lead, but is closely followed by all three of the other types, among which there are slight differences. Bronze wire may take second place in this comparison, but there is little to choose between it and either of the others.

In conductivity the copper wire leads again, its relative conductivity ranging from 97 per cent of that of pure soft copper for hard-drawn wire of unusually good quality down to almost 90 per cent for an extra hard-drawn wire which has been used but very little. Ninety-five per cent is a good average figure and one that can practically always be met. The conductivity of bronze wire ranges from 85 per cent with a comparatively soft wire to 40 per cent, and will average about 45 per cent. Copper-clad wire has a conductivity varying from 50 per cent to 25 per cent, averaging about 40 per cent. That with less than 35 per cent is seldom used for trolley wire. The conductivity of the steel wire is only about 10 per cent.

Desirable Qualities of Trolley Wire

Of the many qualities which enter into the manufacture of a good contact wire, the following are important: strength, ductility, hardness, stiffness, high elastic limit, resistance to arcing, high melting point, toughness, homogeneity and permanence of the original good qualities under wear. Tensile strength is an important item because of the severe treatment that the ordinary trolley wire receives not only from the elements, but also from the blows of "wild" poles. Occasional slow, heavy pulls are to be expected such as follow when a trolley wheel leaves the wire and the pole is pulled down with the wheel engaged in a span. Ordinary No. 00 hard-drawn copper wire will withstand a pull of about 5500 lb. before breaking. All three of the other types have about the same tensile strength which will average for wire of this size about 7800 lb.

The elastic limit of all of these wires is about 75 or 80 per cent of their ultimate strength. However, since the strength of the copper wire is much below that of the other three, it will break before any of the others have been strained enough to produce a permanent set.

Ductility and hardness might be considered as opposite qualities, yet no trolley wire should possess one in excess with the other negligible. The wire needs to be hard to resist the grinding action of the trolley wheels, which is sometimes great on sharp curves, yet it should have sufficient ductility to prevent breaks due to crystallization at ears, circuit breakers, crossings or other hard spots in the line. In order that the wire may not be too brittle, it is well to specify that when broken in the laboratory it will stretch at least 3 per cent in 10 in., with a maximum of 5 or 6 per cent. A soft wire will not only lack the strength of a harder one but will stretch after being installed and thus become too slack, especially in warm weather. This slackness might per-

mit the trolley wheel to ride on its flanges in the trough under a bridge structure due to its pressure upward on the wire.

While resistance to arcing might be considered as a minor virtue, nevertheless, much depends upon this quality, as is shown by the rapid wear and increased tendency to break evidenced in wire from which heavy currents are taken. This is true, for instance, on grades or at points where the cars are started. The troubles from this cause appear to be greatest with the steel wire and least with the bronze.

By high melting point is meant not merely the ability to resist high temperatures but the ability to carry heavy currents such as will flow through a grounded trolley wire without fusing or serious annealing. If the melting temperature was the only thing to be considered steel wire would have an advantage over copper in that their melting points are about 2500 deg. Fahr. and 2000 deg. Fahr. respectively. However, with the same currents flowing through the two wires the temperature of the steel will be much the higher owing to its higher resistance, so that the copper will melt later. It has been asserted that, owing to the higher resistance of the other wires, not so much current will flow through them as through the copper when they are grounded. This is true to a degree, but the current will not vary inversely as the resistance of the trolley wire because the trolley constitutes only about one-half of the circuit.

The tension test for trolley wire, regarding which there has been considerable discussion, has been retained because most engineers believe that it gives a better measure of toughness than any other test. The writer has never made, or seen the results of any tests of this character on steel or copper-clad wire, but the results of several hundred tests on copper and bronze wires show that the latter will stand almost twice as many twists as the former, the figures for 10 in. being approximately forty and twenty respectively.

By homogeneity is meant the sameness of characteristics in all parts of the wire. This quality cannot exist in copper-clad wire, but it will be found in both steel and bronze wires and perhaps in copper wire. It is generally believed, and until a short time ago the writer thought universally accepted, that with a hard-drawn copper wire the greatest strength was to be found in a thin skin of metal on the outside of the wire and that the inside of the wire was but little stronger than soft copper. Tests have been published to confirm this opinion, although it has been said that the rolling action of the trolley wheels tended to harden the metal on the inside as the outside was worn off. A short time ago, however, one of the large wire companies made tests which showed that the action of the drawing had its effect entirely through to the center of the wire. Successive skins were removed, both by cutting and by etching with acid, and the wire on the inside stood up under the same tests as that on the outside; the appearances of both under a microscope being the same.

It is important that the wire shall not only begin its service in good condition, but shall retain its good qualities. In this respect the bronze wire appears to have an advantage over the others. Tests made on copper wire cut from lines that have been in service for a number of years show that the copper has become virtually the same as that in soft drawn wire. Steel wire, too, will show the annealing effect of heavy currents, although to a lesser degree than copper, and in addition, after being up in the air for a time the steel wire will begin to rust. To prevent this it has been proposed to use galvanized wire, but the writer does not know that this has ever been done. One company attempted to resist corrosion by painting the wire. The writer cannot speak with authority as to the effect of heavy currents on copper-clad wire, but it is logical to assume that the effect would be the same as with copper or steel wire since it is composed of both metals. Another change which occurs to the copper-clad wire is a greater increase in resistance due to the wearing away of the copper of high conductivity on the outside, leaving only the steel core. Tests made on bronze wire, after years of use, show that this wire retains practically the same qualities that it had when put up.

Proper Service for Different Materials

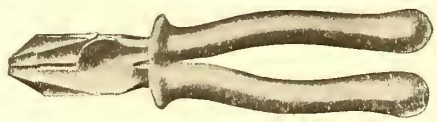
From the foregoing it is seen that no wire possesses all of the good qualities. The engineer must decide in each case which qualities are most important for the line under consideration and purchase the wire that best embodies them, instead of merely following the practice of some other road which may be operating under very different conditions.

With long, comparatively light lines, where there is little or no feeder in multiple with the trolley wire, conductivity will be the important consideration and therefore copper would naturally be used. On the other hand, where the service is very frequent and heavy, necessitating the use of heavy feeders and frequent side feed taps, as for instance in the downtown sections of large cities, strength, toughness and all other qualities which will cut down the number of breaks would point to the adoption of either the bronze, copper-clad, or steel wire. Under trough work, where there are hard spots at every hanger, with the ordinary construction the steel wire will not last as long as the other two, as it cannot withstand the constant hammering. Steel wire is also at a disadvantage where heavy currents are required, as in freight or train service, since it will not resist the arcing as well as the bronze or copper-clad wires, especially the former. Copper wire will withstand the effects of the arcing under such service, but has not the needed physical strength.

With high voltages and the resultant reduction of current and lessened percentage of line drop, the steel wire comes into its own realm, more particularly on lines of light traffic. It will be recalled that the New York, New Haven & Hartford Railroad was the first to use the steel contact wire, but owing to its heavy service, it has more recently adopted bronze wire for the latest construction and for gradual replacement of steel. The fusing, burning and corroding of steel were potent factors in making this improvement despite the much higher cost of bronze.

Pliers Insulated for 10,000 Volts

Pliers of tool steel, insulated for 10,000 volts, are being made by the Rubber Insulated Metals Corporation, Plainfield, N. J. The insulation is a rubber compound that will not only give high-voltage protection, but it has satisfactory wearing qualities as well. It is said that the bond between the rubber and the metal is such



PLIERS WITH RUBBER INSULATED HANDLES

that after some severe tests the insulation showed no tendency to loosen from the handle. Another feature of this tool is that each bears the stamp of approval of the Electrical Testing Laboratories, Inc., of New York City, showing that it has passed satisfactorily a test at 10,000 volts.

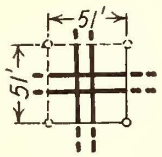
Cost of Erecting Overhead Work—III

(From the records of a large Eastern company)

The following is the third group of a series of diagrams with figures to show actual costs of erecting the various types of overhead construction described under conditions of light, ordinary and congested traffic. The first and second groups in this series appeared in the issues for Jan. 20, page 127, and Jan. 27, page 173. The remaining groups will be published in later issues.

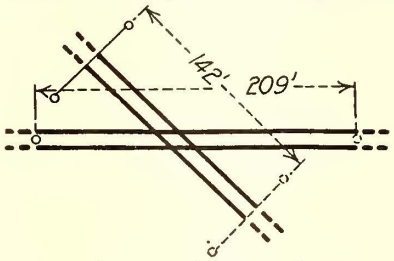
LABOR REQUIRED FOR CONSTRUCTING VARIOUS TYPES OF OVERHEAD TROLLEY SPECIAL WORK UNDER VARIOUS TRAFFIC CONDITIONS

Double track crossing double track, angle 90 deg.



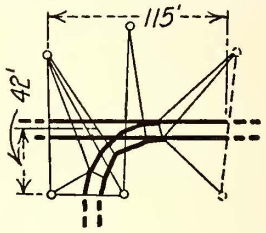
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
18	$15.95	$6.60	$19.14	$7.92	$22.33	$9.24

Double track crossing double track, angle 45 deg.



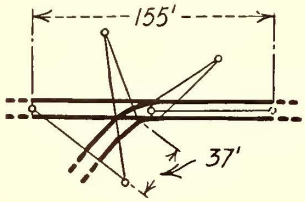
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
19*	$18.15	$13.20	$21.78	$15.84	$25.41	$18.48

Double track, left-hand branchoff, angle 90 deg.



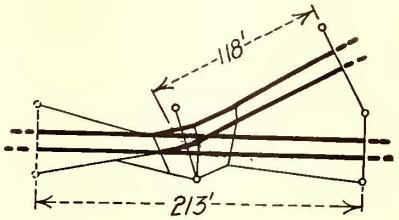
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
20	$23.93	$9.90	$28.71	$11.88	$31.90	$13.20

Double track, left-hand branchoff, angle 45 deg.



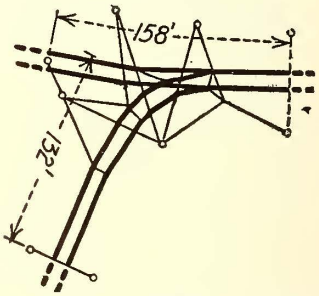
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
21	$23.93	$9.90	$28.71	$11.88	$31.90	$13.20

Double track, left-hand branchoff, angle 30 deg.



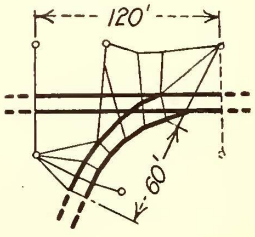
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
22*	$29.04	$21.12	$36.30	$26.40	$45.38	$33.00

Double track, left-hand branchoff from curved main line, angle 60 deg.



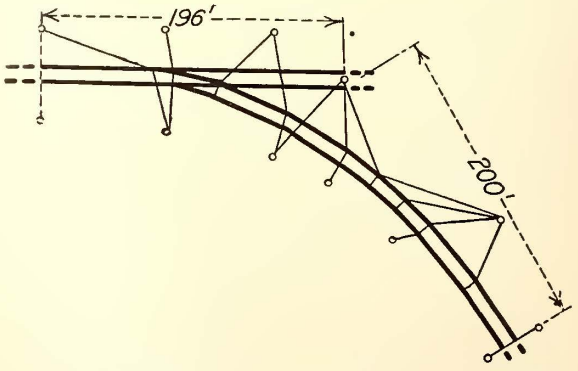
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
23*	$36.30	$26.40	$43.56	$31.68	$50.82	$36.96

Double track, left-band branchoff, angle 60 deg.



No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
24	$25.52	$10.56	$30.31	$12.54	$36.69	$15.18

Double track, right-hand branchoff, angle 60 deg.



No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
25*	$36.30	$26.40	$45.38	$33.00	$54.45	$39.60

*Trucking includes cost of extra reel truck. None of the figures on this page includes cost of superintendence and engineering.

Storage, Handling and Filtering of Insulating Oils

Too little attention probably has been given to the proper handling of insulating oils by those handling oil-insulated electrical apparatus. The engineers of the Westinghouse Electric & Manufacturing Company advise attention to the following considerations:

Insulating oils are generally shipped either in the tank with the apparatus, in soldered tin cans, or in steel drums provided with screw bungs which are sealed before shipment. Oil in unsealed drums should be tested before use. It is advisable to store drums in a closed room, but if they are stored out of doors, protection from the weather should invariably be provided. They should always be placed on their sides in storage, for when they are turned up on end, water can collect in the head around the bung.

All apparatus should be thoroughly dried before filling, and during the actual transferring of the oil every care must be taken to prevent moisture from getting into either the oil or the apparatus. A drum of cold oil when taken into a warm room will "sweat," and the resulting moisture on the outer surface may mix with the oil as the latter flows from the drum. Before breaking the seal, therefore, the drum should first be allowed to reach room temperature. All vessels used for transferring the oil should be absolutely dry and free from metallic or carbonaceous particles.

Immediately before placing the oil in the transformer or switch tanks particles of foreign matter, scale, etc., should be removed. Such may have adhered to the interior of the drum too firmly to be removed by the washing and drying which the drum received at the oil refinery before filling, but may have become loosened by the continual swashing of the oil during transit. This material can be conveniently removed by using a funnel of large size, the top of which is covered with a filter made of two layers of any ordinary, finely woven, cotton cambric that has been thoroughly washed and dried to remove the sizing. If slightly warm, the oil will pass through this filter more rapidly. The funnel may be made to discharge directly into the tank of the electrical apparatus, otherwise the oil must be returned to an empty drum which is known to be thoroughly clean and dry. The thoroughness with which the filtering has been done may be determined by measuring the dielectric strength of the oil with a testing cup and spark gap.

Hints on Blasting Hardwood Stumps

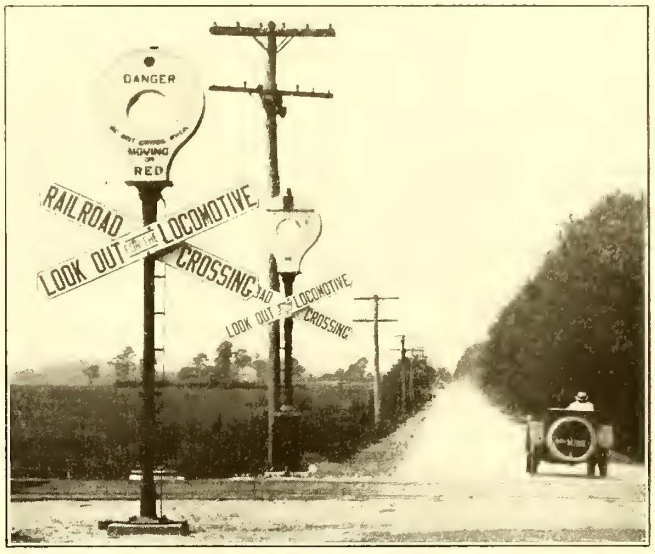
Stumps of maple, beech, birch, hemlock and basswood, commonly known as hardwood stumps and found in the northern part of the country, are removed by blasting with dynamite. Detonation is done with cap and fuse, as the use of a blasting machine is rarely required. The principal reason for using dynamite is that of economy. This requires that the proper amount of charge be placed under the center of the stump, or the point of greatest resistance.

The proper dynamite for hardwood stumps is a medium-slow powder of 40-per cent strength. Dynamite of 20-per cent strength is sufficient for old stumps on clay soil, while for green stumps on lighter soil 60-per cent strength is recommended. A hole for the charge is made with a piece of steel shafting about 6 ft. long with one end drawn to a point. The other end is flattened like a chisel to cut small roots. Such a bar, weighing about 25 lb., can be used to strike the stump to "sound" it, and thus help to determine the proper amount of charge.

Wigwag Signal Used at Highway Crossings

The Hall Switch & Signal Company is putting on the market an oscillating type of highway crossing signal, or flagman. In its method of indication, this signal is somewhat similar to a wigwag signal of another make described in the issue of the ELECTRIC RAILWAY JOURNAL for July 22, 1916, page 151. It is at present installed on several Eastern steam roads, but is equally applicable to electric roads.

The electrically-operated crossing flagman appears as shown in the accompanying illustration. It has a case with two circular openings of unequal sizes, fitted with glass, through which the indications are displayed. Danger is indicated by two red disks operated by a signal instrument inside the case. The disks travel in arcs of a circle and oscillate simultaneously in opposite directions. They are so placed that as they pass the central position they coincide with the openings. The larger disk, as it oscillates past the large opening, indicates danger by day. A lamp is mounted on the back of the case so that the light is seen through the small opening. This gives the warning at night as the smaller disk passes in front of it. More than one small opening with lamps can be provided to give a series of red flashes for the night indication.



WIGWAG SIGNAL FLAGMAN SHOWING CLEAR

Should the apparatus become deranged, the danger indication is automatically displayed as the disks assume positions opposite the openings. The signal light then appears red continuously and during the day the larger disk is visible through the large opening. For a clear indication the disks are held out of sight to leave the white light visible and the large opening clear. The signal is also designed to display indications in both directions, and is used with gong or horn if desired.

According to information compiled recently by the Government Forest Service, 102 treating plants, operating throughout the United States, report a total of 125,639 poles treated in 1915. This is estimated to be about one-half the actual number subjected to treatment, since a large number given a brush treatment are not reported. The principal preservative used was creosote oil, and the average absorption was about 11 lb. per cubic foot. About 85 per cent of the poles treated were yellow pine, while western red cedar and Douglas fir largely made up the remainder.

News of Electric Railways

Traffic and Transportation

Financial and Corporate | Personal Mention | Construction News

Petition Before Commission

Philadelphia Presents Petition to Public Service Commission—P. R. T. Presents Full Text of Its Rapid Transit Offer

Virtually no opposition was offered when the application of the city of Philadelphia for permission to construct the proposed high-speed subway and elevated system was heard by Public Service Commissioner James Alcorn at Harrisburg recently. Although the entire high-speed system, with the exception of the Darby "L," was under consideration, only one modification in the plan mapped out for it by the city authorities was asked for, and that was a comparatively unimportant one. City Solicitor John P. Connelly, who, with Transit Director William S. Twining, represented the city of Philadelphia, agreed that this modification should be made, affecting as it did one of the principal hotels of the city. Now that the formality of holding a hearing of the city's application for a certificate of convenience has been gone through before a member of the Public Service Commission, Director Twining can at once let contracts for the continuance of the construction of the high-speed lines under the present plan, unless the commission should itself decide upon further modifications, which is considered extremely unlikely. The application did not cover the proposed Darby "L" because the plans for it have not been completed, nor did it include the Frankford "L" south from Callowhill Street for the same reason.

The complete text of the Philadelphia Rapid Transit Company's offer to lease and operate the city's high-speed lines has been delivered to Mayor Smith in the form of a lease ordinance. Except as to a few modifications to provide for contingencies, the amplified copy conforms to the original plan presented to the city on Dec. 20, and noted at length in the Electric Railway Journal of Dec. 30, 1916, page 1359.

Bonds to Be Issued

The draft of the ordinance reveals the fact that the company proposes to raise the money for equipping the lines by an issue of first-mortgage gold sinking-fund bonds. It has been estimated that it will require $19,000,000 to equip the lines, and this, it was believed, would be raised with the aid of the Union Traction Company, by assessment on the stock of that corporation, making it full paid. Such a contingency is provided for, but it is specified that the money which shall be raised by such payments on the stock of the Union Traction Company is to be used for additions, betterments, refunding and other proper capital expenditures, under the provisions of the 1907 contract between the city and the Rapid Transit Company.

Bids for the construction of the subway delivery loop were opened on Feb. 6 by Director Twining of the Department of City Transit. One of the bidders was a new company, the Philadelphia Subway Construction Company, in which State Senator Edwin H. Vare is said to be the dominating figure. One of the incorporators is Norman G. Degnon, of the Degnon Contracting Company, New York, N. Y., and another is George D. Grover, an engineer in Mr. Vare's employ. The low bidder, apparently was the Keystone State Construction Company, which is controlled by State Senator James B. McNichol, the political rival of Mr. Vare. On contracts No. 201, 202 and 203 the bids of the Keystone company were $1,575,000, $2,496,000 and $1,713,000, a total of $5,784,000. This company is already engaged on contract No. 1, which covers the City Hall section of the Broad Street subway.

The Public Service Commission will hold a hearing on the Philadelphia subway and elevated applications in Philadelphia on Feb. 15.

Hearing on the Frontier Railway

Case Adjourned Pending Decision as to Merits of Application to Have Certificate of Convenience Revoked

The plans of the Pennsylvania Railroad and the Delaware, Lackawanna & Western Railroad to use the Frontier Electric Railway between Buffalo and Niagara Falls as an extension of their freight trunk lines were revealed before the Public Service Commission for the Second District of New York at Albany, on Feb. 7. H. A. Taylor, attorney for the Erie Railroad, filed an application for the revocation of the certificate of convenience and necessity granted to the Frontier Electric Railway by the commission. The case developed into a struggle between the Pennsylvania Railroad and the Delaware, Lackawanna & Western Railroad on the one hand and the Erie on the other for the business of the rich, industrial territory at Niagara Falls and possibly future connections with the proposed new transcontinental line of the Canadian Northern Railway. Chairman Van Santvoord of the commission said:

"I had no idea from the testimony presented that this was to be a fast freight line when I voted to give it permission to cross certain highways. All the testimony was to the effect that it was to be a suburban and electric passenger line."

He then asked the representatives of the Pennsylvania and the Lackawanna railroads as to whether the proposed line was to be used for freight. In reply, J. G. Rodgers, superintendent for the Pennsylvania Railroad, said:

Local Freight Line Proposed

"It is certainly to be a local freight line with the possibility of later making it part of a through freight line to Canada."

Thereupon the chairman of the commission said:

"We have never entered into any inquiry as to the necessity of another freight line. In fact, this commission recently found that there was no public necessity for a similar freight-carrying project."

L. L. Babcock, attorney for the Delaware, Lackawanna & Western; Morris Cohn, for the Frontier Electric Railway, and E. G. Connette, president of the International Railway, Buffalo, argued at length to the effect that the Frontier Electric Railway, incorporated under the railroad law, has always been both a freight and passenger road, and so always made its applications.

Mr. Van Santvoord said:

"Irrespective of this controversy over business between the railroads I do not believe that we should permit these railroads to extend a new freight trunk line to the Canadian border without full notice to the people of that territory."

The commission indicated that the present application of the Pennsylvania Railroad and the Delaware, Lackawanna & Western Railroad to buy into the Frontier Electric Railway would not be disposed of until the commission had been satisfied of the necessity for the trunk freight line. The hearing was adjourned pending a decision by the commission as to the merits of the Erie Railroad's application to have the certificate of convenience revoked.

The hearing on Feb. 7 was a continuation of the one commenced on Jan. 15 before the commission on the application of the steam railroads mentioned previously for permission to purchase the capital stock and the right-of-way of the Frontier Electric Railway between Buffalo and Niagara Falls, parallel and contiguous to the high-speed line which the International Railway now has under construction. The previous hearing was reported in the Electric Railway Journal for Jan. 20, page 135.

Progress in Chicago Plans

Bills for Enabling Legislation to Make Financing Possible Approved by Committee

Means for obtaining enabling legislation to carry out the plans of the Chicago Traction & Subway Commission rapidly took definite form at the meeting of the local transportation committee of the City Council on Feb. 5. The committee approved with a few changes the draft of the McCormick bill for "home rule" for Chicago utilities, outlined briefly in the ELECTRIC RAILWAY JOURNAL for Jan. 27. The committee also approved a bill for the consolidation of the elevated and surface lines. A provision is written into the proposed consolidation bill which will prevent the owners of a few shares of stock from holding up the consolidation plans, reservation being made that the minority stockholders who might object to consolidation shall have the right to go into court and obtain cash for such real value of the securities as the court might fix.

Walter Fisher, special counsel for the committee, recommended the granting of a thirty-year franchise to the new consolidated companies, with provision written into the ordinance for a twenty-year extension of the franchise, provided the city did not take over the property at or before the expiration of the thirty-year period. The city will have the right to take over the property by paying the unamortized investment after such part of the franchise period has elapsed that the investment will be a certain percentage retired. This percentage is under consideration but will probably be fixed at 50 per cent, which would mean at the end of thirty years, provided all expenditures were placed in revenue-producing properties. The securities issued, by this plan, will not necessarily expire in 1947, as the ordinance will provide that the city assume the unpaid balance whenever it takes the property over. This will make financing easier. Mr. Busby is still holding out for the indeterminate franchise and this is also favored by Mr. Fisher, but the latter believes it impossible to secure the necessary constitutional amendment in less than five years.

These various items have been taken to Springfield to be introduced before the General Assembly, with the understanding that they may be revised by the City Council when it acts upon them, but they are placed before the Assembly at once in the hope that they may be passed and be ready for referendum vote in April or June.

I. T. S. Makes St. Louis Freight Connection

After the city of St. Louis had refused permission to the Illinois Traction Company to make a freight connection at Hall Street with the tracks of the Terminal Railroad Association the company made the connection at night over private property, with the consent of the Missouri Public Service Commission.

The company now is in direct connection with every steam railroad and industrial plant switch in St. Louis for coal deliveries. It has had on file for years a coal tariff of 10 cents a ton from the Tri-cities in Illinois to any point on its lines in St. Louis, although it has been unable before to reach any steam railroad and only hauled coal to the end of its bridge, where it was dumped into bunkers for dealers to cart away. The company operates over the streets of Venice, Ill., which is opposite St. Louis, on the surface. It is stated unofficially now that the company plans to construct an extended bridge approach crossing Venice, Ill., to facilitate the expected heavy coal traffic.

Ira L. Burlingame, general traffic manager of the Terminal Association, has admitted that the connection between the Illinois Traction System and tracks of the Terminal Railroad Association had been built without the knowledge or consent of the Terminal Association officials. He said no coal cars had yet been tendered to the terminal and until such tender was made, he could not say what the policy of the Terminal Association would be.

The freight connection was made without crossing a city street, as formerly had been planned. A sharp turn was made on the Illinois Traction Company's own property, and its tracks tied to the Terminal without touching city ground.

Another Atlanta Dynamiting

Shortly after midnight on Feb. 5, after more than two months and a half of surcease from this type of violence, a car of the Georgia Railway & Power Company, Atlanta, Ga., was dynamited by strike sympathizers. The dynamite was laid on the company's rails in front of the English Avenue public school. A number of windows were broken in the car, the floor was damaged, and one of the wheels was cracked. Two city policemen were riding on the car, not as guards but as casual passengers. No injuries were sustained by them or the members of the car crew.

The last preceding instance of dynamiting in connection with the so-called strike against the Georgia Railway & Power Company, in the name of the Amalgamated Association, occurred on the night of Nov. 15, 1916, after a season of dynamiting that had begun on Oct. 5 and in the course of which thirty-one cars of the company were subjected to this form of violence.

The English Avenue School was the scene of an ambuscade in that same season, a number of men hiding behind the bushes in the school yard and "shooting up" a passing car late one night, wounding a member of the car crew.

On the day preceding the dynamiting of Feb. 5, Edward McMorrow, organizer of the Amalgamated Association, returned to Atlanta after an absence of several weeks.

The transportation department of the Georgia Railway & Power Company has been fully manned since immediately after the first disloyal trainmen abandoned their cars at the beginning of the evening rush hour on Sept. 30, and joined the Amalgamated Association.

An extended account of Atlanta's reign of terror in connection with the strike agitation was published in the ELECTRIC RAILWAY JOURNAL of Dec. 16, 1916, page 1262.

Electrification Work at Salt Lake

Plans Announced in May, 1916, Delayed on Account of Rearranging Plan of Financing, but Work Will Continue

The Salt Lake, Garfield & Western Railway, which owns and operates a steam railroad running between Salt Lake City and Saltair, and operating under the jurisdiction of the Interstate Commerce Commission, has work under progress for the extension of its lines from Saltair to Garfield, the whole line to be electrified. This comprises 17 miles of present railway and with the extension will include 20 miles of main linetrack.

Announcements of this extension and electrification work were made in the ELECTRIC RAILWAY JOURNAL for May 13, 1916. Owing to rearrangements in the plan of financing, construction work was delayed but has recently been resumed. All rails, poles, and ties are on the ground. The copper trolley and equipment, however, are yet to be purchased. The type of equipment and nature of electrification has not as yet been determined, but it is understood that H. A. Strauss, consulting engineer, Harris Trust Building, Chicago, who has this matter in hand, is in Salt Lake City at present to study the requirements. The work is being financed by C. F. Childs & Company, Chicago and New York, by means of a $300,000 first mortgage bond issue.

This railway affords the only transportation to the lake and to Saltair, which is visited by several hundred thousand people annually. The extension to Garfield will furnish a high-speed frequent service for the residents of that city to Salt Lake City. The concentrating plants of the Utah Copper Company and the smelters of the American Smelting & Refining Company are located at Garfield and the famous "copper mountain" of the Utah Copper Company, is located directly behind the city in Bingham Canyon. Since the mountain is connected with Garfield by the private railroad of the copper company, it is anticipated that considerable passenger traffic may be expected from this territory over the electrified line into Salt Lake City. It is also anticipated that with the improved service, the Salt Lake, Garfield & Western Railway may secure the transportation of some of the output of the copper smelters. The company now hauls considerable freight, this business including at present the transportation of 6000 tons of salt a month.

$7,000,000 Canadian Project

Failure of property owners along the route of the proposed Toronto-Niagara Falls hydroelectric line to approve bond issues for its construction has prompted the Canadian Northern Railway to decide to start immediately on the construction of a double-track line between Toronto and the Canadian-Niagara frontier at Niagara Falls, Ont., a distance of about 84 miles. Included in the company's plans is provision for the construction of a bridge across the Niagara gorge near the Bridge Street terminal of the International Railway, at Niagara Falls, Ont. The Canadian Northern Railway will have direct connections with the Erie, the Lackawanna, the Pennsylvania and the Lehigh Valley Railroads. Construction work, which will probably start in April, will involve the expenditure of more than $7,000,000. The route passes through Hamilton and St. Catharines, Ont., and the heaviest grades will be less than one-half of 1 per cent. Bridges will be built at Oakville, Bronté, across the Désjardines canal and River Jordan. The Ontario-Lewiston Connecting Bridge has been incorporated to handle the details of the Niagara gorge structure. Sir William MacKenzie of the Canadian Northern Railway is discussing the possibility of operating electric locomotives over the route, especially in view of the new power canal project of the Ontario Hydroelectric Commission.

Another Hudson Tunnel Reported

It has been reported recently that the Public Service Corporation of New Jersey was planning to extend its electric railway service from New Jersey under the Hudson River to New York City. A statement made by the company in regard to the matter follows:

"The Public Service Corporation has only this to say upon the subject at this time: Its officers have for a long time had in mind a tunnel project. Within the year it has begun such investigations as are necessary. The investigations have not been completed. Until they are completed the subject cannot be discussed by the Public Service Corporation. When the investigations are finished, the company will be glad to make public its findings and its conclusions."

Partnership Suggested in Frisco

Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., was quoted by the San Francisco *Journal of Commerce* on Jan. 31 in part as follows:

"The time is not ripe for naming a figure which shall become a basis of sale to the city. If this were a matter between two corporations negotiations might be quickly brought to a head. But the entire public has to be taken into consideration in this case. Education, explanation and discussion of the merits of the various propositions are a necessary precedent to action.

"A physical valuation of the properties is now being made by the Railroad Commission. That will be used if the sale proposition is considered. I do not doubt that any set of fair-minded and competent men can agree upon a right valuation. I contend that the operation of a successful municipal system of street railways makes a monopoly necessary. I cannot expect the city to sell to us. Therefore I offer to sell to the city.

"The proposed four-line system down Market Street is unreasonable. The ideal street railway system would be one built by private capital, operated by a private company, the city to have a voice in the management, extensions to be made under the guidance of or at the instance of the city government, the municipality to have a definite fixed share of the earnings of the roads, and a valuation to be placed in advance upon the entire property with the proviso that the city might at any time buy the system at the price fixed. In such a case the franchise would be indeterminate. Price would be set on each new extension before construction. The public would be amply protected. Under such an arrangement San Francisco would be well served with transportation facilities and there would be no duplication. I cannot get money for extensions under the present system."

Operating Allowance Increase Asked

Cleveland Railway Makes Plea for Increase Under Tayler Grant

At the regular meeting of the Council of Cleveland, Ohio, on Feb. 5, a letter was read which had been addressed to Fielder Sanders, street railway commissioner, by J. J. Stanley, president of the Cleveland Railway, in which Mr. Stanley asked that the operating expense allowance be increased from 13½ cents per car mile to 15 cents. The letter also asked authority to charge off deficits in the operating allowance and maintenance reserve account from the interest fund.

Mr. Stanley stated that the operating deficit on Jan. 1, 1917, was $195,075, and that the deficit in the maintenance reserve account was $268,918. These deficits are due to abnormal expenditures, payments for injuries and damages, increased wages and the high price of supplies. Practically the same causes contributed toward the higher operating allowance requested.

Expressions from Chairman Reynolds of the street railway committee and Councilmen Myers and Stolte indicate that they will oppose any movement to increase the operating allowance, but they did not give any plan by which the increasing expenses can be met by the company without this step. Mayor Harry L. Davis refused to comment upon the matter until he could confer with Mr. Sanders, who is ill.

An increase in the operating allowance would no doubt mean an advance in the rate of fare, especially if present deficits are deducted from the interest fund. Under the provisions of the Tayler franchise an increase in fare would follow the reduction of the interest fund to less than $300,000.

A resolution has been adopted by the Council authorizing the Cleveland Railway to expend $300,000 for a new substation.

$1,500,000 to Be Spent in Tacoma

Louis H. Bean, general manager of the Tacoma Railway & Power Company, Tacoma, Wash., is authority for the statement that approximately $1,500,000 will be spent during 1917 in Tacoma by that company and the Puget Sound Electric Railway, both of which are controlled by the Puget Sound Traction, Light & Power Company. A considerable amount of the funds appropriated will go into new equipment and for bettering the service. The company plans to spend $70,000 for new cars, and will install heaters in twenty-one cars not having them at present.

Passaic Gas Case Closed

The Public Service Gas Company, controlled by the Public Service Corporation of New Jersey, has decided to make no further effort to restore the rate of $1 per thousand cubic feet for gas and, after a formal motion before the United States Supreme Court, the appeal which had been made to that court was dismissed. An agreement to this effect was reached by counsel representing the gas company, the New Jersey Board of Public Utility Commissioners and the cities of Passaic and Paterson, all of which were parties to the litigation. In explanation of this action President Thomas N. McCarter of the company stated substantially as follows:

When the order of the Board of Public Utility Commissioners, effective Feb. 1, 1913, was made, fixing the price of gas at 90 cents per thousand cubic feet, the ruling was very burdensome; in fact, it was considered confiscatory of the company's property. The litigation in regard to the order, due to no fault of the company, has been very protracted, four years having elapsed since the order was made. Latterly due to the growth of the business and certain other features connected therewith the burdensome features of the rate have been lessened. The company decided that even if it won the case it would not go back to the dollar rate. Under these conditions it was not proper to present the case to the court as the only effect of a favorable decision would be to obtain an opinion of the court and not a judgment to be put into force.

Cleveland Paving Case Decided.—Common Pleas Court rendered a decision on Jan. 22 to the effect that the Cleveland Railway must pave the space occupied by its tracks on Euclid Avenue through East Cleveland and that the work must be begun by June 1. The city and county laid their portions of the pavement last fall, but the remainder is in the condition left at that time. The company claims that East Cleveland enjoys the same rate of fare as is paid in Cleveland and that it should not expect it to build pavement, when the Cleveland franchise does not demand it. However, the East Cleveland franchise does contain this stipulation.

Publication of Toledo Plan Postponed.—On request of Henry L. Doherty, of Henry L. Doherty & Company, who operate the Toledo Railways & Light Company, the Street Railway Commission of Toledo, Ohio, has decided to delay publishing the proposal prepared as a solution of the franchise question until Mr. Doherty has filed suggested changes in certain portions. He wired the commission that the company could not accept some portions of the plan as they stand, and would prefer that no publication be made until he could suggest changes. These he will submit in the shape of redrafts. Mr. Doherty has been unable, because of illness, to be in Toledo for some time.

Commission Seeks to Compel Compliance With Its Order.—Assistant District Attorney Unger, acting on a complaint filed by the Public Service Commission, has started a proceeding before Justice Freschi of Special Sessions, sitting as a Magistrate, to punish the officials of the Third Avenue Railway, the Belt Line Corporation, and the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, New York, N. Y., for failure to comply with an order issued by the commission last April. The three companies were represented by Joseph H. Choate, Jr., who said his clients had endeavored to comply with the requirements of the order, but were prevented by the torn-up conditions of one of the streets. The court ordered both sides to submit briefs.

Abandonment of Gettysburg Line Proposed.—What is believed to be the first step in the abandonment of the electric railway on the Gettysburg Battlefield at Gettysburg, Pa., has been taken in the introduction of a bill in Congress authorizing the purchase of the right-of-way in the National Military Park and carrying an appropriation of $30,000 for the purpose. It is understood that the bill has the approval of the National Park Commission, which never has regarded the presence of the electric railway on the field with special favor. The cars have been run in a more or less desultory fashion for twenty-three years. For the last two years only one car has been used to cover the route. Except in years of National Guard encampments or big reunions, the line has never been operated at a profit.

Abandonment of State Railway Urged.—The State of North Dakota will abandon the street railway business, will surrender the charter under which it operates in Bismarck and will dispose of the present so-called Capital Car Line for the purpose of repaying to the Capitol building fund, moneys expended in the construction of the line, if the Legislature acts in accordance with an opinion filed by Attorney-General William Langer with the State Budget Commission. The opinion, prepared by Assistant Attorney General Dan V. Brennan, holds that the State of North Dakota is engaged in the street railroad business in contravention of the provision of the constitution. The Capital Car Line is 1.5 miles long. It was built to afford a permanent means of conveyance between the Capitol grounds and the railroad station. One car is operated.

Market Street Line, San Francisco, Authorized.—After the Board of Supervisors of San Francisco, Cal., had passed for print on Jan. 28 a resolution which authorized the immediate construction on Market Street of the Twin Peaks tunnel line by the city James E. Powers offered a resolution providing for the purchase of all the holdings of the United Railroads of San Francisco by the city as the "best solution of transportation problems." The resolution was not discussed. At the meeting of the supervisors at which this resolution was presented a letter was read from Jesse W. Lilienthal, president of the United Railroads, in which he asked the supervisors to delay action on the additional line until the city engineer and the general manager of the United Railroads had an opportunity "to confer with a view to devising some plan that will provide for a fair solution of pending transportation problems."

Pacific Electric Club Opens Headquarters.—The Pacific Electric Club, composed of employees of the Pacific Electric Railway, Los Angeles, Cal., opened new quarters in Los Angeles last month, with a three-day celebration. The new club headquarters are at 431 South Hill Street, adjoining the Hill Street station, and occupy two entire floors of the building. The company provided $25,000 with which to fit up the quarters, which include all conveniences of modern club rooms. Arrangements have been made so that wives of employees may use the club rooms, and facilitate shopping excursions by having parcels delivered to the club. There are pool and billiard rooms, a library, a kitchen, lounging rooms and large halls specially arranged for dancing. F. L. Annable, general superintendent of the railway, is president of the club, and Ed. Thomas, manager of the traffic department of the company, is the secretary.

Mr. Dempsey Convicted of Violating Commission Order.—John J. Dempsey, superintendent of elevated transportation of the Brooklyn (N. Y.) Rapid Transit Company, was found guilty, on Feb. 6, by a jury before Judge Roy in the Kings County Court on charges of violating an order of the Public Service Commission issued in 1912. Mr. Dempsey's is the first conviction under the law which makes a violation of a Public Service Commission order a misdemeanor. The maximum penalty is a year in prison or a fine of $500 or both. Mr. Dempsey's indictment followed the failure of elevated express trains of the Brooklyn Rapid Transit Company to make the Third Street station stop on the Fifth Avenue line. The Public Service Commission, after a hearing, ordered the stop made, but the company argued it was unable to do so because of another Public Service Commission order which limited the running time of trains to Manhattan. Mr. Dempsey will be sentenced on Feb. 12. His $1,000 bail was continued.

Partnership Agreement Suggested in Kenosha.—S. B. Way, vice-president of the Wisconsin Gas & Electric Company, which operates the street railway lines in Kenosha, Wis., has proposed to Mayor Pfennig that the city share equally in the profits of the company above 6 per cent. The company in return asks the co-operation of the city in making the company a paying concern. Mr. Way declared that the line had been operated at a loss for the last three years. According to the plan as outlined by Mr. Way, the company will be permitted to pay overhead and operating expenses and an annual dividend of 6 per cent to its stockholders. All profits above this amount, minus 20 per cent to be given as bonuses for employees of the company actually operating the lines, will be divided equally between the city and the company. The only demand made upon the city is that it co-operate with the company to secure the most profitable possible operation of the lines. The company has placed the physical valuation of the lines, the basis for profit, at $375,000. This is less than the company paid for the property when it was purchased four years ago.

Cincinnati Loop Arrangement Protested.—W. L. Woodward, chairman of the transportation committee of the Federated Improvement Associations, of Cincinnati, Ohio, recently sent a letter to the Rapid Transit Commission, calling attention to the failure of the commission to include in the proposed lease to the Cincinnati Traction Company any agreement for a 5-cent fare on all interurban cars within the city limits, a restricted transfer system on the Millcreek Valley route and omission of a fixed charge for interest and sinking fund charges on the rapid transit bonds. Mr. Woodward claims that, as it stands, the lease makes the Cincinnati Traction Company a preferred creditor against the city and insures it against loss. He also objected to a fixed annual franchise tax of $325,000 for the company, in place of the present 6 per cent basis, on the ground that all the money is used for repair of streets over which the company's tracks run and that the amount should increase in the same proportion as the company's gross receipts. In reply to an inquiry, Mr. Woodward said his letter was not approved by the transportation committee, but that it embodied the sentiments of members expressed at a recent meeting. It was referred without comment to the conference committee of the City Council.

Financial and Corporate

New York Franchise Taxes Raised

State Board Reports Increases of $34,362,900 in New York City

The State Tax Commission of New York made public on Jan. 29 the special franchise valuations for 1917 for New York City. In a note of explanation the commission says:

"In the systems embracing operated and affiliated companies taken as a whole, with the exception of the Third Avenue Railway, there have been substantial increases, although some of the individual companies within the systems have been reduced."

The total of special franchise tax valuations for New York City, the State Commission says, is $494,231,250. This is an increase of $34,362,900 over the preceding year. Detailed valuations of the principal electric railway properties follow:

	1917	Increase
Brooklyn Rapid Transit system	$46,396,000	$3,352,100
New York Railways system	28,000,000	*1,439,000
Third Avenue Railway system, total	20,096,000	*5,344,000
Manhattan Railway—		
Bronx Borough	6,450,000	*2,808,000
Manhattan Borough	63,400,000	3,323,000
Richmond Light & Railroad Co.	1,600,000	600,000
Hudson & Manhattan Railroad	8,234,000	.....
Pennsylvania Tunnel & Terminal Co.	17,478,800	412,200

*Indicates decreases.

1916 Financing in Great Britain

Government Borrowings Overshadow All Else—No New Tramway and Omnibus Capital Raised

In its annual summary of British new financing, the London *Economist* shows that the control exercised by the treasury committee over new issues had even a stronger effect in 1916 than in the year preceding, for apart from British Government borrowing and subscriptions in London to the second French loan, only about £16,000,000 out of £585,436,400 was raised. Of this about £6,500,000 was raised by the colonial governments, so that the utility, industrial and other companies secured less than £10,000,000 during the year.

The following analysis shows the various purposes to which the new capital created was devoted:

Description	1916	1915
British Government	£554,071,100	£614,250,700
Colonial Government	6,500,000	17,385,000
Foreign Governments	15,000,000	38,450,000
British municipalities	495,000	.....
Colonial corporations	.....	350,000
Foreign corporations	.....	.....
British railways	1,679,000	3,294,000
Indian and colonial rails	.....	3,965,000
American railways	.....	.....
Foreign railways	384,000	2,940,000
Mining companies:		
Australian	7,500	.....
South African	.....	.....
Other mines	15,000	21,500
Exploration and financial	.....	45,000
Breweries and distilleries	.....	.....
Merchants, etc.	102,500	.....
Manufacturing	1,449,300	1,807,500
Stores and trading	.....	.....
Estate and land	.....	25,000
Rubber	15,600	152,700
Oil	1,573,500	22,100
Iron, coal, steel, etc.	1,275,000	162,900
Electric lighting, power, telegraph, etc.	102,400	546,900
Tramways and omnibus	.....	432,500
Motors	381,300	130,000
Gas and water	16,400	20,000
Hotels and theaters, etc.	7,000	78,700
Patents	27,000	.....
Docks and shipping	800,000	580,000
Banks and insurance	275,000	266,200
Miscellaneous	1,259,800	316,000
	£585,436,400	£685,241,700

From the foregoing figures it appears that new capital issues for tramways and omnibus lines decreased from £432,500 in 1915 to nil in 1916, while the new issues for electric lighting, power, telegraph, etc., companies dropped from £546,900 to £102,400. Big increases, however, were apparent for oil companies, iron, coal and steel companies, and miscellaneous organizations.

Annual Report

Lehigh Valley Transit Company

The comparative income statement of the Lehigh Valley Transit Company, Allentown, Pa., for the years ended Nov. 30, 1915 and 1916, follows:

	1916 Amount	1916 Per Cent	1915 Amount	1915 Per Cent
Passenger revenue	$1,852,506	74.9	$1,550,125	75.4
Other transportation revenue	115,002	4.7	99,297	4.8
Revenue from other railway operations	504,363	20.4	407,453	19.8
Total operating revenue	$2,471,871	100.0	$2,056,875	100.0
Operating expenses	1,433,665	58.0	1,130,835	55.0
	$1,038,206	42.0	$926,040	45.0
Taxes	84,445	3.4	73,552	3.6
Operating income	$953,761	38.6	$852,488	41.4
Non-operating income	145,209	5.8	136,146	6.6
Gross income	$1,098,970	44.4	$988,634	48.0
Deductions from gross income	630,493	25.5	665,246	32.3
Net income	$468,477	18.9	$323,388	15.7

In view of the unprecedented economic conditions, which greatly increased all labor and material costs entering into maintenance and operation, the foregoing showing for the last year was considered most satisfactory. Revenue from transportation increased $318,086 or 19.2 per cent, power sales advanced $96,473 or 24.2 per cent, and total operating revenue increased $414,996 or 20.1 per cent. Operating expenses, however, rose $302,830 or 26.8 per cent, and taxes $10,893 or 14.8 per cent. Yet the final result was an increase of $145,089 or 44.8 per cent in net income.

Dividends of $248,983, equivalent to 5 per cent on the preferred stock outstanding, were disbursed. The last fiscal year was the first time that the company paid the full 5 per cent dividend on its preferred stock. At the same time it was able to add to its surplus account, which now stands at $560,200, an increase of 62.7 per cent.

Beginning with the fiscal year 1911 there has been credited each year to maintenance, renewals and depreciation an amount equal to 22 per cent of the gross earnings of the railway lines. All items of maintenance and renewals are charged to this account, the balance being set up to accrued depreciation reserve. This showed a credit of $293,241 as of Nov. 30, 1916.

The operation of jitneys in the company's territory declined remarkably during the year, it is said, and could not be considered as a competitive factor. A fast and reliable freight service is operated by the company connecting with the Philadelphia Rapid Transit Company at Chestnut Hill, Philadelphia. The surplus from the freight business in the last year increased $2,905 or 18.9 per cent. The operation of the Adams Express Company over the company's lines resulted in an increase of $1,288 in the surplus from its business or 13.9 per cent.

Returns for Montana Lines

The latest report of the Montana Board of Railroad Commissioners, which is *ex-officio* the Public Service Commission of the State, contains tables showing the investment in plant and equipment, operating revenues and operating expenses of Montana street railways for the year ended June 30, 1916. These tables are partly reproduced herewith. It should be noticed that for combined lighting and railway properties only transportation data are included.

STATISTICS FOR MONTANA ELECTRIC RAILWAYS FOR YEAR ENDED JUNE 30, 1916

	Plant and Equipment	Operating Revenue	Operating Expenses†	Per Cent Net to Investment
Anaconda C. M. Co.	$313,727	$132,334	$98,369	10.82
Billings Traction Co.	120,955	23,761	28,917	0.00
Butte Electric St. Ry.	2,514,664	550,037	502,639	1.88
Montana Power Co.	*.....	137,474	76,853	*...
Helena L. & Ry Co.	*.....	85,874	82,984	*...
Missoula St. Ry.	666,990	73,002	74,177	0.00

*Railway figures not separately reported.
†Includes taxes and depreciation.

Terms of Texas Merger

Capitalization of Texas Electric Railway, a Consolidation of the Texas Traction Company and the Southern Traction Company, Totals $19,660,000

With practically all stock represented, either in person or by proxy, stockholders of the Texas Traction Company and the Southern Traction Company, at a meeting in Dallas, Tex., on Jan. 30, voted unanimously to approve the terms of consolidation of the two companies into the Texas Electric Railway. As noted in the ELECTRIC RAILWAY JOURNAL of Feb. 3, page 225, of the 30,000 shares of stock of the Texas Traction Company outstanding, 26,820 shares were represented at the meeting, and of the 70,000 shares of Southern Traction Company stock outstanding, 67,298 shares were represented.

J. F. Strickland, president of the two companies, was elected president of the newly formed company. Other officers of the Texas Electric Railway were elected as follows: Vice-presidents, Osce Goodwin, Dallas; R. B. Stichter, Dallas; C. W. Hobson, Dallas; J. L. Penn, Waxahachie; F. N. Drane, Corsicana; W. J. Neale, Waco; W. R. Brents, Sherman; J. S. Heard, Dallas; H. I. Gahagan, Dallas; and Burr Martin, Dallas; secretary and assistant treasurer, James P. Griffin, Dallas; assistant secretaries, J. C. Thompson, Corsicana; C. L. Cox, Dallas, and W. H. Painter, Dallas; treasurer, H. I. Gahagan, Dallas; general manager, Burr Martin, Dallas.

The directors of the company are J. F. Strickland, Osce Goodwin, George W. Bowman, W. R. Brents, J. L. Lovejoy, S. D. Moore, W. B. Munson, R. B. Stichter, R. L. Waddell, A. A. Jackson, C. B. Dorchester, W. W. Batcheler, F. N. Drane, W. D. Lacy, W. J. Neale, W. W. Seley, J. L. Penn, J. H. Miller, A. L. Smith, George W. Coleman and M. B. Templeton. The members of the executive committee are J. F. Strickland, Osce Goodwin, T. J. Cole, R. E. L. Saner, John N. Simpson, J. S. Heard and C. W. Hobson.

The total of authorized capitalization of the Texas Electric Railway is $19,660,000, as follows: first preferred stock, $1,500,000; second preferred stock, $3,000,000; common stock, $6,000,000; twenty-five-year 6 per cent convertible debentures, $2,160,000; first and refunding 5 per cent bonds, $4,804,000; divisional underlying bonds, $2,196,000.

TERMS OF MERGER

The terms of the merger approved by the stockholders include the following:

1. Of the $1,500,000 of first preferred stock of the Texas Electric Railway $700,000 will be used to purchase, acquire or discharge obligations of the Texas Traction Company and the Southern Traction Company, and the remaining $800,000 will be held in the treasury to provide for future betterments, improvements and extensions.

2. Of the $3,000,000 of second preferred stock of the company $1,200,000 will be delivered to the Texas Traction Company and $1,800,000 to the Southern Traction Company, for distribution among their preferred stockholders at the following ratios: $120 par value of second preferred stock of the Texas Electric Railway for each $100 par value of the preferred stock of the Texas Traction Company, and $107.20 par value of second preferred stock of the Texas Electric Railway for each $100 par value of preferred stock of the Southern Traction Company.

3. Of the $6,000,000 of common stock of the company $2,000,000 will be delivered to the Texas Traction Company and $4,000,000 to the Southern Traction Company for distribution among their stockholders in the following ratios: $100 par value of common stock of the Texas Electric Railway for each $100 par value of common stock of Texas Traction Company, and $80 par value of common stock of Texas Electric Railway for each $100 par value of common stock of the Southern Traction Company.

The Texas Electric Railway also authorized an issue of first and refunding mortgage 5 per cent gold bonds to the amount of $4,804,000, and twenty-five-year 6 per cent convertible debentures to the amount of $2,160,000, subject to present outstanding divisional and underlying bonds to the amount of $2,196,000. The proceeds of the first and refunding bonds and the debentures will be used in refunding or discharging present outstanding bonds of the Southern Traction Company and also in refunding or discharging present outstanding gold notes of the Texas Traction Company to the amount of $700,000.

EXTENT OF SYSTEM

The Texas Electric Railway extends north from Dallas through McKinney and Sherman to Denison; from Dallas southeast to Corsicana and from Dallas south through Waxahachie to Waco. The company also does the entire street railway business in Waco, Denison, Sherman, Corsicana, Waxahachie and McKinney. The company operates a total of 259 miles of main track, of which it owns 249 miles. The total mileage, including second track, yard track, etc., owned by the company is more than 267 miles. Power is purchased from the Texas Power & Light Company under long-time contracts.

Merger Proposed in Reading

Reading Transit & Light Company and Metropolitan Electric Company Propose to Take Over Leased Properties

Announcement was made in Reading on Feb. 5 by officials of the Reading Transit & Light Company that an application will be made to the Public Service Commission of Pennsylvania on Feb. 20 for approval of the proposed purchase of the controlling interest in the United Traction Company. The Metropolitan Electric Company has made similar application for the approval of the purchase of the Edison Electric Illuminating Company and the Lebanon Valley Electric Light Company, both of Lebanon, Pa. The Reading Transit & Light Company on Feb. 5 authorized the following statement:

"This is the first step in a plan which will establish the financial strength of our companies on such a basis as to make possible the development and extension of the railway and electric service in Reading and vicinity in a manner and on a scale in keeping with the progressiveness of this district.

"The properties we operate are leased by us for long terms. The acquisition of these properties would avoid the payment of rentals. The leases of the various properties contain options giving us the right to buy, but these leases do not expire for many years. At the present time we have no idea when and how these options might be exercised, and the steps taken at this time are only preliminary to the possible development of a plan along these lines. The exercising of the options would, of course, depend upon whether the Public Service Commission feels, as we do, that it would be to the best interests of the people of Reading and vicinity in general to have us do so.

OUTLINE OF PLAN

"The plan is to have the Metropolitan Electric Company acquire a controlling interest in the Edison Electric Illuminating Company, the Pennsylvania Utilities Company and the Lebanon Valley Electric Light Company. This does not mean a change in the ownership of these companies. At the present time they are controlled by the same financial interests as the Metropolitan Electric Company, and the transferring of the control of these companies to the Metropolitan would result in economies in the operation and management of all of the properties, as the Reading organization, with very little expense, can be expanded to take care of these properties. All of the electric properties in and about Lebanon are at the present time connected with the large generating station of the Metropolitan Electric Company at West Reading by transmission line.

"Whe West Reading plant is susceptible of development on an unlimited scale and will continue to be the logical center of a large power supply. The capacity of the West Reading plant has been greatly augmented during the past year by improvements and additions which have doubled the capacity of the plant, and contracts have recently been let for still further improvements and additions which will again double the present capacity of the plant by the year 1918."

New Holding Company Planned

National Utilities Company Will Take Over the National Properties Company, National Gas, Electric Light & Power Company and the Jersey Central Traction Company

The National Utilities Company has been incorporated under the laws of Delaware to bring under one management the National Properties Company, the National Gas, Electric Light & Power Company, and the Jersey Central Traction Company. The National Utilities Company will have authorized stock issues of $10,000,000 each of common and preferred stocks and will market $2,500,000 of three-year 6 per cent notes. For the present only $4,000,000 of common and $3,000,000 of preferred stock will be issued. The consolidation is being effected by the banking firms of Bioren & Company and Newburger, Henderson & Loeb. The firm of Hecker & Company is interested in the National Gas, Electric Light & Power Company, which is to form an important part of the proposed merger.

Owners of the preferred stock of the National Gas, Electric Light & Power Company may exchange their holdings on the basis of 90 per cent in new 6 per cent collateral trust bonds of that company and 10 per cent in preferred stock of the new holding company. Holders of the common stock will receive $47.64 in cash, $30 in 6 per cent notes of the holding company and $20 in common stock for each share of their present common stock holdings. It is not stated what holders of National Properties Company stock or those of Jersey Central Traction Company will receive. Holders of shares of the National Gas, Electric Light & Power Company must deposit their stocks with the bankers interested on or before Feb. 15 in order to take advantage of the offer. The proposed arrangement is contingent upon a sufficient number of both classes of shares being deposited.

Van Horn Ely, president of the National Properties Company and its subsidiary, the American Railways, will continue in active charge of the various properties and companies.

The companies included in the merger operate 623 miles of street railways and supply electric light and power to more than fifty cities and towns and gas to eleven cities. Their combined gross earnings for the year 1916 amounted to $9,327,702.

Cleveland Fare Increase Inevitable

At the annual meeting of the Cleveland (Ohio) Railway on Jan. 31, President J. J. Stanley told the board of directors that an increase in the rate of fare is inevitable. Mayor Harry L. Davis had previously suggested through the newspapers that an election be held in 1918 to vote on a bond issue for the purpose of taking over the property. This, in effect, was President Stanley's reply. Mayor Davis had publicly avowed that the service must be improved or the city would take over the property, and he was answered by Mr. Stanley in a published statement that the city could buy the stock of the company at $110 whenever it liked, under the terms of the Tayler franchise.

President Stanley stated at the board meeting that he will ask Council for an increased operating allowance, as the advance in the cost of materials and labor has made this necessary. Should Council refuse, the question, under the franchise, may be taken before a board of arbitration.

In regard to the statement of President Stanley, Commissioner Sanders said it is obvious that an increase in fare must come in time, as materials are costing 40 per cent more than formerly, but the practice of strict economy, he believes, will postpone the necessity for making an increase for a year at least. He said he would be opposed to making an increase at this time.

The annual report submitted at the meeting showed gross receipts of $9,597,306; expenses, $7,044,432; taxes, $579,423; interest, $1,912,815; surplus, $60,635. The increase in the gross receipts amounted to $1,054,993. The total number of passengers carried was 375,382,748, an increase of 12 per cent over 1915. The big day was Dec. 23, when 1,351,985 passengers were carried.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—Plans are being made to incorporate a new street railway to acquire the franchise of the Dunkirk (N. Y.) Street Railway, now held by the Buffalo & Lake Erie Traction Company. The Dunkirk Street Railway operates a belt line service around the city, but for some time past efforts have been made by the Buffalo & Lake Erie Traction Company to abandon this route, which it contended was unprofitable. Several conferences have been held by the City Council of Dunkirk and representatives of central New York interests who are fostering the project. The Council appears to be willing to grant a new franchise to the new company provided a fifteen-minute service is maintained. This is said to be agreeable to the representatives of the proposed company.

Detroit (Mich.) United Railway.—At the annual meeting of Detroit United Railway on Feb. 6, all retiring directors and officers were elected. The stockholders approved an increase in the capital stock of the company from $12,500,000 to $25,000,000, and the board took action offering $2,500,000 of the new stock to stockholders of record of Feb. 16 at par in the proportion of one share of the new stock for each five now held. Subscription rights will expire on March 29.

Lehigh Valley Transit Company, Allentown, Pa.—Negotiations are reported to be under way for consolidating the Lehigh Navigation Electric Company, owned and controlled by the Lehigh Coal & Navigation Company, and the Lehigh Valley Transit Company. The deal has for its object the combining of all the power plants of these two companies into one central power system, increasing the power plant of the Lehigh Navigation Electric Company at Hauto and enlarging the Allentown plant of the Lehigh Valley Light & Power Company, which is controlled by the Lehigh Valley Transit Company.

Los Angeles (Cal.) Railway Corporation.—The City Railway, Los Angeles, has filed with the California Railroad Commission an application for authority to issue $303,000 par value of bonds and to deliver the same to the Los Angeles Railway Corporation in payment of moneys advanced and invested in the plant of the City Railway. The company says that it had an investment of $3,893,000 in its system before making the additional investment of $303,433, and that in accordance with the provisions of its trust deed it wishes now to sell these additional bonds, the money for which was obtained from the Los Angeles Railway Corporation.

Shore Line Electric Railway, Norwich, Conn.—A lengthy bill amending the charter of the Shore Line Electric Railway has been introduced in the Legislature of Connecticut. The bill provides for the dissolution of the Norwich & Westerly, the Groton & Stonington and the New London & East Lyme Street Railways and joins them under the title of the Shore Line Electric Railway. Provision is also made for the operation of street railways by the company in Rhode Island. It is also provided that the Shore Line Electric Railway shall have power to sell energy for commercial purposes. The bill further provides for the increase of the company's capital stock to an amount not exceeding $8,000,000. The company has outstanding at present $300,000 of preferred stock and $700,000 of common stock. It operates under lease the New London division of the Connecticut Company, controlled by the New York, New Haven & Hartford Railroad, which under the requirement of the United States Department of Justice is obligated to dispose of its electric railway holdings in both Connecticut and Rhode Island within a period of five years from Nov. 7, 1914.

St. John (N. B.) Railway.—The St. John Railway, controlling tramways, electric light, power and gas in St. John, has called a special meeting of stockholders to consider an offer to purchase the entire assets of the company. The New Brunswick Investment Company, Ltd., formed for the purpose, has offered $1,300,000 for all the company's properties and franchises and in addition $10 a share for each share transferred, making a total of $140 per share net to the shareholders. The circular says: "The directors are of the opinion that the offer should be accepted."

United Service Company, Scranton, Pa.—The DuBois (Pa.) Traction Company has been taken over by the Keystone Utilities Company, a holding company which has recently been formed to acquire various public utilities. The United Service Company has an operating agreement with the Keystone Utilities Company to operate the DuBois property, and for this reason the management of the DuBois company will be charged to the United Service Company. The local manager, R. B. Blakeslee, will continue as resident manager in DuBois.

Dividends Declared

Boston (Mass.) Elevated Railway, quarterly, 1½ per cent.

Bristol & Plainville Tramway, Bristol, Conn., quarterly, 2 per cent.

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Pacific Gas & Electric Company, Sacramento, Cal., quarterly, 1½ per cent, original preferred; quarterly, 1½ per cent, first preferred.

Electric Railway Monthly Earnings

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'16	$176,571	*$123,253	$53,318	$35,856	$17,462
1 "	"	'15	154,561	*104,075	50,486	36,478	14,008
12 "	"	'16	2,056,362	*1,380,868	675,494	433,911	241,583
12 "	"	'15	1,909,544	*1,302,702	606,842	436,166	170,676

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m.,	Dec.,	'16	$87,477	*$57,445	$30,032	$27,550	‡$2,618
1 "	"	'15	73,105	*78,317	†5,212	22,358	‡†27,358
6 "	"	'16	541,664	*426,471	115,193	166,006	‡†49,724
6 "	"	'15	498,746	*400,203	98,543	106,885	‡†7,299

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m.,	Dec.,	'16	$336,954	*$200,513	$136,441	$43,565	$92,876
1 "	"	'15	300,315	*164,527	135,788	41,189	94,599
12 "	"	'16	3,537,399	*2,105,124	1,432,275	516,373	915,902
12 "	"	'15	3,113,175	*1,846,437	1,266,738	476,281	790,457

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m.,	Dec.,	'16	$808,198	*$682,285	$125,913	$103,218	‡$45,262
1 "	"	'15	704,552	*477,524	227,028	99,722	‡150,413
6 "	"	'16	5,070,883	*3,897,273	1,173,610	591,109	‡748,405
6 "	"	'15	4,452,422	*2,974,355	1,478,067	592,736	‡1,024,591

LEWISTON, AUGUSTA, & WATERVILLE STREET RAILWAY, LEWISTON, ME.

1m.,	Dec.,	'16	$63,270	*$50,711	$12,559	$15,401	†$2,842
1 "	"	'15	57,929	*40,889	17,040	15,942	1,098
12 "	"	'16	803,660	*553,296	250,364	187,773	62,591
12 "	"	'15	737,850	*475,422	262,428	189,839	72,589

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m.,	Dec.,	'16	$216,914	*$124,162	$92,752	$42,128	$50,624
1 "	"	'15	204,364	*116,881	87,483	42,946	44,537
12 "	"	'16	2,383,041	*1,453,188	929,853	508,971	420,882
12 "	"	'15	2,143,903	*1,318,834	825,069	510,587	314,482

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m.,	Dec.,	'16	$49,155	*$55,436	†$6,281	§$9,935	‡†$14,900
1 "	"	'15	42,794	*46,228	†3,433	$5,540	‡†7,641
6 "	"	'16	308,464	*287,024	21,440	$41,702	‡†14,152
6 "	"	'15	257,135	*254,386	2,749	$36,000	‡†23,681

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m.,	Dec.,	'16	$512,594	*$257,702	$254,892	$183,084	$71,808
1 "	"	'15	482,938	*255,280	227,658	182,824	44,834
12 "	"	'16	5,483,110	*3,038,254	2,444,856	2,178,258	266,598
12 "	"	'15	5,511,345	*3,073,628	2,437,717	2,208,356	229,361

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m.,	Dec.,	'16	$481,638	*$389,007	$92,631	$119,634	‡†$26,107
1 "	"	'15	440,663	*350,340	90,323	120,150	‡†28,149
6 "	"	'16	3,083,384	*2,204,373	879,011	721,628	‡191,520
6 "	"	'15	2,756,262	*2,047,156	709,106	722,286	‡21,776

*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the New York, New Haven & Hartford Railroad under guarantee, also interest on notes held by the New York, New Haven & Hartford Railroad, not credited to income of that company.

Traffic and Transportation

Los Angeles Fare Case Dismissed

California Commission Decides in Favor of Company —Extension of City Boundary Does Not Work Automatically to Decrease Fares

The Railroad Commission of California has dismissed the applications of Palms, Richardson, Bairdstown, and certain sections of Hollywood, to reduce fares on the Pacific Electric Railway, Los Angeles, to a 5-cent basis. The commission says that if the desired reduction were made, the Pacific Electric Railway would further lose $300,000 a year, and that such a condition would be created as to make operation of the road much more burdensome. The Southern Pacific Railroad owns all of the Pacific Electric Railway stock and a great amount of its bonds. The commission says that only because of this ownership has the Pacific Electric Railway been able to support the losses caused by jitney competition. The jitney losses and the $821,734 of the actual loss sustained in 1916 would create an annual deficit in excess of $1,000,000. The commission believes that the situation would have been worse had not the freight earnings of the Pacific Electric Railway increased $500,000 in 1916 over 1912. The commission found that the income of the Pacific Electric Railway has been decreased between $30,000 and $40,000 a month as a result of jitney competition. On this point the opinion of the commission says:

"It must be obvious that the company cannot, when showing such great deficit, be expected to give improvements in service which might otherwise be properly required or reduce fares still lower, thereby increasing its already severe losses. The evidence shows that the present fares do not give the Pacific Electric Railway sufficient revenue to meet its current expenses."

The Commission's Opinion

In rendering its decision the commission said in part:

"The population of Los Angeles for 1910 was 319,198; in 1912, estimated on basis of registration, it was 461,558, and on the same basis for 1915 it was 558,011, but notwithstanding this great increase in population, defendant's passenger revenue shows practically no improvement, being $6,677,289 in 1912, as compared with $6,705,708 in 1916, a difference of only $28,419.

"For the transportation of milk the revenue in 1912 was $41,569, in 1916 it was $4,939, a net loss of $36,629. The total of all traffic handled by passenger trains in 1912 was $6,882,654, and in 1916 only $6,880,742, or a net reduction at the end of the five-year period of $1,911. The freight earnings, however, increased from $1,112,683 in 1912 to $1,656,067 in 1916, or $543,384. During the same period taxes increased from $320,698 in 1912 to $515,556 in 1916, an excess of $194,857. Interest on funded debt increased from $2,081,607 in 1912 to $2,834,107 in 1916. New bonds amounting to $15,066,000 were issued in conformity with this commission's decisions, these including bonds for refunding, as well as for improvements, additions and betterments. It is also to be noted that the interest on unfunded debt increased from $114,337 in 1912 to $254,192 in 1916.

"The defendant has never paid a dividend and shows, as of June 30, 1916, a deficit of $4,432,855. In the year 1912 there was a net income profit of $496,216; in 1913, a profit of $199,871; in 1914, a loss of $467,220; in 1916, a loss of $683,521, and in 1916 a loss of $821,734.

"While it would be advantageous to certain residents and property owners of the districts affected by these proceedings to secure reductions in the present fares, the public in general, as well as the carrier, have an interest in the margin of safety due to a public utility and, therefore, this commission must and will take into consideration not only these complainants, but the rights of defendant and all other interests served by this defendant, whose legitimate investments should not be injured.

"The mere fact that territory is annexed to a city does not automatically operate to reduce existing fares which are higher than 5 cents to 5 cents, if the higher fares are justifiable. This rule has been previously declared by this commission in Froelich vs. Los Angeles Railway Corporation.

"Complainants have not proved the rates to be discriminatory; neither has it been shown that the districts in question furnish a traffic of sufficient volume to justify a street car fare of 5 cents, and the commission finds that the charges and fares to the points and places designated in the complaints herein, which were lawfully in effect on Nov. 3, 1914, are justified.

"This commission can only prescribe just and reasonable rates and, after careful deliberation upon all the elements in these cases and the effect upon the revenue which would result from the reductions demanded by complainants, I am of the opinion that the facts do not sustain the complaints and recommend that the cases be dismissed."

Chicago Paper Studies Car Delays

The Chicago *Herald* has recently been making a survey of the causes for street car delays during rush hours in Chicago. Starting out with the announcement that it intended to investigate this subject, in view of the wide discussion about delayed traffic, the paper assigned reporters to ride on the cars on different routes and report on the nature and length of all delays. Then for several days it printed a column or more of specific information showing just what car operators have to meet in making their rush-hour runs.

In general, the evidence showed that the drivers of automobiles, trucks and other vehicles use the car tracks freely, either because of a willful or careless disregard for car operation or because of the parking of automobiles along the curb, so as to leave not much more than the tracks open. In practically all cases the delay could have been avoided if vehicular traffic had not been on the tracks. The survey may aid materially in the execution of recommendations made in the report of the Chicago Traction & Subway Commission for an ordinance prohibiting the unnecessary use of tracks by vehicles in rush hours.

In closing its campaign of education the *Herald* published a signed statement by Leonard A. Busby, president Chicago Surface Lines, who explained the problems of operation in the loop district. Mr. Busby said that the speed of surface cars is cut down 40 per cent through the loop during the morning and evening rush hours because of teams on the tracks and automobiles parked beside the curb. As for blockades, those resulting from teams and automobiles becoming stalled in the street or broken down on the tracks are greater than all others combined. The records of the operating department show that 56 per cent of all blockades which are of a nature serious enough to require the services of a wreck wagon are due to the breaking down of vehicles on the track, or to the overloading of vehicles which get on the track and cannot get off without the services of a wreck wagon. The other blockades requiring the services of a wreck wagon are due to derailment, fires, overhead troubles and miscellaneous causes.

These figures, Mr. Busby said, do not take into account the vastly greater volume of delays due to vehicles holding the track, thereby delaying the cars and making the headway irregular. Nor do they take into account the fact that in the congested districts where cars are operated up to track capacity about 25 to 30 per cent of the actual track capacity on a given street during rush hours is at times used by vehicles which displace a large number of cars. These, then, are obliged to stand in line waiting for an opportunity to get through.

This condition is growing steadily worse, Mr. Busby stated. Clearing the tracks of vehicles in the congested district during the rush hours would at the present time afford greater relief to the public than could be obtained by any other measure under existing track facilities. This would, of course, involve the necessity of preventing the parking of automobiles and other vehicles along the curb on narrow streets.

Year's Effect of the Seattle Jitney

Many Jitneys Are Still in Operation, but This Problem Is Secondary to That of High Cost of Materials

The long-expected demise of the jitney as an agent of transportation in Seattle, Wash., has failed of accomplishment, according to the annual report presented to the Mayor of that city by A. L. Valentine, superintendent of the city department of utilities and covering a period from Nov. 30, 1915, to Nov. 30, 1916. The report says:

"Two hundred and seventy-five jitneys are still doing business during the evening rush period, lesser number by about seventy-five than were in operation at the time of the filing of our last report. During the summer months, at a time when prohibitive legislation seemed imminent, and when the price of the required $2,000 bond had soared from $175 to $250 per annum, there was a noticeable falling off in the number in operation, but this condition did not long endure, and during the last few months the number has been slowly increasing. Applicants for drivers' licenses are being constantly examined and passed upon, and if the older drivers are learning that the business cannot be conducted at a sufficient profit, if the increasing industrial activity is drawing numbers of them to more lucrative fields of endeavor, there is, nevertheless, no lack of new material to take their places and continue where they left off. A total of 749 applicants were examined for licenses during 1916. Beyond the raising of the fares on certain of the routes, there have been no changes or improvements of note. None of the consolidations of drivers has succeeded in holding together to any definite purpose; none of the promised capital which was to take hold of the industry, conduct it on a large scale and give it a definite status, has materialized.

"During the year ending Dec. 1, 1915, the gross railway receipts of the Puget Sound Traction, Light & Power Company fell off nearly $620,000 as compared with the same period of the previous year. For the year ending Dec. 31, 1916, the receipts show a gross gain of about $72,000 as compared with the 1915 period, but are still far short of 1914. This sum of approximately $1,270,000 represents the extent to which the company's receipts have suffered through jitney competition.

"In any discussion of street railway finances, and looking at the matter from every angle, the financial status of a city's transportation system cannot be otherwise than of interest to all residents of the city, neither can we overlook the fact that the high cost of materials in living expenses are just as great in this quarter as they are in the home of the most humble citizen. In fact, it has come to a point where it is not so much a question of jitney competition with the street railway company, not so much a question of whether or not the percentage of the gross receipts shall be paid to the city treasury, and whether or not the company shall pay its right of way and fulfill other franchise obligations. All these questions become secondary in the face of the problem of meeting the enormous increase in the cost of all necessary materials. Lumber, steel, copper, wages, everything, have all tended upward at an appalling rate, and the end is not in sight, while the price of a street car ride remains the same. And so it is fair to conclude that the jitney bus has been only one of a number of elements, the advent of which has proved to be very calamitous to the holder of traction securities."

Railway Abandons Jitney Service

Everett Company Decides Against the Auto After Trial Service

The Everett Railway, Light & Power Company, a subsidiary of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has terminated its jitney service in Everett. The order was issued by D. C. Barnes, general manager of the company. He said:

"We have decided to withdraw our jitneys, for the time being at least, because our experience has clearly demonstrated that it is not an economically successful means of transportation.

"In our eighteen-months' operation, the cost of auto transportation has been 2 cents a seat mile, as compared with a cost of ¾ of a cent for street car service. Even by picking the cream of the business, the revenue of the jitneys in every month of their operation has fallen considerably below the expense of operation with a suitable allowance for depreciation. We are convinced that the jitney cannot survive the time which must eventually come when it will be required to give service equivalent to the street car, grant free transfer, and contribute to paving maintenance. The jitney has shown that the public wants frequent service and the new light weight cars which are operating on Hewitt Avenue are the answer."

Ten Ford machines were included in the equipment of the company, but the number of cars in service fluctuated with the volume of traffic during various hours of the day.

Non-Advertising Safety Posters

Kansas City Railways Enlist Co-operation of Drivers and Chauffeurs in Observing Safety Suggestions

As one phase of the safety work of the Kansas City (Mo.) Railways a group of safety suggestions was prepared, directed especially to teamsters and chauffeurs. Large cards, 16 in. x 24 in., have been printed, and posted in garages, barns, and similar places. Superintendents of barns and owners of garages have taken pains to direct the attention of drivers to the bulletins, with substantially good results in the reduction of collisions with street cars.

The bulletins do not mention the name of the Kansas City Railway Company. They read as follows:

A FEW SAFETY SUGGESTIONS

There are many accidents between street cars and vehicles of all kinds. Delays are caused and property is wasted.

Many accidents can and should be avoided.

Motormen are human and work for a living just as you do and you should show them every consideration that you would ask them to show you.

Cars are seldom broken, wagons and automobiles often are.

Cars do not have pain, drivers and horses do.

ACT AS YOU WOULD WANT THE DRIVER TO ACT IF YOU WERE A MOTORMAN.

The following rules should be rigidly adhered to:

Rule No. 1. When approaching a car track from a side street slow down so that you can stop on short notice. Cars are heavy and cannot stop as quickly as automobiles and other vehicles.

Rule No. 2. When driving on streets where there are car tracks drive between curb and track whenever possible.

Rule No. 3. Do not pull on to track to pass vehicle ahead of you until after you have looked back to see if car is approaching.

Rule No. 4. When passing car ahead do not pull to the left on to opposite track. Car may be approaching.

Rule No. 5. When passing a standing car have your vehicle under control. A passenger may suddenly appear from behind car.

Fare Increases Protested

Protests have been filed with the Public Service Commission for the Second District of New York against the contemplated fare increases on the lines of the Schenectady Railway and the Fonda, Johnstown & Gloversville Railroad. Mayor George R. Lunn, of Schenectady, is leading the opposition to the proposed increases. He is backed, however, by practically all the Chamber of Commerce committees as well as the civic organizations of the cities and towns along the lines affected.

The Schenectady Railway proposed to increase its fare by 5 cents between Troy and Schenectady by increasing the number of fare zones between the two cities from four to five, and increasing the fare from 30 to 35 cents between Schenectady and Saratoga Springs by the addition of another fare zone.

New specific tariffs were filed for each station on the Fonda, Johnstown & Gloversville Railroad. Generally speaking this would practically mean graded increases between the cities of Gloversville and Schenectady and Schenectady, Troy and Saratoga as well as intermediate points.

The only variance from the above mentioned protest was the point raised by the representatives of the city of Watervliet, in that they claimed that the franchise granted to the Schenectady Railway limited it to its present fare rates between Watervliet and Schenectady, and that any deviation therefrom affected the franchise.

The commission on its own motion agreed to enter into an investigation as to the reasonableness of the rates proposed, and on Jan. 25, 1917, issued an order suspending the proposed fare increase until April 15 or until a later date if a further suspension would be necessary. No date has as yet been set for a hearing in the matter.

Atlanta Has Company Publication

It Is Built on the Form of a Daily Paper—No Advertising Accepted

Here We Are is the title of a monthly whose publication has just been begun. It is issued for distribution among employees, officers and owners of Georgia Railway & Power Company, Georgia Railway & Electric Company, Atlanta Gas Light Company, Atlanta Northern Railways, all of Atlanta, Ga., the Suburban Gas & Electric Company, Decatur, Ga., and the Carrollton (Ga.) Electric Company. In make-up it differs radically from nearly all other company publications, the page size being 19 in. x 12½ in. This admits of five 2¼-in. columns. There are four pages in the first issue, which is dated Feb. 1, 1917.

The material is patterned also on the daily newspaper and consists of short articles with crisp heads. The material relates not only to the internal news of the company, but to its new construction plans. A special notice says that no advertising will be accepted.

Advertisements Removed from Outside Cars.—The Trenton & Mercer County Traction Corporation, Trenton, N. J., has ordered all advertisements removed from the outside of its cars. The Trenton City Commission recently adopted an ordinance prohibiting advertisements being displayed on vehicles and by "sandwich" men.

Columbus Civic Bodies Plan Re-routing.—Representatives of twenty-seven civic organizations in the city of Columbus, Ohio, have undertaken to formulate a plan of re-routing and they declared at a meeting on Jan. 31, that it is their intention to follow Mayor Karb's suggestion to map out a plan that will be of the greatest benefit to the majority of the people of the city.

Grade-Crossing Accident in Joplin.—Eight men were badly hurt when a work car on the Southwest Missouri Railroad, Webb City, Mo., was struck by a Frisco passenger engine on East Fourth Street in Joplin at 1.15 p. m. on Jan. 23. The work car was demolished and the engine was overturned. All the injured were members of the interurban line's work crew.

Texas Parlor Car Service in April.—The Texas Electric Railway, a consolidation of the Texas Traction Company and Southern Traction Company, expects to begin the operation of the previously announced parlor-car service on its lines from Dennison to Waco and Corsicana on April 15. According to Burr Martin, general manager of the lines, an extra charge of 25 cents will be made for the parlor-car privilege.

Boston Elevated Creates New Department.—The Boston Elevated Railway has consolidated the department of surface lines and the department of traffic into a new department, to be known as the department of surface transportation. Edward Dana, at present superintendent of traffic, has been appointed manager of surface transportation and has been given charge of the new consolidated department and will hereafter be responsible for the operation of all surface line service. C. R. Tripp, at present superintendent of surface lines, is appointed supervisor of surface lines, reporting to the manager of surface transportation.

Memphis Company Celebrates Accident Reduction.—According to figures given out by E. W. Ford, general superintendent of the Memphis (Tenn.) Street Railway at a "Safety First" banquet on Jan. 16, in 1912 the company

recorded 3496 accidents, while in 1913, when the safety committees were organized, there were 2514 accidents. The reduction has followed each year until 1916 showed only 1726, a decrease of 50 per cent. A comparison of the number of controversies, under which head appears "fighting and ejectments," showed that in 1912 238 persons were ejected for fighting, while last year only 127 were listed under this head. There were only 685 collisions with vehicles last year as against 1401 in 1912; 1008 in 1913; 586 in 1914, and 652 in 1915.

Commissioner Woods Urges Traffic Changes.—The wisdom of appointing a traffic commission to work out and recommend a plan for handling traffic in New York City in view of the increasing difficulty and dangers of the traffic problem has been urged by Arthur Woods, Police Commissioner, in a letter to Mayor Mitchel. Among other matters to be considered by such a commission, the letter suggests opening up various arteries of travel by removing pillars of elevated lines and placing them on the sidewalk at the curb lines, and by reducing the width of sidewalks along certain sections of Madison and Lexington Avenues and along Central Park West. The letter also suggests working out arrangements whereby certain classes of vehicles could be kept off crowded streets at busy hours, and whereby a considerable portion of the traffic could be done at night.

Full Service Established After Fire.—Full service has been established on the lines of the Eastern Pennsylvania Railways, Pottsville, Pa., after interruption by the fire of Jan. 6, which damaged the power station and repair shops at Palo Alto. For a few nights after the fire only partial railway service could be maintained, but the full lighting load was met. The failure of two converters due to fire damages caused a shortage of power and the management was further handicapped by the losses of buildings and other equipment. A portable substation was obtained from the Monongahela Valley Traction Company at Fairmont, W. Va. It arrived in Palo Alto at noon on Jan. 28, and was ready for operation early on the morning of Jan. 29. It was an important factor in helping to restore traffic. The normal number of cars has been operated now for some time and work of reconstruction is being carried out.

240,211,749 Passengers Carried in St. Louis in 1916.—According to the quarterly report filed on Jan. 15, with the City Register by the United Railways, 19,000,000 more passengers were carried during the year 1916 than during the year 1915. A total of 62,907,496 passengers was carried in the last three months of 1916. This is an increase of more than 3,700,000 over the preceding three months and is 5,200,000 more than in the corresponding three months in 1915. The 3,700,000 extra passengers in the last three months were transported with the use of an average of only five more cars on week days than in the preceding quarter and nine more cars on Saturdays. A total of 1267 week-day cars were used in the last three months and 1262 were used in the previous three months. In 1916 a total of 240,211,749 passengers was carried, as against 221,039,858 in 1915. The cars made 6,495,454 trips in 1916 and 6,147,822 trips in the preceding year.

New York Railways Depicts Congestion Crisis. — In line with the recently adopted plan of the Interborough Rapid Transit Company, New York, to issue for public perusal bulletins from time to time as special problems arise, the New York Railways is now represented in a similar manner by the publication of a new illustrated bulletin, entitled *New York Railway Service*. The first issue, dated Jan. 29, is devoted entirely to the crisis in street congestion in New York City, which is characterized by serious blockades from building operations, subway construction, sewer and water main excavation and repaving, by a grave shortage in the Street Cleaning Department's snow fighting forces and by an enormous increase in the number of automobiles. As relief measures which would help the situation, the bulletin suggests that vehicles be not allowed to stand along the curb of certain designated streets, that traffic officers co-operate closer at certain localities in regulating traffic, and that certain crosstown streets be limited to one-way traffic during rush hours.

Personal Mention

W. B. Savage has been appointed claim agent of the Tidewater Power Company, Wilmington, N. C.

J. J. Kilkenny has been elected vice-president of the Sacramento Valley Electric Railroad, Dixon, Cal.

J. H. Robertson, superintendent of the Salisbury & Spencer Railway, Salisbury, N. C., has been appointed local manager of this company, succeeding R. J. Hole.

K. D. Leavitt, master mechanic of the Public Utilities Company, Evansville, Ind., has resigned to become master mechanic of the Northern Ohio Traction & Light Company, Akron, Ohio.

William Hardecker, who has been connected with the Pottstown (Pa.) branch of the Reading Transit & Light Company, has become superintendent of the street railway facilities in Lebanon.

G. Harold Smith, assistant engineer of the Rockford and Interurban Railway, Rockford, Ill., has been appointed acting chief engineer of the company, until a successor to Ward S. Hubbard is selected.

Edward Dana, superintendent of traffic of the Boston (Mass.) Elevated Railway, has been appointed manager of surface transportation in charge of the new consolidated department, which includes the department of surface lines and the department of traffic.

R. B. Stichter, vice-president of the Texas Traction Company and the Southern Traction Company, Dallas, Tex., while crossing a street in Dallas on Jan. 24, was run over by an automobile, and seriously injured. According to a local newspaper report, he will probably recover.

G. R. Tripp, superintendent of surface lines of the Boston (Mass.) Elevated Railway, has been appointed supervisor of surface lines, reporting to the manager of surface transportation in the new consolidated department which includes the department of surface lines and the department of traffic.

R. H. Sperling, formerly general manager of the British Columbia Electric Railway, Vancouver, B. C., and latterly assistant chairman and a director in London, England, has resigned those positions on taking a commission in the British army, and has been appointed one of the advisers to the directors.

A. E. Ward, who in the past has been located in Reading, Pa., with the Reading Transit & Light Company, has been transferred by that company to Lebanon and appointed general manager of the Lebanon division, with full authority in the operation of the electric and street railway service there.

W. S. Murray has been appointed assistant to the president of the Housatonic Power Company, effective on Jan. 1, 1917. This is one of the subsidiaries of the New York, New Haven & Hartford Railroad and the work includes caring for the engineering, operation and construction of the power system. The Housatonic Power Company develops and transmits high-voltage electricity in the western and middle sections of Connecticut, using steam and hydroelectric stations, and among its principal customers are the Connecticut Company and the United Electric Light & Water Company. Owing to its growing business it has many interesting power and transmission problems, a recent one being the supply of power to meet the growing demand of the United Electric Light & Water Company at New Britain. To meet this demand the Housatonic Power Company has ordered the necessary electrical apparatus in the form of step-up and step-down transformers, frequency changes and switchgear to transmit 6000 kw. to a frequency change station at New Britain. The transmission potential will be 33,000 volts, with duplicate three-phase circuits. The wires will be No. 00 copper, supported on steel towers and the distance is approximately 38 miles. Mr. Murray's work in connection with the Housatonic Power Company will in no way affect his re-

lations with the firm of McHenry & Murray, with which he remains a partner.

G. Gordon Gale, general manager and chief engineer of the Hull (Que.) Electric Company, has been appointed vice-president and general manager, succeeding E. W. Beatty, who, however, remains as a director. Mr. Gale will continue to attend to the engineering work. He was graduated from McGill University and prior to 1907 was assistant engineer of the Canadian Rubber Company's electrical plant. From 1907 to November, 1908, he was superintendent of power of the Hull Electric Company and from November, 1908, to 1909, was acting superintendent of the company. From 1909 to June, 1914, Mr. Gale was general superintendent of the company. In 1914 he was appointed manager. Mr. Gale is an associate member of the Institute of Electrical Engineers and the Canadian Society of Civil Engineers.

G. GORDON GALE

Clarence W. Huntington has been elected president of the Richmond Light & Railroad Company, succeeding the late Charles W. Hotchkiss, and also chairman of the board of the Virginian Railway, with headquarters at New York. Mr. Huntington was born in 1857, at Newark, N. J., and was educated in the public schools, the Newark Academy, and Dorchester High School, Boston. He began railway work in 1876, as a freight brakeman on the Chicago, Rock Island & Pacific Railroad, and for sixteen years held various positions on the same road. He was then for one year assistant superintendent of the Des Moines Northern & Western Railroad and later for one year was superintendent of the same road. From 1894 to 1902 he was general superintendent of the Iowa Central Railroad, and then went to the Central Railroad of New Jersey as general superintendent, with headquarters at New York. In February, 1914, he was elected vice-president and general manager of the Minneapolis & St. Louis Railroad, with headquarters at Minneapolis, Minn., from which office he resigned to accept his present position.

E. A. Maher, Sr., whose election as president of the Third Avenue Railway System, New York, was announced in last week's issue, has become by the assumption of his new position the head of a property aggregating about 370 miles of single track, including subsidiary companies, connecting Manhattan with the Bronx and extending out into the suburban towns of Mt. Vernon, New Rochelle, Bronxville, Larchmont, Tuckahoe, Pelham, Yonkers and Hastings. Mr. Maher, owing to the broad executive training and practical experience in dealing with the public which he gained from his earlier positions as president of the Board of Supervisors of Albany, as a member of the Assembly from that city and later as Mayor of Albany for two years, is eminently well qualified for the exacting demands of his new office. This broad training has been supplemented by an expert knowledge both of public utility operation and of the special problems attending the system with which he is connected, based on twenty-five years of street railway work, including sixteen years as president of the Union Railway and nine years as general manager and later vice-president of the Third Avenue Railway.

E. A. MAHER

Obituary

Charles T. Schoen, one of the foremost figures in the development of the steel car industry of the country, died on Feb. 5, at his home, at Rose Valley, Moylan, Pa. He was seventy-two years old. Mr. Schoen was born in Delaware and was educated in Wilmington. He worked there with his father, Henry Casper Schoen, in whose shops he learned the cooper's trade. About 1864 he removed to Philadelphia to assume a position with Charles Scott, who was engaged in the manufacture of car springs. Mr. Schoen later developed pressed steel equipment and fittings for wooden freight cars, including car trucks, and finally the complete steel car. The first company to manufacture the steel cars was known as the Schoen Pressed Steel Car Company, and its extensive plant was established in 1889 at Schoenville, near Pittsburgh. Out of this company afterwards grew the reorganized Pressed Steel Car Company. His connection with this industry ceased in 1902. He also produced a solid forged and rolled steel wheel. A plant was established adjoining his former car plant at Schoenville and also in Leeds, England, which now is being used to produce munitions. In 1907 Mr. Schoen sold his plant at Schoenville and his patents to the United States Steel Corporation, and returned to his estate. He is survived by his widow and three daughters.

George Henry Hill, assistant engineer railway and traction department General Electric Company, died at his home in Schenectady on Jan. 31, 1917, after a short illness from pneumonia. At the time of his death he was less than forty-five years of age. This unfortunate event deprives the General Electric Company of one of its most useful and highly-appreciated engineers, and the profession of electrical engineering of a vigorous and well-balanced analyst of its problems, particularly those relating to control of electrical apparatus and heavy electric traction. His reputation for fairness and square dealing, also, invariably won for him an unswerving loyalty among his associates in business and in private life.

Mr. Hill's career shows what can be done by concentration of purpose and ingenuity in overcoming practical and theoretical difficulties. His work was consistent in plan and purpose from the time of his completion of the electrical engineering course at the Johns Hopkins University, Baltimore, Md., in 1895, until his death nearly twenty-two years later. Immediately after graduation he joined the staff of Frank J. Sprague, who at that time was engaged in the development of electrically-operated elevators and multiple unit control for railway service. He soon became chief of construction of the elevator department of the Sprague Electric Company and, when this company gave up its elevator business in 1900, he became chief engineer of the company with headquarters at Bloomfield, N. J. Here with Mr. Sprague he devoted his attention to development of multiple-unit control for railway trains.

In 1902 the General Electric Company took over the Sprague patents and interests, and Mr. Hill went to Schenectady to assist in the further development of train control. He became assistant to F. E. Case and was actively connected with the manufacture of car equipment for the Manhattan Elevated Railroad in New York, the Boston Elevated Railway, the Interborough Rapid Transit Company, the Northwestern Elevated Railroad, the Philadelphia Rapid Transit Company and others. He did work also in connection with the Baltimore & Ohio, New York Central and other electric locomotives. After four years in this work he became assistant engineer of the railway and traction department where he has since aided in the solution of many difficult problems. Articles from his pen on railway subjects have frequently appeared in the technical press and in the proceedings of the A. I. E. E. Two years ago he served a term effectively as chairman of the local section of this association. During the course of his studies he made many useful inventions in the railway and other electrical fields and was granted nearly fifty patents. The editors of the ELECTRIC RAILWAY JOURNAL have been assisted in their work on many occasions by Mr. Hill, and at the time of his death he had in preparation for this paper an article on an important electric railway subject.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

*Duquoin, Christopher & Eastern Traction Company, Duquoin, Ill.—Incorporated to construct a line out of Duquoin through the towns of North City, Christopher, Buckner, Orient and West Frankfort to Elkville, Hallidayboro, De Soto and Carbondale. Capital stock, $6,000.

*Ocean City & Fenwick Island Railway, Ocean City, Md.—Incorporated to construct an electric railway 8 miles up the beach in Ocean City to Fenwick Island. The construction contract has been let to Thomas E. O'Connell of Phoenixville, Pa. The company is in the market for about 10 miles of relaying rails weighing from 60 to 70 lb. per yard; also for necessary materials for overhead work and four trolley cars of the open type, with running boards. Officers: W. B. S. Powell, president; C. Edward Shute, secretary; Harry J. Cropper, vice-president, and Frank W. Truitt, treasurer, all of Ocean City.

FRANCHISES

Fullerton, Cal.—An ordinance providing for a franchise for the Pacific Electric Railway through Fullerton on the route to Anaheim has been adopted by the City Council of Fullerton. The franchise is indeterminate as to the number of years that the line may be maintained, providing that it can be taken over by the city of Fullerton at any time after five years by condemnation. Work on the Pacific Electric line to Anaheim has been begun and it is expected that the line will be completed in four months.

Waterbury, Conn.—The Public Utilities Commission of Connecticut has approved the plans of the Connecticut Company for the construction of double tracks on West Main Street and private right-of-way in Waterbury..

Chicago, Ill.—The City Council of Chicago has referred to the transportation committee an ordinance for the extension of the 103d Street line of the Chicago City Railways from Cottage Grove Avenue east to Torrence Avenue.

Fort Wayne, Ind.—The Fort Wayne & Northern Indiana Traction Company has asked the City Council for a franchise to construct an extension of its Pontiac Street line.

Baltimore, Md.—The Board of Estimate has approved the ordinance authorizing the United Railways & Electric Company to lay switches and turnouts in the construction of the new Liberty Heights Avenue car line, which is being constructed as a more direct route from Garrison Avenue to the center of the city.

Tonawanda, N. Y.—The International Railway has received a franchise from the City Council to construct an extension of its Grand Island Ferry line along the River Road to the Wickwire Steel Company's property in Tonawanda. The proposed line will be 7700 ft. long.

TRACK AND ROADWAY

Fort Smith Light & Traction Company, Fort Smith, Ark.—This company has concluded a contract with the Arkansas Zinc & Smelting Company of Van Buren to extend its Van Buren line to the smelter. The extension will be 1 mile long and will cost about $20,000. Work on the new extension will begin at once and will be pushed through to completion as fast as material and labor can be had.

Pacific Electric Railway, Los Angeles, Cal.—R. Sherer Company, Los Angeles, has received a contract from the Pacific Electric Railway for grading the roadbed and building bridges and culverts on its proposed line from La Habra to Fullerton. The cost will be about $54,000.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—It is reported that the Oakland, Antioch & Eastern Railway plans to construct an extension from Pittsburg to Antioch within the next few months.

San Diego & South Eastern Railway, San Diego, Cal.—The Utah Construction Company, Ogden, has received a contract from the San Diego & South Eastern Railway to construct about 20 miles of railway.

Municipal Railways of San Francisco, San Francisco, Cal.—A municipal railway line up Market Street from the Ferry through the Twin Peaks Tunnel to Sloat Boulevard, and the connection of the completed Church Street line with it, has been authorized by the Public Utilities Committee of the Board of Supervisors. It will entail altogether an expenditure of $655,000, as follows: Kearny and Market Streets to Van Ness Avenue and Market Street, $250,000; Van Ness Avenue and Market Street to Church and Sixteenth Streets, $110,000; Church and Market Streets to the mouth of Twin Peaks Tunnel, $82,000; through the Twin Peaks Tunnel to Sloat Boulevard, $213,000. The construction of the lines was authorized under the recent decision of Federal Judge Hunt, which gives the city the right to parallel the tracks of the United Railroads. City Engineer M. M. O'Shaughnessy was directed to order the rails for the construction of outer tracks on Market Street from Kearny Street to Van Ness Avenue, and from Church Street to the tunnel mouth. These rails will cost $37,605. By taking advantage of the option it had to order additional rails. The city now will begin to get deliveries by June 29. The entire projected lines will be completed and cars operating over them by Nov. 1. The Church Street-Van Ness Avenue line will be in operation by July 1. In addition to authorizing the city engineer to order the additional rails, the Public Utilities Committee recommended that the Board of Works be authorized to call for bids for the construction of the different lines.

Meriden, Middletown & Guilford Railway, Meriden, Conn.—Francis Atwater, New Haven, has been appointed receiver for the Meriden, Middletown & Guilford Railway. The railway was incorporated in 1907 to construct a line between East Meriden and Guilford, but little work has been done on the line.

Peoria (Ill.) Railway.—This company will double-track its Adams Street line from Western Avenue to Nevada Street, Peoria.

Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind.—A contract has been awarded to the Pennsylvania Steel Company, Pittsburgh, Pa., for new 125-lb. steel rails for the north side line of the Chicago, South Bend & Northern Indiana Traction Company between South Bend and Mishawaka. The cost of the new rails, new section work and new paving will be about $155,662.

Manhattan City & Interurban Railway, Manhattan, Kan.—A bond issue of $200,000 has been voted by the stockholders of the Manhattan City & Interurban Railway to pay indebtedness and to make extensive improvements.

Mankato (Minn.) Electric Traction Company.—A contract has been entered into between the Mankato Electric Traction Company and the city of Mankato whereby the company will pay $5,000 to the city toward the construction of a bridge to North Mankato and an additional $300 toward defraying the expenses of constructing cables and trolleys across the structure.

St. Paul (Minn.) City Railway.—This company plans to construct extensions of its East Seventh Street and St. Clair Street lines.

*Freehold, N. J.—Plans are being revived to construct an electric railway between Freehold and Asbury Park and the Civic Development Company of Farmingdale has been incorporated with a capital of $50,000 to advance the project. More than $100,000 has been subscribed toward the proposition and $25,000 actual cash has been paid in. The incorporators of the Civic Development Company are: William J. Lansley, Farmingdale; Clarence Hodson, Newark, and L. C. Tompkins, Morristown.

*Binghamton, N. Y.—Plans are being revived for the construction of a line from Binghamton to Utica. Franchises granted in 1907 have been renewed. The plan includes the construction of a large power house at Whitney's Point. Thomas McBride, Clinton, is interested.

Brooklyn (N. Y.) Rapid Transit Company.—Operation of the Jamaica Avenue elevated line of the Brooklyn Rapid Transit Company from Cypress Hills to Spruce Street, Richmond Hill, will be begun on April 1, and of the whole line to Grant Avenue, Jamaica, by Sept. 1. The line is 4½ miles long and will be operated in conjunction with the Broadway elevated line in Brooklyn and will connect with the express service over that division.

Panama Traction Company, Jamestown, N. Y.—Grading is now under way by this company between Sugargrove, Pa., and Busti, N. Y., and between Busti and Ashville, N. Y. It is expected that the line from Youngsville to Panama will be completed and in operation by next Fall. The engineers of the company are Graham & Chapman, Jamestown, N. Y. D. L. Davis, Jamestown, general manager. [Jan. 20, '17.]

Interborough Rapid Transit Company, New York, N. Y.—The new Astoria elevated extension connecting with the Queensboro subway was placed in operation by the Interborough Rapid Transit Company on Feb. 1. Plans have been made by the Public Service Commission for the First District of New York for the construction of an extension of the Eastern Parkway subway on Utica Avenue. The extension will be a three-track elevated line from Eastern Parkway to Flatbush Avenue. The cost is estimated at $5,210,536.

Manhattan & Queens Traction Corporation, New York, N. Y.—The Board of Public Works has ordered the Manhattan & Queens Traction Company to begin construction of an extension of its railway from Lambertville Avenue and Sutphin Road through to Springfield Avenue, Hollis.

Cleveland, Akron & Canton Terminal Railway, Cleveland, Ohio.—J. J. Breitinger, a director of this company, is authority for the statement that work will be started on the proposed freight subway under East Fifty-fifth Street, Cleveland, on April 1. A contract, amounting to $12,000,000 has been awarded to the Foundation Company, New York, and it is expected that the road will be in operation within two years. He said further that an amendment to the franchise would be asked of the City Council, allowing the company to change its route somewhat. [Dec. 9, '16.]

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—This company contemplates the construction of an extension from Seville to Wadsworth.

Youngstown & Niles Railway, Youngstown, Ohio.—Construction will be begun next spring by the Youngstown & Niles Railway on its proposed line to Niles. The new company is a subsidiary of the Mahoning & Shenango Railway & Light Company. The line will begin at the end of the Steel Street line and will continue westward on the south side of the river, passing through the new town of MacDonald and entering Niles at the south end of the Main Street bridge. A mortgage has been filed at the courthouse by the company to the Guaranty Trust Company, New York, as trustee to secure an issue of $10,000,000 of bonds to provide funds to cover the cost of building the road and care for future financial needs. J. P. Wilson, Youngstown, president. [Aug. 26, '16.]

Toronto, Ont.—Small towns along the Canadian-Niagara frontier have received a communication from the Ontario Hydro-Electric Association protesting the granting of permission to the Toronto, Hamilton & Buffalo Railway, to extend its line to Port Colborne. The steam line has asked for a franchise to construct a steam or electric line along the Canadian-Niagara frontier which would be in competition with the hydroelectric line which was approved at the special election in January.

Dover-Rossville Transit Company, Dover, Pa.—Construction work has been completed by the Dover-Rossville Transit Company on its trackless trolley line between Dover and Rossville, and operation will be begun soon. [Jan. 20. '17.]

Philadelphia, Pa.—Plans for the Darby elevated line, Philadelphia, have been completed and forwarded to the Public Service Commission of Pennsylvania, with an application for a certificate of convenience to authorize construction. This completed the plans for all the lines of the comprehensive system as specified in the transit ordinance approved by the Philadelphia Council in 1916. The parkway, subway and elevated plans were filed by the Transit Department when a hearing was held before the Public Service Commission several weeks ago. The ordinance authorizing the construction of the system provides also for the building of the necessary spurs northeast and northwest from the Broad Street subway, but the lines are not definitely fixed nor the routes determined. The council will have to approve the routes and authorize their construction.

Marlin-Temple Interurban Company, Marlin, Tex.—S. D. Hanna, chief engineer of the Marlin-Temple Interurban Company, has filed a report showing preliminary estimates of cost of construction, which is placed at $450,000. The engineer's report is based on a 1 per cent grade. The proposed line is 33 miles long, and will pass through Temple, Belfalls, Durango, The Falls and Marlin. It will cross the Brazos River on a bridge to cost $53,500. Work will be begun on the laying of rails immediately. [Jan. 20, '17.]

SHOPS AND BUILDINGS

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—This company contemplates the construction of large additions to its present carhouse and a new paint shop in Lewiston. The building will be one story high, of brick construction, and will cost about $18,000.

Twin City Rapid Transit Company, Minneapolis, Minn.—A new $90,000 carhouse will be built by the Twin City Rapid Transit Company at St. Paul. The new station will take care of 100 street cars, thirty-six in the carhouse and the remainder on outside storage tracks, and will include trainmen's club rooms and offices for foremen and clerks.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—This company will erect a new passenger station at Princeton.

POWER HOUSES AND SUBSTATIONS

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—This company, through its subsidiary, the Consumers' Power Company of Maine, is constructing on the Manistee and Ausable Rivers two new additions to its power system in Michigan. At the Manistee Junction dam 23,000 hp. will be in operation by next December and on the Ausable two plants of 12,000 hp. each will be ready by June, 1918. Already the company has four plants on the river, with a total combined capacity of 60,000 hp. The demand for power in this section has increased 35 per cent during the past year.

International Railway, Buffalo, N. Y.—The International Railway will construct a new substation in Niagara Falls, N. Y. A site has been acquired at Allen Avenue and Twenty-fourth Street, and plans have been made for the erection of a brick and steel building to cost $31,000. Transformers and other electric equipment will cost approximately $150,000. The new station will not only supply the Niagara Falls local lines but will supply part of the power for the new Buffalo-Niagara Falls lines. The company has placed an order with the General Electric Company, Schenectady, for a 1000-kw. generator. Pending the completion of the new substation, the generator will be temporarily installed in the plant of the Niagara Falls Power Company. This will tend to relieve the shortage of power now being experienced by the company in the operation of its Niagara Falls local lines.

Richmond Light & Railroad Company, New Brighton, N. Y.—It is reported that the Richmond Light & Railroad Company plans to construct a new 6000-volt transmission circuit on both sides of Staten Island to afford improved lighting service to the different municipalities.

Northern Ohio Traction & Light Company, Akron, Ohio.—A 7500-kw. generating unit has been installed by the Northern Ohio Traction & Light Company in its substation at Akron, to be used until two new 20,000-kw. units have been installed. The first of these units has been delivered and will be in use in April. It is expected to have the second unit in operation in June. About 4000 hp. additional boiler capacity will be installed in the latter part of the year. The transmission and distributing lines of the company in the Canton-Akron district are to be extended materially this year.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent
Rolling Stock Purchases Business Announcements Trade Literature

Observations on Car Motor and Control Purchasing

Suggestions Made by an Engineer Who Urges Closer Co-operation in Purchasing and Greater Exactness in Specifying

Last year the electric railways of the United States and Canada ordered 3942 new cars. These orders were placed by 250 roads, and 3420 of the cars were for passenger service. Fully 3200 of these cars required motor equipment, so that it may definitely be stated that for the year 1916 the average motor order per week day was for about thirteen cars. Many motors of course also were ordered for replacements.

Types and capacities of motors vary so widely that it would be difficult to approximate the sale value of the average car order. However, the duty which the motor car has to perform and the original and up-keep cost of the electrical equipment are sufficiently great in value to warrant the statement, based on experience, that electric railways could profitably afford to devote more engineering attention to motor buying. The thoughts here set down are based on a desire to bring about closer and more profitable co-operation between the buyer and seller of motor car electrical equipment.

Study Operating Conditions

Manufacturers of motor equipment invariably welcome an opportunity to help in the study of operating conditions. This will lead to the choice of the correct motor for the actual service desired. Any approximation of service conditions introduces estimations rather than definite calculations and thus may involve the correctness of the final choice. Descriptions of service conditions when given to a motor manufacturer may be accurately recited so far as they go, but in general it is safe to say that a more detailed analysis would bring out more accurate results. For example: Exactness in statements of the miles of operation in city, suburban and interurban territory are not always clearly set forth. Variation in these classes of service will sometimes show that the real conditions to be met are less severe or more severe than the average would have indicated, and therefore might involve inaccuracy in the recommendations made the manufacturer. It is not unknown for a manufacturer of motors to be confronted with conditions of service desired in which the total standing time is equivalent to the total running time. A statement of how the working and idle hours of a motor are to be distributed throughout the day will mean much in the consideration of the internal heating problem.

It is reported on reliable authority in connection with service conditions of a locomotive that where the question was asked, "How many hours a day would it be in operation?" the reply was to the effect that "It would not operate during the day, but merely at night."

In the setting down of the working conditions to be met by new motors, careful attention should be given to such items as stops per mile and their duration. Special inspection of the service with a stopwatch in hand may be necessary to bring existing data on stops down to date. All too frequently the statement of the average voltage over the line is the result of observation of the brilliancy of the lamps in the car rather than actual volt meter readings. The proper way to obtain the average voltage is to take ten-second voltmeter readings on the car during light-load and heavy-load period round trips.

The weight recited in connection with either an old or a new car is too often in guess work, and a variation of even more than a ton does not seem to call for careful weight-checking even though the weight to be moved is a most important factor in the choice and design of motor equipment.

It is often indicated by the buyer that such and such a motor is successfully performing service similar to the one under consideration, and therefore the buyer calls for "The same size motor." On inquiry it may be found that no real observations were taken to determine whether the service to be performed was or was not similar to that on which the old motors were supposed to be doing so well. Success is merely a relative term. A given company may be accustomed to certain conditions of failure which on another property would not be tolerated. This is one more reason for furnishing the motor manufacturer with complete data rather than permitting the choice of equipment to be based on the experience of any one man or group of men.

Make Specifications Definite

Definiteness in specifications for motor equipment is far more essential than for most any other class of material purchased by electric railways. Specifications requesting bids very often indicate conditions of service to be met, yet the full descriptions of service may be found to be incomplete. Time will not always permit the motor manufacturer to make detailed investigations for the purpose of verification. In such instances the bidder may find himself unable to make the best possible offering. Hence, the purchaser may not have the advantage of fully competitive bidding. Alternative propositions which may be submitted on the basis of assumed changes in requirements breed uncertainty.

For the reasons here set forth, an electric railway which contemplates the purchase of motors either for new cars or for replacing antiquated equipment is certainly warranted in analyzing its conditions in a most exhaustive way before requesting bids.

Specifying Axle Sizes and Gears

Now as to some of the details. Car wheels are practically standard and change mainly as to diameter, but motor gearing is built especially to suit the service conditions of a given road. Yet the choice of motor gearing too often is only considered, analyzed and determined upon after all of the rest of the equipment has been ordered. It should be remembered that if solid gears are to be used, which is the standard practice of the present day and logically so, the gears will be needed by the manufacturer almost as soon as the motor order is placed.

And while on the subject of gears, it might be well to point out that the allowance for press fits of the gear on the axle has been fixed by practice. The standard established is 0.001 in. allowance per inch of diameter of the bore of the gear, with a manufacturing tolerance of plus 0.0015 in. to minus 0.001 in. This factor is known, but in placing the order for the axles the diameter is not always indicated with due regard to manufacturing tolerance in finishing, and it will readily be seen that proper allowance for finishing in a given case may be wiped out by lack of consideration of this factor.

Forehandedness in ordering motor equipment also may bring about considerable relief to the manufacturer when fulfilling delivery requirements. The railway motor consists of approximately 175 different parts, made from about twenty-five different kinds of materials. Copper has always been and probably will remain for some time the most difficult portion of the motor to obtain. It is much easier to secure the ordinary commercial steel and wood entering into the construction of the car body than the cable, wire and copper parts needed in the construction of the car body, yet the amount, size and type are determined only too often at the very last moment—thus creating rush and confusion and possible delay in delivery.

Full standardization of equipment is something worth working for. If the day ever comes when the design of motors can be restricted to ten sizes or less for ordinary city

and interurban work, then the railways properly may demand a more finished product, which the manufacturers in turn will be able to deliver at less cost. Now-a-days it frequently happens that changes from a manufacturer's standards are requested apparently in order only to meet the notion of the buyer. Standards adopted by the manufacturers are the result of years of experience and exemplify the recorded wish of operating engineers throughout the country. Therefore, one who is specifying motors must be sure of his ground before setting his requirements against this array of experience and talent.

To summarize: The main things to be remembered are forehandedness in ordering, adherence to established standards where possible, and a thorough study of operating conditions crystallized into a definite set of specifications.

Relieving the Car Shortage

Business Men Urged to Work for Central Traffic Regulator—Railroads Need Reserve for Abnormal Times

In a recent answer to queries propounded by the American Druggists' Syndicate, A. H. Smith, president New York Central Lines, explained the causes of car shortage in this country and the means for its relief. In his opinion, the present congestion has been brought about entirely by an unprecedented and abnormal industrial situation, created somewhat by the catastrophe abroad. In addition to the enormous foreign traffic moving to and from tidewater, there has been set up a greater internal industrial situation in manufacture and commerce to provide these supplies. An unprecedented amount of ore, coal, coke, pig iron, billets, automobiles, motor trucks, munitions, food products and hospital supplies of all kinds are being handled, and in many cases half a dozen times. Within a few months the railroads were called upon to perform in many instances a service 40 per cent in excess of the preceding year. They had not the reserve for such a condition, and had been unable financially to anticipate it even if they would have been justified in so doing. Simultaneous with the demand for rail transportation, there occurred a demoralization of ocean shipping, owing to naval warfare and to the withdrawal of ships for other purposes. Traffic now has to be handled by embargoes in harmony with the ocean shipping, which naturally results in congestion in the interior.

The duration of the congestion, Mr. Smith says, is problematical. Unfortunately the very conditions which have produced the present prosperity have greatly increased the costs of material, including equipment, and the great shortage of labor not only retards construction work but embarrasses the daily operation of railroads. Notwithstanding the great cost of doing work at the present time, however, some large companies now have under contract and under construction hundreds of additional engines and thousands of additional cars which, as they arrive from time to time, will aid somewhat in facilitating the movement of traffic.

Mr. Smith believes that business men can render powerful aid, if not in overcoming the immediate situation, at least in preventing to some extent a recurrence of similar congestions. This aid must come through the creation of a healthy, honest, fair and intelligent public opinion towards railroads. Railroads must be permitted to build up a surplus and a reserve to meet the abnormal fluctuations in business. These fluctuations come suddenly and spontaneously, due to the abundance of crops and other natural conditions, which cannot be anticipated. As long as the railroads are required to exist on a miserly basis of the sparse year and the minimum traffic, it is useless to expect them to be ready for abnormal conditions and for the years of plenty.

The ultimate remedy seems to be that business syndicates, chambers of commerce, manufacturers' associations, traffic leagues and other various commercial and agricultural organizations must take up their own case by organizing in some way a national board of transportation, and undertake a campaign of education which will ultimately show the wisdom of creating a central authority to co-ordinate the work of federal and state commissions and regulate traffic. Before such a tribunal the board of transportation and the railroad interests could always meet and determine what really ought to be done in the way of rates and improvements, and the means of raising the money therefor.

Long-Period Deliveries for Raw Materials Continue

No general change in the raw materials delivery situation is apparent, except perhaps a psychological one on the part of buyers. In some few cases an improvement has already been noted. As a rule, however, deliveries of raw materials are just as long as they were in the fall of 1916, and in many cases longer. Brass manufacturers, steel manufacturers, foundries, etc., have sufficient orders on their books to take care of capacity production for many months, and will therefore be unable to materially better deliveries for some time. The shortage of freight cars for the past three months has been another very disturbing factor in this connection. Some roads have been forced to place embargoes on heavy freight, thereby adding a further delay in shipment.

In view, however, of the chaotic state of deliveries of twelve months ago, it can almost be said that at the present time deliveries are in an excellent state. As buyers formerly had been accustomed to receiving delivery in at least three weeks or a month, they were naturally disturbed when deliveries had to run into months and months. Factories were sending orders for rush delivery and making every effort to replenish and maintain their stock. When, however, buyers had reached that psychological state that they finally were satisfied that deliveries could not be made in as short a time as formerly, they accepted the situation as such, and made their plans accordingly. As a consequence, even though the deliveries are two, three, four, and sometimes more, times longer than prior to the war, there is very little suffering compared with what there was ten months ago. Contracts are being placed now for three-months' delivery with little more feeling in the matter than when they were placed for three weeks.

It took some time for manufacturers to adjust themselves to these conditions, but it is felt a favorable result has now been achieved. Buyers of finished products, however, have been slower in accepting these conditions, but now are rapidly coming to share their manufacturer's point of view.

CURRENT PRICES FOR MATERIALS

Quoted Thursday, Feb. 8.

Copper (electrolytic)	New York, 33 cents per pound
Rubber-covered wire (base)	New York, 38 cents per pound
No. 0000 feeder cable (bare)	New York, 37½ cents per pound
No. 0000 feeder cable (stranded)	New York, 35 cents per pound
No. 6 copper wire (insulated)	New York, 35 cents per pound
No. 6 copper wire (bare)	New York, 37 cents per pound
Tin (straits)	New York, 55 cents per pound
Lead	New York, 8½ cents per pound
Spelter	New York, 10¼ cents per pound
Rails, A. S. C. E., O. H.	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3 per 100 pounds
Steel (bars)	Pittsburgh, 3.25 cents per pound
Sheet iron (black, 28 gage)	Pittsburgh, 4.50 cents per pound
Sheet iron (galv., 28 gage)	Pittsburgh, 6.25 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire,	New York, $6.82 per 100 ft.
¾-in. galv. high strength steel wire	New York, $3.41 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.52 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $1.94 per 100 ft.
Galvanized barb wire and staples.	Pittsburgh, 3.85 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.65 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.07 per barrel
Cement (carload lots)	Chicago, $1.96 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Sand in large lots	Chicago, $1.25 per ton
Linseed oil (raw, 5-bbl. lots)	New York, 95 cents per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, 96 cents per gallon
White lead (100-lb. keg)	New York, 9¾ cents per pound
Turpentine (bbl. lots)	New York, 52½ cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29½ cents per pound
Copper (light)	New York, 24½ cents per pound
Red brass	New York, 19 cents per pound
Yellow brass	New York, 18 cents per pound
Lead	New York, 7.25 cents per pound
Steel car axles	Chicago, $34 per net ton
Zinc	8 cents per pound
Iron car wheels	Chicago, $18.50 per gross ton
Steel rail (scrap)	Chicago, $24.50 per gross ton
Steel rail (relaying)	Chicago, $30 per gross ton
Machine shop turnings	Chicago, $9.25 per net ton

Railways to Purchase Coal Mines

In order to improve existing fuel conditions on their various properties, the General Gas & Electric and Eastern Power & Light Companies, New York City, some time ago took under advisement the policy of furnishing fuel to their subsidiary properties through the purchase or lease of some desirable coal properties. A careful investigation was made of certain coal mines then on the market, and options have been taken on them. The closing of these options will depend upon tests now under way at the plants of subsidiary companies under actual operating conditions. Special attention has been given to the matter of cars and transportation facilities in selecting the location of these mines, and it is felt that satisfactory service is assured.

ROLLING STOCK

Eastern Pennsylvania Railways, Pottsville, Pa., are in the market for five car bodies to replace the equipment lost in a recent fire.

Tacoma Railway & Power Company, Tacoma, Wash., plans to spend $70,000 for new cars. In addition, heaters will be purchased for twenty-one cars not having them at present.

International Railway Company, Buffalo, N. Y., has purchased five wooden passenger coaches from the Pennsylvania Railroad and will have them rebuilt for use on the new Buffalo-Niagara Falls line which will probably be placed in operation in the spring. The electrical equipment will be furnished by the General Electric Company.

Interborough Rapid Transit Company, New York, N. Y., is in the market for 310 steel subway cars, 217 of which are to be motor cars and ninety-three trail cars. An option to purchase an additional 167 car bodies of which 120 will be motor cars and forty-seven trail cars is included, and will be exercised within six months of the date of the proposal.

Boston (Mass.) Elevated Railway, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 27, 1917, as having purchased thirty-five steel cars for service in the Cambridge subway and Dorchester tunnel extension to Andrew Square, has specified the following details for this equipment:

Builder of car body, Pressed Steel Car Company
Type of car.....Closed, motor
Seating capacity...Seventy-two
Weight (car body only), Approx. 41,360 lb.
Bolster centers, length, 51 ft. 0 in.
Length of body, 69 ft. 2½ in. over bumpers
Width over sills.....9 ft. 6 in.
Width over all.....9 ft. 6 in.
Height, Rail to top of floor 50 in.
Body .....Metal
Interior trim .....Enameled
Roof, type..Modified steam car
Underframe .....Metal
Air brakes .....Westinghouse
Axles .....Carnegie Steel
Bumpers ...Hedley anti-climber
Cables .....Westinghouse
Control...Westinghouse automatic line field control
Couplers..Tomlinson, Ohio Brass
Door operating mechanism, National Pneumatic
Gears and pinions.Westinghouse
Journal boxes.....Symington
Motors, type and number, 2 West. 557-A-1
Motors .....Inside-hung
Seats, style .....Longitudinal
Seating material .....Carpet
Trucks, type, Brill 27 MCB-2 and 3
Ventilators .....Perry
Wheels, Trailer 31 in., motor 34 in.

The cost of these cars complete will be about $18,500 each, compared with $11,415 each for similar cars in 1912. Delivery will be made in September of this year.

TRADE NOTES

Farley Gannett, consulting engineer, Harrisburg, Pa., has changed the firm name to Gannett, Seelye and Fleming. Mr. Seelye has been a member of the firm since its organization, Aug. 1, 1915, and Mr. Fleming since February, 1916. On account of expanding business, the firm has found it necessary to change the location of its offices, and after Jan. 15 will occupy offices at 204 Locust Street, Harrisburg, Pa.

General George W. Goethals announces that he has opened consulting offices in the Wall Street Exchange Building, 43 Exchange Place, New York. He has associated with him experienced specialists and will engage in a general consulting practice in civil, electrical, mechanical and hydraulic engineering. Special attention will be given to examinations and reports on canals, harbors, dry docks, terminals, dams, water-power development, water supplies, purification of tropical waters, refrigeration, reinforced concrete structures, organizations, management and public utilities.

Walter Kidde, engineer-constructor, New York, has incorporated his organization under the title of Walter Kidde & Company, Inc., with headquarters at 140 Cedar Street. Mr. Kidde began business in 1900 and has done a large amount of work in the construction and equipment of factories. One of his most recent commissions is the plant of the American Hard Rubber Company, at Akron, Ohio. The officers of the new company are: Walter Kidde, president; B. G. Worth, vice-president; I. R. Lewis, secretary and treasurer. These are all members of the board of directors, which also includes Henry Lang, who is vice-president of the Ingersoll-Rand Company, and E. S. Boyer, who is associated with the American Hard Rubber Company.

ADVERTISING LITERATURE

Cooper-Hewitt Electric Company, Hoboken, N. J., has prepared bulletin No. 67, descriptive of its P, L, H and K lamps for direct-current indoor lighting.

United Hammer Company, Boston, Mass., is distributing a twenty-four-page booklet on Fairbanks power hammers. In this booklet, five different types of hammers, made by this company, are described and illustrated.

Harrison Safety Boiler Works, Philadelphia, Pa., has issued publication No. 710 on "Cochrane" heaters for use in heating, metering and softening water for boiler feed and other purposes.

Westinghouse Lamp Company, New York, N. Y., announces the construction of a large factory at Trenton, N. J., for the manufacture of incandescent lamps. The site for the factory covers about five acres, upon which will be built a plant of 200,000 sq. ft. of floor space. The contract has been awarded to the Stone & Webster Engineering Association and the cost of the buildings and equipment will amount to more than $1,000,000. When in full operation, the lamp factory will employ about 600 people, manufacturing approximately 1,500,000 Westinghouse Masda lamps per month.

Harvey Fisk & Sons, New York, N. Y., have issued 'United States Bonds, Historical and Descriptive," a seventy-four page pamphlet which contains an historical sketch tracing the fluctuations in the Government's debt from about $75,000,000 in 1791 down to the present time when the debt amounts to less than $1,000,000,000. The different outstanding issues of United States Government bonds are described. The portions of the Federal Reserve Act dealing with the refunding of United States bonds are analyzed and all rulings in regard thereto of the Federal Reserve Board and of the United States Treasury Department are printed. Existing provisions of law for new issues of United States bonds are clearly set out.

NEW PUBLICATIONS

Bridge Engineering. By J. A. L. Waddell, LL.D., consulting engineer. John Wiley & Sons, Inc., New York, N. Y. Two volumes. Vol. 1, 1064 pages; Vol. 2, 2177 pages. Cloth, $10 per set.

Dr. Waddell has put into this great work the cream of a lifetime of study and application in this special field. The treatment is, of course, most exhaustive. Practical suggestions regarding bridge design and construction are given, as well as charts and data for making cost estimates for bridges and structures of any sizes yet attained, or for approximating weights of metal in spans of unprecedented dimensions.

Safe Practices. Edwin R. Wright, editor. National Safety Council, Chicago, Ill.

The Council is reporting the results of its investigations on accident prevention summed up in monthly pamphlets. The first issue is on the subject of "Ladders," and it contains a brief review of the safety movement. The second is devoted to the subject of "Stairs and Stairways," and the third issue, just published, is entitled "Boiler Rooms." It is intended in this way to deal with various subjects separately and furnish information so that it can be preserved for reference. Details regarding the Council's activities can be obtained by application to W. H. Cameron, general manager.