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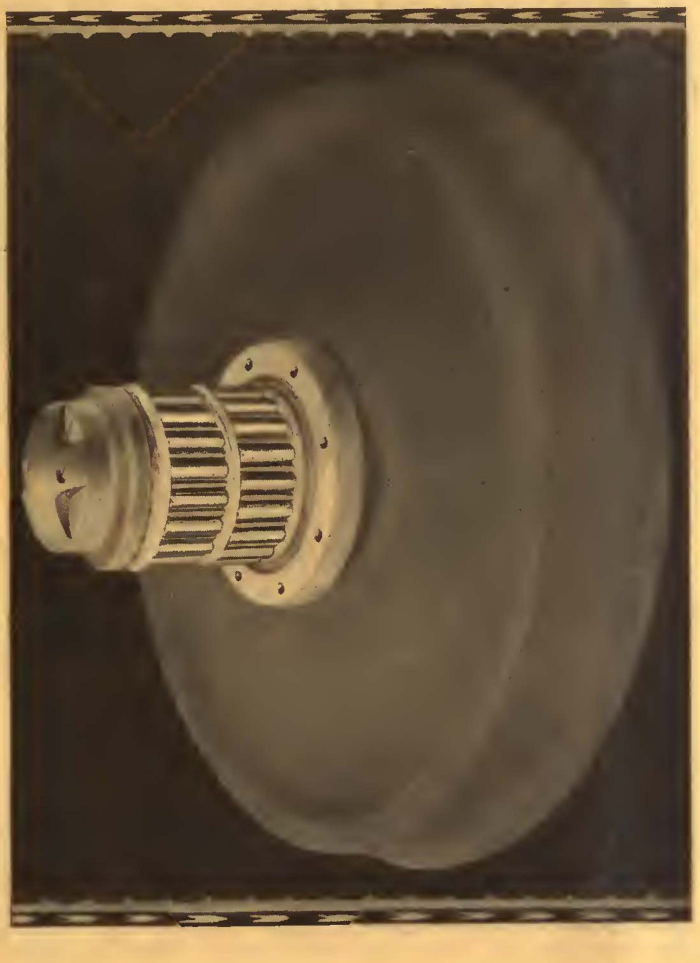
ELECTRIC RAILWAY JOURNAL



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WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 62, No. 18 New York, November 3, 1923 Pages 765-806

ELECTRIC RAILWAY JOURNAL

CONTENTS

Job Printing

IN a secluded corner of the eleventh floor, a little removed from the din and commotion incident to the working of linotype machines, is the job printing department of the McGraw-Hill Company. Here is a complete print shop within a print shop. These men whom you see cutting leads, and setting type are a busy lot. This is evidenced by the fact that the average weekly output is about 145 jobs. They range all the way from reprints of articles and advertisements for our readers and advertisers to cards, circulars, booklets, company and publication stationery, etc., for our own use. In addition we often fall back on the Job Printing Department to do rush inserts for the publications. Considerable color work, too, is included in its tasks. The handsome literature you see advertising our papers to prospective subscribers and advertisers and promoting our company as a publishing institution is also the product of this shop.

This job printing force is something in your life, too, reader of the ELECTRIC RAILWAY JOURNAL, because "Who's Who" in the railway field is composed right here in this department. Twice a year these men give us the McGraw Electric Railway Directory, without which we railway followers would be lost.

The job composing room pictured above is equipped with the most up-to-date steel type frames, of which there are ten. Seven full series of types are carried. In the press room, there are three Kelly presses, one Universal, and four Chandler & Price presses, two of which are equipped with Miller automatic feeders. Nine men are employed in the pressroom, fourteen in the composing room.

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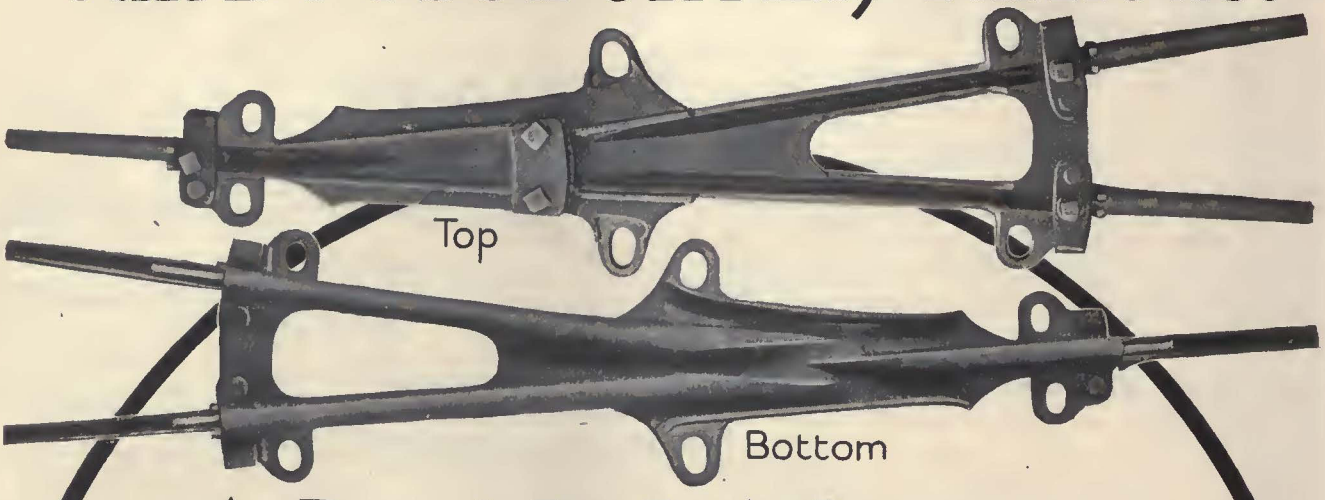
Printed in U. S. A.

Type CR Universal Trolley Frogs Can Be Used On Any Turnout.



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Until the introduction of the Westinghouse Universal Trolley Frog, difficulty was experienced in making the overlapping-runner design operate satisfactorily when running from curve to tangent.

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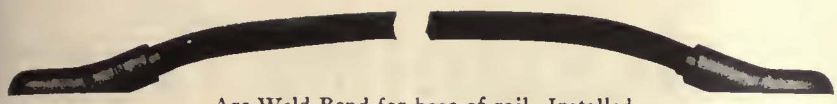
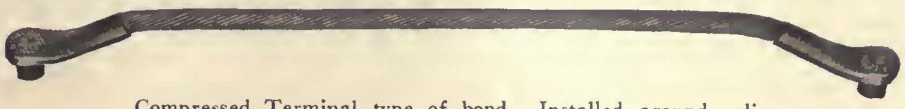


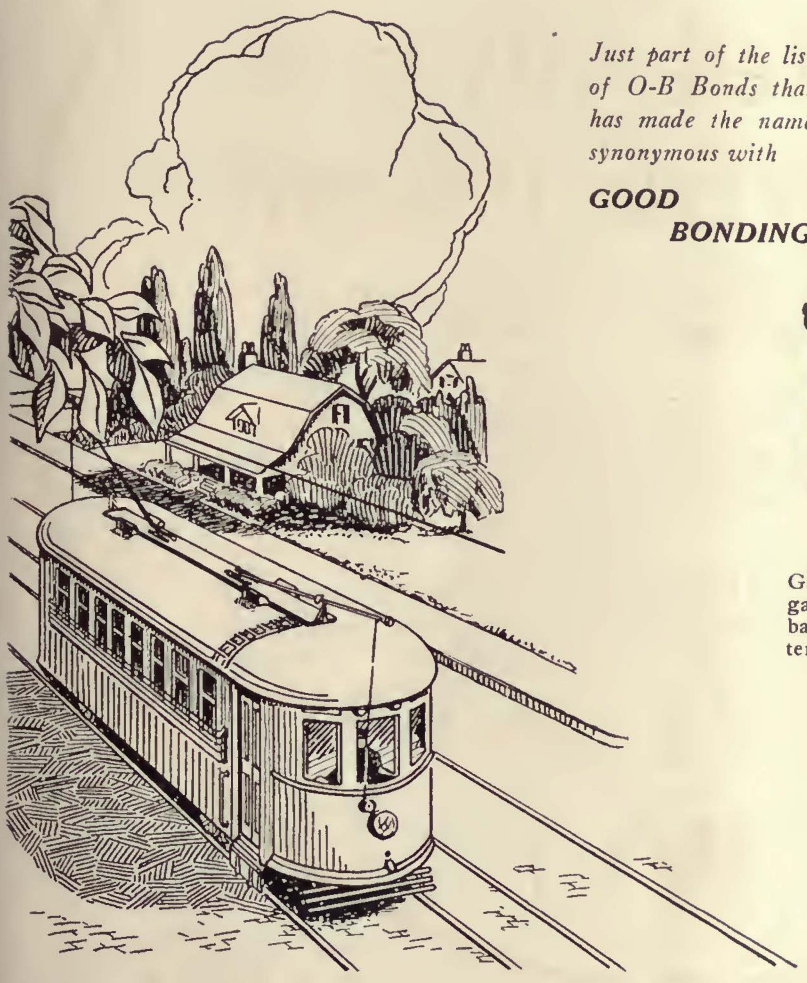
Arc Weld Bond for base of rail. Installed around splice plate. Wide angle welding scarf makes welding easy. Type AW-7.



Compressed Terminal type of bond. Installed around splice plate, also for cross bonding. Made in a variety of lengths and capacities. Type E-2. Made also in Pin Driven type.

Pin Driven Terminal type of bond. For installing on web of rail under splice plate where space is limited. Made also in Compressed Terminal type. Cut shows special bond for very limited space. Type FP.

For the Return Circuit



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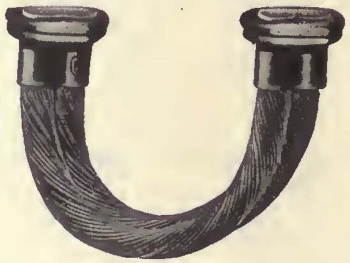
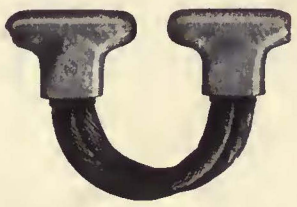
UNIVERSAL RECOGNITION



Gas Weld Bond. A highly efficient gas weld bond for application to ball of rail. Has steel armored terminals. Type ST-2.



Arc Weld Bond for ball of rail. Has a wide angle welding scarf like the AW-7. Type AW-8.

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—a treadle built in the platform
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—a reliable door engine above

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How you can apply it to your one-man cars, to speed up passenger interchange and safeguard fare collection, will be shown by our representatives.

The Chicago cars with these devices have shown remarkable results. The automatic door operating mechanism is National Pneumatic throughout.

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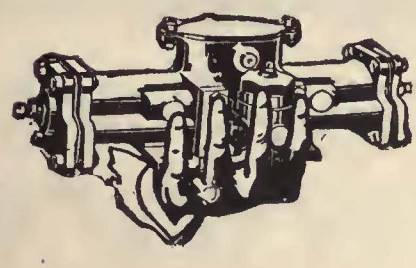

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IN SEATTLE

The portable compressor outfit illustrated here was built by the Seattle Municipal Railways by mounting a Westinghouse-National E-4 Type Air Compressor on a second-hand 2½-ton chassis, with special body. The outfit operates four tie-tampers or two paving breakers and has saved in some cases as high as $100 to $150 per day in the cost of way maintenance work. It enables six men to do the work formerly done by thirty. The compressor has a piston displacement of 110 cu.ft. per minute and is equipped with Automatic Control.

You, too, can Economize!

COMPRESSED air can be employed for innumerable operations which are slow and costly when performed by hand. Westinghouse-National Industrial Air Compressors are built to meet every need of the electric railway field, and the satisfactory service which they invariably give has become a matter of tradition. The highest degree of economy is attained in the general plan of design and especially in the distinctive feature of Automatic Control. All types and sizes. Write today.

Westinghouse Traction Brake Company
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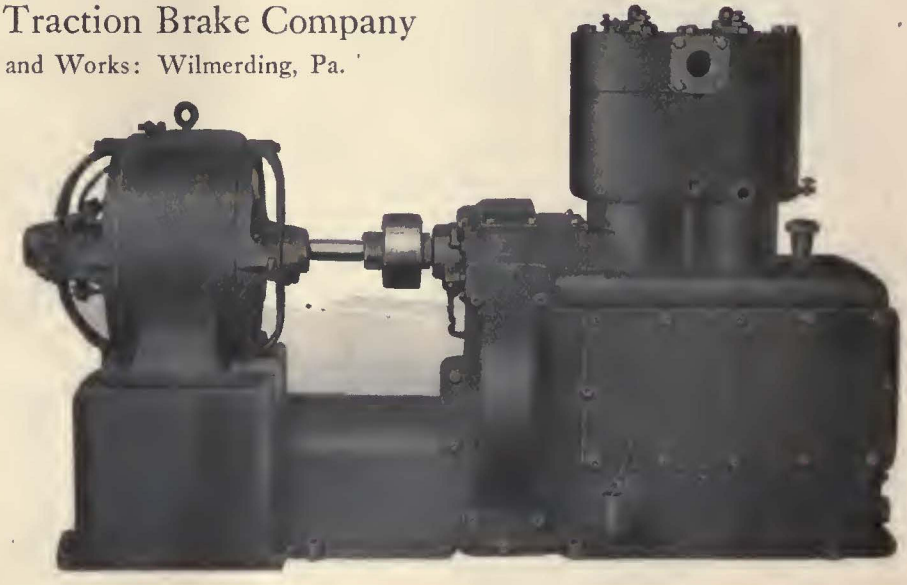
Westinghouse Type E-4 Compressor with Thermo-Syphon Cooling System



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Air Compressors

"QUALITY MACHINES FOR QUALITY SERVICE"

From the brief that won the Charles A. Coffin Prize of 1923

"Reduction of Power Consumption"

"Believing that the greatest economy can be had only by careful analysis of all items which enter into cost of rendering service, power recording meters were installed on all passenger equipment and accurate records kept of power required per car mile in all classes of service. The reduction in energy consumption which followed the installation of this metering equipment was due to several causes, but each of the steps taken to accomplish results were studied with the aid of these meters." (The above quotation from page 676 *Electric Railway Journal*, October 20th, 1923.)

"It has been done"

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Have Helped

Economy Meters were first installed on the North Shore lines in 1915. Based on performance they have repeatedly ordered Economy Meters for new equipment.

Economy Meters are standard on over 100 properties, large and small. They are inducing total savings well worth while, whether you are operating high speed interurbans or city street cars.

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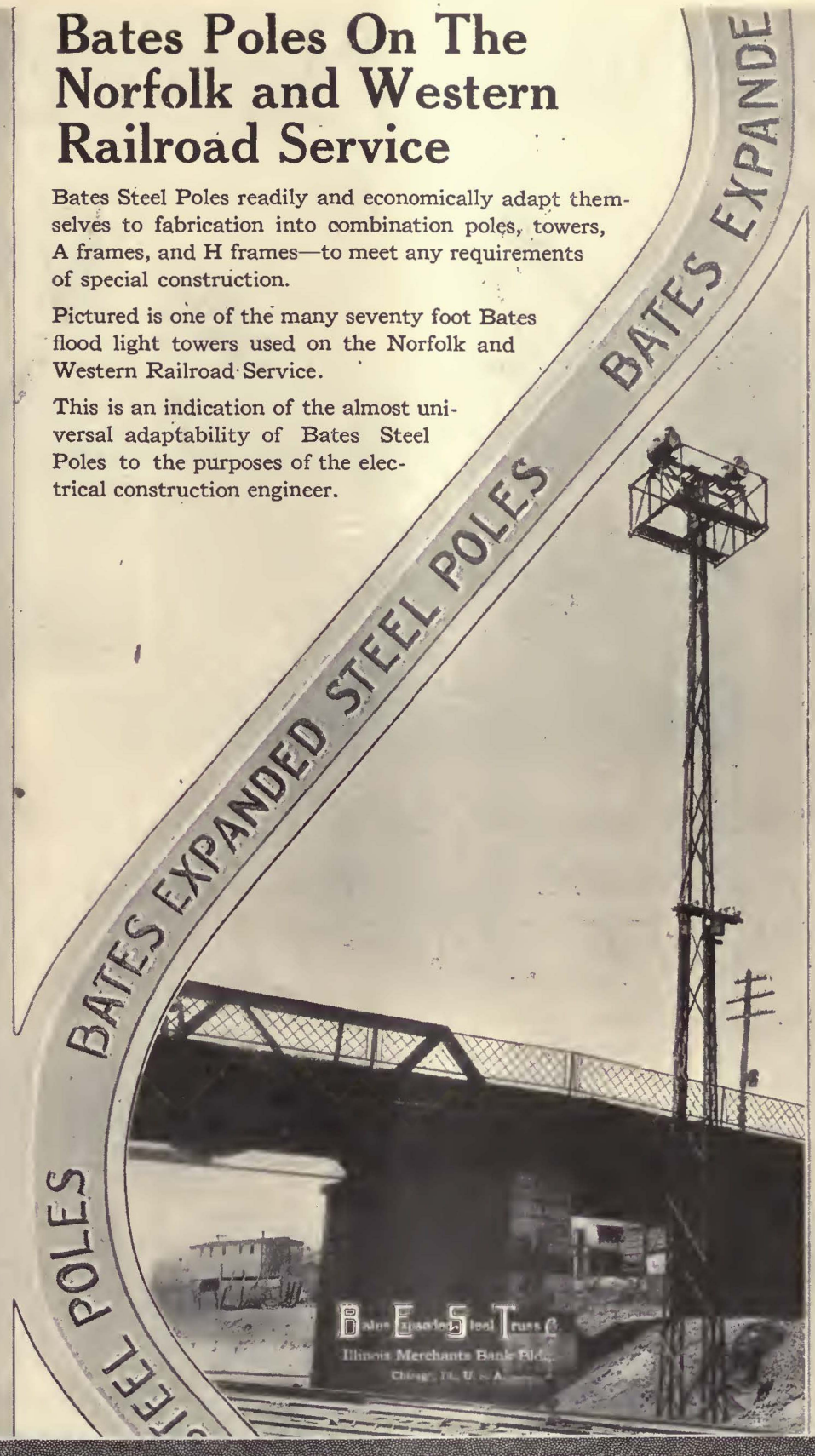
METER THE ENERGY—THAT'S WHAT YOU WANT TO SAVE

Bates Poles On The Norfolk and Western Railroad Service

Bates Steel Poles readily and economically adapt themselves to fabrication into combination poles, towers, A frames, and H frames—to meet any requirements of special construction.

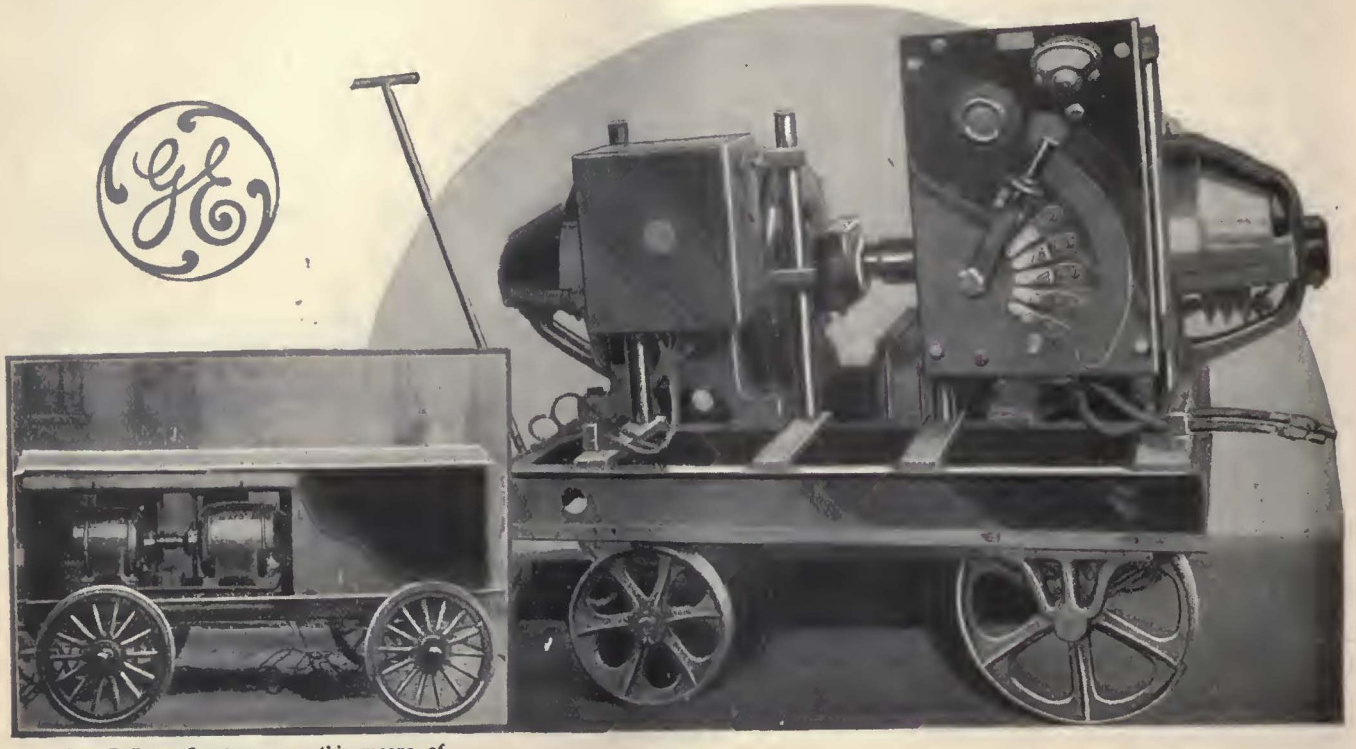
Pictured is one of the many seventy foot Bates flood light towers used on the Norfolk and Western Railroad Service.

This is an indication of the almost universal adaptability of Bates Steel Poles to the purposes of the electrical construction engineer.



BATES ONE PIECE EXPANDED STEEL POLES

Here's the Arc Welder for You



One Railway Company uses this means of mounting "WD-9" for track work.

"WD-9" does great shop and track work!

"WD-9" was specially designed to run at constant speed where the supply circuit varies even as much as 400 volts minimum or 650 volts maximum. It gives the operator constant conditions in the arc—and that means good welding. It is a compact, well-built set—easy to use and economical to operate.

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Get acquainted with "WD-9" at any of the G-E Sales Offices which are in all large cities.

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GENERAL ELECTRIC

43B-750

New York, Saturday, November 3, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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

Volume 62
Number 18

The Electric Railways Are Coming Back

SO MUCH evidence has accumulated showing the electric railways are coming back, that they now have a real story to tell to the financial world. An opportunity to do that came last week at the convention of the Investment Bankers' Association in Washington, D. C., and J. W. Welsh, executive secretary American Electric Railway Association, made the most of an invitation to speak on the electric railway situation. His address is presented elsewhere in this issue. It consists of a plain statement of facts, forming for the bankers inescapable proof that the electric railways are making noteworthy progress in working out their difficulties. They are surely coming back.

That was the most important message the industry had to give the investment bankers, for many of them have not been cognizant of the improving situation and have continued their disapproval of these securities. In reality the time is not far distant when electric railway securities are again going to be considered in the investment rather than the speculative class. And this the investment bankers want to know. So Mr. Welsh's talk was timely and helpful.

An Intensely Interesting Narrative of Railroad Development

LEST some readers may have missed it, special attention is directed to the publication in the JOURNAL for Oct. 20 of the brief of the Chicago, North Shore & Milwaukee Railroad submitted in the contest for the Charles A. Coffin gold medal prize. Every one interested in electric railways will find the reading of that brief most interesting and profitable. The editors of this paper were familiar with the matter set forth in the brief, as practically every accomplishment recorded there had been related in the JOURNAL as it was done. And the 1922 Annual Convention Number of the JOURNAL devoted fourteen pages to a story surveying all the things that had been done to build up this property.

Yet the editors found this brief—the road's own story of its accomplishment—the most interesting narrative of electric railway development they had ever read. It is a plain statement without embellishment of what has been done, the methods followed and the results obtained. It ought to be read and reread by every interurban railway man in the business, for it contains a host of practical, proved suggestions of things that can be done to build up a railroad. Of course it is realized that fundamentally this line had something to build on, but aside from having a good right of way between good terminal cities, few roads are any farther down the scale of physical and public relations imperfection, as a basis to build on, than was this line.

That the development of the road has involved more than ordinary progressiveness is reflected in the frequency with which it has been the subject of comment and articles in this magazine. Having thus followed the work of Britton Budd and his associates, the JOURNAL indorses the finding of the Coffin prize committee, for it believes a record of accomplishment is set up here that is without parallel in recent electric railway history. And the significant thing is that it has all been done by simple, ordinary means. There has been nothing spectacular or superhuman in the program. It is just the accumulative result of a thousand little improvements, but coupled with a sound, sincere policy of giving the public what it likes and wants.

The Motor Bus at the Convention

TO SHOW the progress of the electric railway industry toward acceptance of the motor bus, and the general thinking about the bus, it is interesting to bring together the gist of the discussion on this subject at the recent convention.

L. S. Storrs, president the Connecticut Company, observed that today we find the careful students of transportation in practical agreement that the two agencies (railway and bus) must be co-ordinated. As to how to establish co-ordination, he said that the necessary preliminary to any effort to co-ordinate these two agencies is a public opinion that will support legislation which recognizes that the two agencies are merely different means of providing a convenient and needed public transportation service, which must be unified in order that the various communities may have a thoroughly efficient transportation service at the lowest possible rate. We can talk all we please, he said, about co-ordinating these facilities, but we can accomplish nothing until public opinion is of a temper to accept the needed regulation. Real co-ordination devolves upon the transportation utilities, and a full measure of bus operation should be undertaken as rapidly as the need for service is apparent and funds available to provide the equipment.

Of the situation in California, where bus competition has been most intense, D. W. Pontius, vice-president and general manager Pacific Electric Railway, told of the material progress that has been made in correcting the situation—partly by the railways themselves going into the bus business and partly through legislation. The main point cited in correcting the situation was the legislation effected imposing a tax of 2 cents a gallon on gasoline and requiring that buses and trucks operating in common carrier service must pay to the state 4 per cent of their gross revenue.

Pertinent among the statements made by the com-

mittee on bus operation was one that if a railway company adopts the policy of providing all transportation needs in the territory served, the possibilities of the bus as an aid to such a policy cannot be overlooked. While noting that supplanting of existing rail lines with bus routes is a matter of economics, the committee acknowledges that it will be found that when rail lines with low earning power are faced with heavy rehabilitation or paving charges, the bus can be used as a means of continuing service with an expenditure for equipment much below the cost of plant renewals or paving. It is also asserted that the electric railways are becoming increasingly interested in the use of the bus in meeting the full requirements for transportation in the territory which they individually serve.

H. W. Alden, president Society of Automotive Engineers, the engineering association of the automotive industry, in a friendly discussion of the report of the committee on bus operation, pointed out how this report lacked comprehensiveness in several respects. He observed that the figures presented in the report would have been somewhat different if independent companies had been included, because a great many bus companies are making money. His principal mission in appearing before the railway association was to encourage and urge co-operation between the railways as bus users and the S.A.E., in order that designs of buses may be developed which will meet the requirements of service.

Another non-railway man who addressed the association was Alfred Reeves, general manager National Automobile Chamber of Commerce, the body which primarily looks after the business interests of the automotive industry. No progressive railway man could take exception to his remarks. Out of an interesting address, these few thoughts are worth repeating here. He said that with the present congestion of traffic and concentration of population, the trolleys cannot properly handle all street transportation. They cannot afford to build in sparsely settled territories. Nor can the bus do it alone. Think how many buses would be required, he says, to supplant the trolley which last year carried 15,000,000,000 passengers. A combination of trolley and bus seems to be the real answer. In certain fields of street transportation, the trolley is supreme in efficiency and economy. In other places, the bus holds a similar position. This demands that the two forms be co-ordinated. The prime consideration, therefore, is to fix the fields of endeavor which each shall enjoy.

Speaking of the opportunity which the bus affords to railway men, he said that as experts the trolley people have a rare opportunity to enter the bus field and thus give the public complete transportation. By hesitating, trolley men have missed some golden opportunities, although it is not too late if they will enter the field in the proper spirit. He offered the suggestion that unless the electric railway interests take steps to discharge the apprehension held by many people that if the railways take over the buses it will be for the sole purpose of bringing about their elimination, their entrance into this new field will not receive a proper welcome.

On the matter of regulation, he commented that the automotive industry is in accord with the railway industry, so far as it relates to state supervision of common carriers. He reminded the railway audience that more than two years ago the National Automobile Chamber of Commerce declared that control over motor vehicles as common carriers if deemed necessary should be placed in existing state commissions, and that as a prerequisite to operation the owner should be obliged to obtain a certificate of convenience and necessity. A proviso in this declaration was that lines in actual operation should *prima facie* be regarded as necessary.

The Opportunity of the Railway Association

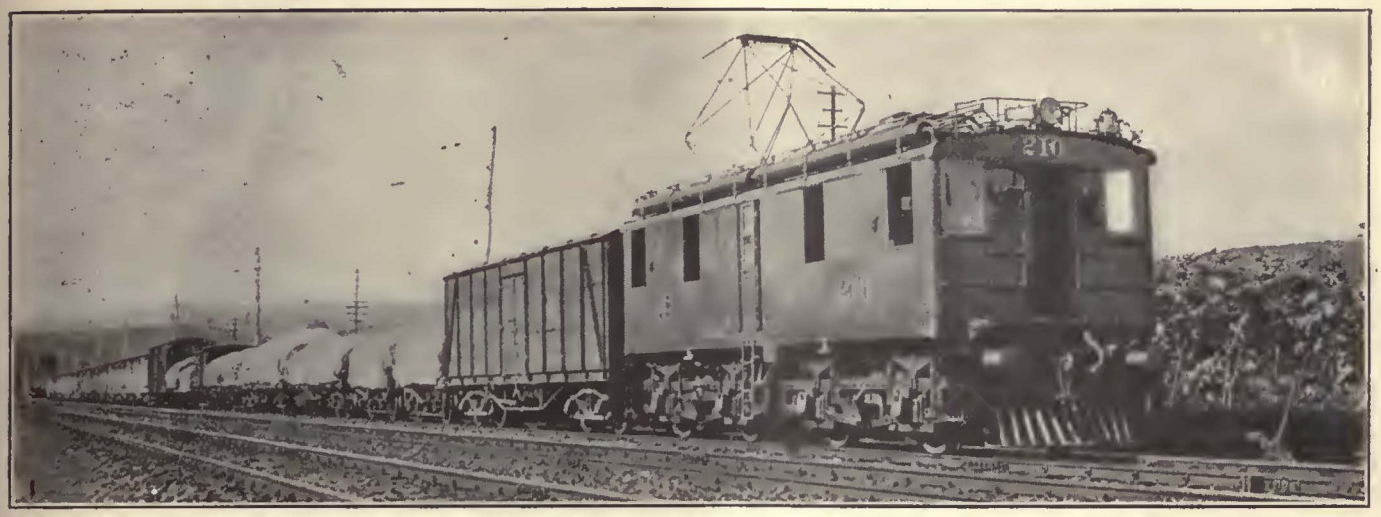
WITH the best thinking inside and out the railway association now concurring very largely in the desirability of co-ordinating bus with railway, and of preserving the monopoly of all transportation facilities in any community, it would seem that the American Electric Railway Association has such an opportunity for broadminded treatment of the bus problem that it cannot afford to miss that opportunity by permitting the reactionary spirit of a minority to hold it back longer in its position of partial aloofness.

Just now the principal organizations of the automotive industry and the leading manufacturers of buses are of a mind to co-operate with the American Electric Railway Association to the end that its members, rather than disinterested or antagonistic interests, may have prior opportunity to capitalize whatever usefulness the bus possesses. They prefer to have the railway men take hold of the bus. But if the association cannot soon see its way clear to accept in generous measure this offer of co-operation, and to take the lead in determining where and how the bus can be used, these automotive industry companies and associations will naturally direct their aggressive energies into other channels of development. There, their activities might be more harmful than helpful to present transportation companies. The transportation industries really have too many common interests to permit the few opposing ones to keep them apart, following separate courses.

The JOURNAL believes that the association might well now accept and encourage whole-heartedly the full co-operation and joint effort of the automotive industry associations. Furthermore, to make this movement effective, its membership should now be opened, on some basis, to those legally authorized bus companies which are established and recognized as permanent, dependable transportation agencies operating in a non-competitive way. Some change must shortly be made, anyway, to provide for membership of the bus subsidiaries of railway members, and of the companies where railway has been superseded by bus, but operated by the same company, and hence it is well to consider the whole question.

It appears now that the association can hardly postpone such action beyond the present association year without missing a really wonderful opportunity to bring together into one fold all of the interests pressing for the common objective of developing the transportation facilities available to the public. The basis of bus membership might be that of a bus section of the railway association, as suggested in ELECTRIC RAILWAY JOURNAL for Dec. 2, 1922, page 869, or any other plan that would bring all the transportation companies "into the family."

Unless all the energies of these various associations and railway and bus operating companies can be directed into a harmonious program, the prospect is a half-hearted co-operation at best, and much destructive competition. But with this harmonious program, the future of transportation is inspiring to contemplate.



Typical Brazilian Export Train Consisting of 700 Tons of Cattle and Coffee Hauled Electrically

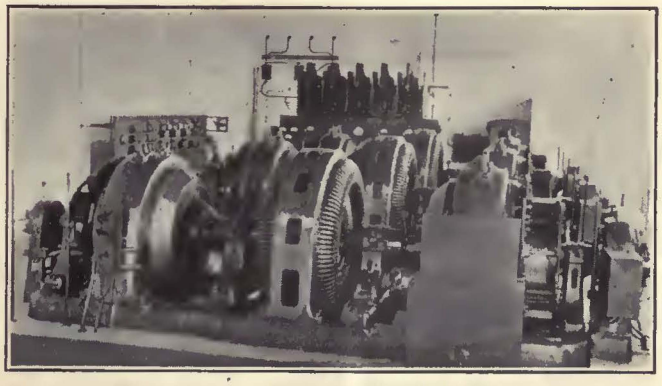
Savings from the Paulista Electrification Estimated

The Costs of Electric and Steam Operation Over a Period of Five Years Are Analyzed on Brazil's Important Main-Line Railway—Electrification Is Expected to Save as High as 65 per Cent of the Total Operating Cost—Fuel Is a Major Factor

By S. B. Fortenbaugh
Railway Engineering Department, General Electric Company

THE Paulista Railway, Brazil, furnishes an interesting example of a projected electrification where the only considerations involved in the decision to employ electric operation to replace steam were economy in operation and the general improvement of the service. This road recently contracted for the electrical equipment necessary for a 50-km. extension from Campinas to Tatú, in addition to its initial installation between Jundiahy and Campinas. This latest addition is in line with the original policy and intention to extend the electric service as far as Cordeiro, 206 km., and beyond as soon as the exchange situation becomes more nearly normal.

Brazil today produces practically no coal or fuel oil, the high price of imported coal and oil and consequent operating costs having originally led the Paulista company to utilize its natural and easily accessible sources of wood as fuel for the operation of its trains. Today obtaining a supply of wood for engine fuel is a serious and much more costly problem with the Paulista, the net result of this condition of affairs being a decision to push electrification and utilize some of the country's water-power development.



Interior of Louviera Substation, Paulista Railway

Coal—From an extended series of careful tests and observations it has been found that the ton-miles moved by an average of 7 lb. of coal on the engine tender of a steam locomotive is approximately equal to that which can be moved by 1 kw.-hr. input to the substation. This figure includes, for convenience of comparison, all the transmission and conversion losses inherent to electric operation, as well as the stand-by losses of the steam engine. It is sufficiently liberal and accurate, furthermore, to include all classes of service, miscellaneous switching, etc., and any usual and reasonable variation in the kind and quality of coal.

This figure of 7 lb. represents the amount of coal burned on steam engines to get the equivalent tonnage movement of 1 kw.-hr. delivered from an electric power station. From this it follows that 1 ton (2,000 lb.) of coal on the engine tender is the equivalent of approximately 286 kw.-hr. of delivered electric power.

Wood—As a result of a survey of Brazilian steam railway practice, it has been determined that the work done by 1 ton of coal is equal, on the different railways, to that accomplished by from 8 to 9.3 cu.m. of wood. Assuming 8.5 as an average figure,

Campinas Yards, Where Much of the Freight Classification Is Done

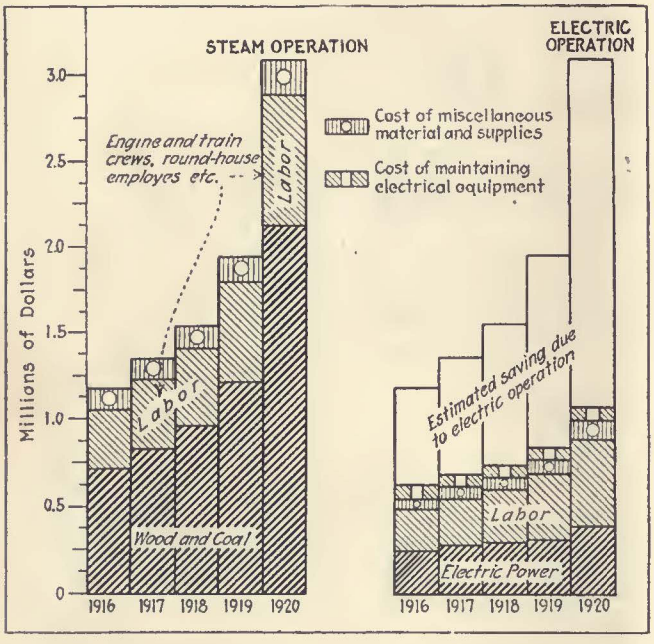


Fig. 1—Comparative Costs of Conducting Trains, All Lines

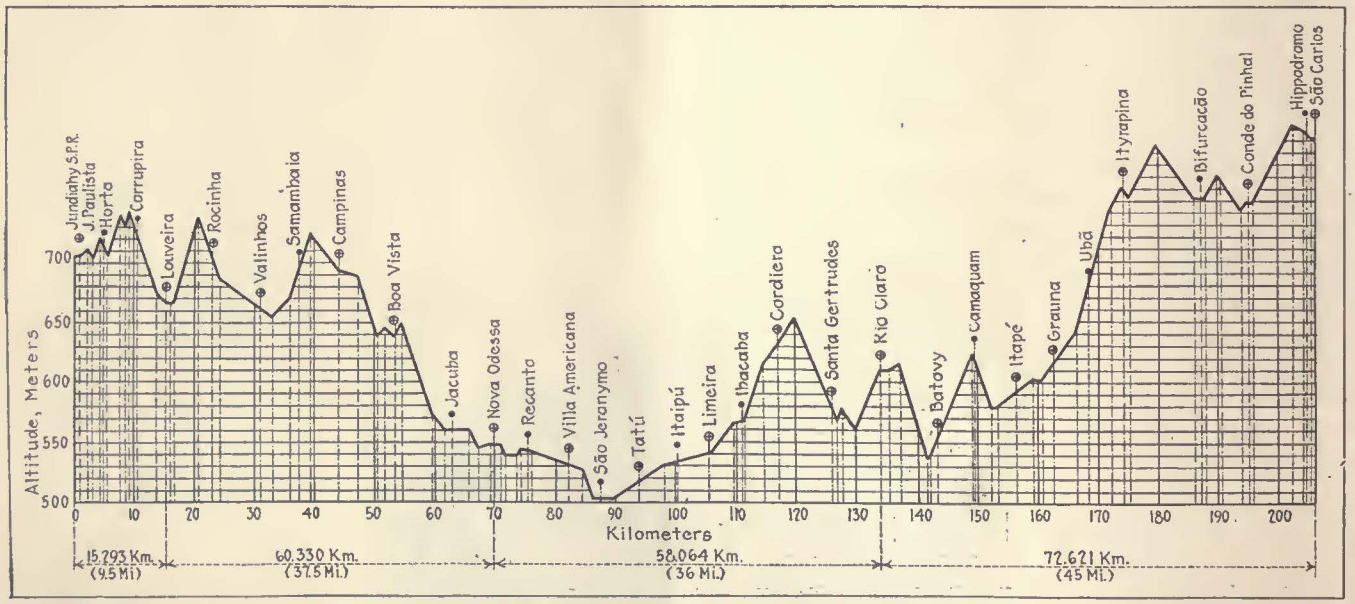
1 cu.m. of wood burned on the steam engine is the equivalent, in work done, to approximately 33.6 kw.-hr. of delivered power.

During the last twelve years the average annual cost of wood per cubic meter has increased from approximately 90 cents to $2.15 in 1922. This is equivalent to purchasing electric energy at rates ranging from 2.75 to 6.35 cents per kilowatt-hour. Power has, however, been contracted for by the railway on a long-term basis at approximately 1 cent per kilowatt-hour.

Possible Saving of 85 per Cent of Fuel Cost

Investigation indicates a possible reduction in the total cost of fuel, based on the existing contract price for electric power, ranging from approximately 40 to 85 per cent for the years 1910 to 1926, inclusive. This is a very large proportion of the total operating expense, and clearly shows the wisdom of the Paulista Company's decision to substitute electric for steam traction. The indications are that the savings effected in fuel alone will more than fully justify the capital expenditure required for electrification.

Table I gives the Paulista's actual operating costs of conducting trains on all lines for the years 1916-1920



Profile of Portion of Paulista Railway Which May Be Electrified Eventually
With completion of the new contract recently announced the section between Jundiahy and Tatú will be under electrification, constituting half of this route.

TABLE I—TOTAL OPERATING COSTS, PAULISTA RAILWAY, BRAZIL—CALENDAR YEARS OF

	1916	1917	1918	1919	1920
Steam operation (actual):					
Waste	$9,250	$8,500	$11,750	$12,500	$14,250
Water supply	11,750	8,500	10,250	10,000	23,500
Lubricants	49,500	51,500	50,500	53,500	86,250
Miscellaneous supplies	39,000	46,000	53,500	62,750	77,000
Total	$109,500	$114,500	$126,000	$138,750	$201,000
Labor	352,500	401,500	447,250	586,000	756,500
Fuel	710,500	824,000	955,500	1,205,500	2,114,750
Grand total	$1,172,500	$1,340,000	$1,528,750	$1,930,250	$3,072,250
Electric operation (estimated):					
Miscellaneous material	$54,750	$57,250	$63,000	$69,500	$100,500
Labor	235,000	267,750	298,250	390,500	504,250
Electric power	241,000	274,750	294,000	297,750	384,250
Maintenance electric equipment	75,000	75,000	75,000	75,000	75,000
Grand total	$605,750	$674,750	$730,250	$832,750	$1,064,000
Estimated saving with electric operation:					
Total	$566,750	$665,250	$798,500	$1,097,500	$2,008,250
Per cent	48.3	49.7	52.3	56.9	65.3

TABLE II—OPERATING COSTS, PAULISTA RAILWAY, BRAZIL SEVEN MONTHS, JUNE-DECEMBER, 1923

	Cents per Train-Mile Steam	Electric
Fuel or electrical energy	37.56	13.09
Conducting trains:		
Engineers and firemen	7.63	5.13
Other train expenses	6.88	4.03
	14.51	9.16
Locomotive repairs:		
Labor	2.99	1.40
Material	6.12	0.92
	9.11	2.32
Substation:		
Labor	.....	1.79
Material	.....	0.25
		2.04
Secondary distribution:		
Labor	.....	0.74
Material	.....	0.12
		0.86
High-tension transmission line:		
Labor	.....	0.23
Material	.....	0.02
		0.25
Totals	61.18	27.72

inclusive, and also the estimated costs for the same period assuming equivalent electric operation. All figures are given in United States dollars on the basis that $1 equals 4 milreis (4$000). The estimates are based on a previous detailed investigation of the 1918 service, and for this reason they are submitted as approximate values only, but with the belief that they are well within the probabilities and are reasonably accurate.

An inspection of these data indicates the magnitude of the possible saving. It is largely a question of fuel vs. electric power.

The estimated cost of the operating force, engineers, firemen, train crews, etc., for the electric service has been assumed at two-thirds of the actual value under steam operation. Experience has shown conclusively that the savings to be expected from such items as the increased speed, heavier trains, reduced engine and train mileage are well within the limit suggested. The marked reduction in the cost of miscellaneous material and supplies, including roundhouse charges, the entire elimination of water tanks, ashpits, etc., will effect an estimated saving in these items of not less than 50 per cent in favor of electric service.

In order to complete the picture a liberal amount has been added to the electric service for the operation and maintenance of the required substations, transmission lines and secondary distribution. This is a relatively small proportion of the total expense, and necessarily speculative, but no possible or probable change in this item can have any material effect on this general comparison of the two methods of railway operation:

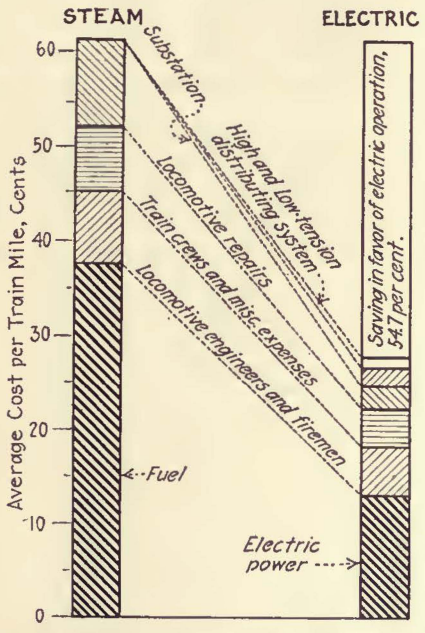


Fig. 2—Comparative Costs of Steam and Electric Operation, June-December, 1922

Only More Evident Savings Included in the Estimate

This startling picture includes only the more evident of the direct savings effected by the substitution of electric for steam traction. The indirect savings to be effected by increased speed and capacity, reliability, convenience in operation, etc., are virtually impossible of accurate determination on a purely engineering basis, but of sufficient magnitude and importance to demand the most careful consideration.

The complete change from steam to electric traction on the section between Jundiahy and Campinas, approximately 27.5 route-miles of double track, was made about a year ago and the costs for the first seven months, June to December, 1922, are now available for the first time. The corresponding steam operating costs for the remainder of the Paulista Company's broad-gage lines (a total of approximately 150 route-miles of single track) are presented herewith for comparison. These values have been converted into United States currency of the basis of 7 milreis (7$000) to the dollar and are therefore approximate only as regards the actual amount in United States currency. The relative values are definite, however, and independent of the conversion factor used. This comparison is shown both graphically and in tabular form. Fig. 1 shows the estimated saving due to electric operations based on actual steam operating costs for 1916 to 1920 inclusive. Fig. 2 shows the difference between steam and electric operating cost for the last seven months of 1922. This comparison, while on a different mileage basis, nevertheless clearly shows how near the estimate made in 1920 came to the actual results now being obtained in the operation of the electrified section of the Paulista.

All permanent notices for display in the cars of the Montreal Tramways are made of neat blue and white decalcomania. Only in the case of one-day or one-week campaigns are paper posters placed in the cars, as it is believed that dirty, ragged paper notices seriously detract from the appearance of the vehicles.

Traffic Survey in Los Angeles

Street Congestion Is Particularly Severe in Los Angeles, Because of the Narrowness of Its Downtown Streets—Remedial Measures Are Suggested in Report Just Issued—Methods of Determining What Constitutes Adequacy of Service Also Discussed

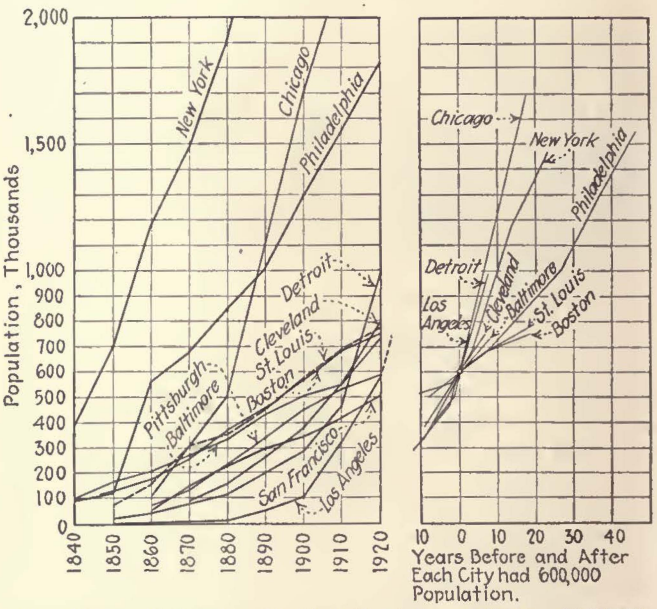
A TRAFFIC survey has recently been completed in Los Angeles for the Los Angeles Railway Corporation by Joe R. Ong of Piqua, Ohio. Los Angeles, Mr. Ong points out in the early part of his report, is a rapidly growing city, as shown by the accompanying population chart, and its expansion in population and activity has increased the concentration in the central business area. This has introduced complications in many directions, one of which is transportation.

It will be noted from one of the charts that the automobiles in Los Angeles County are increasing at a much faster rate than either population or passengers carried by the Los Angeles Railway. This increased use of automobiles has materially affected the traffic of the Los Angeles Railway Corporation. Statistics of the service given by other public utilities is also charted. All show a larger annual rate of increase in the last four years than in earlier years. In street railway traffic there was, following 1913, a period of actual decrease in passengers carried, and not until 1919 did the traffic exceed that in 1913. Another chart shows, on a logarithmic scale, the passengers and car mileage by months since 1916. It will be noted that the maximum mileage was in the year October, 1917, to October, 1918. In the latter month there was a somewhat belated curtailment, because the traffic began to fall off in 1914. Since 1918 there has been little change in the average monthly car mileage, though, through rerouting, the service was improved in 1920. The irregular sawtooth mileage curve is largely due to the difference in the monthly total of a thirty-one day month as compared with a thirty-day month. The low mileage shown in August and September of 1919 was caused by a strike.

Traffic Congestion from Automobiles

There is no magic, says the report, that will relieve traffic congestion. It is a matter largely beyond the control of the street railways. It requires the co-operation of all interests in the community, as well as a vast amount of education. Any solution of the traffic congestion problem will unquestionably curtail the liberty of some individuals. Thus far, the individuals owning automobiles and the merchants, who (mistakenly) believe that their customers are largely automobile users, have effectively blocked sincere efforts to relieve the traffic congestion by non-parking regulations.

The time was when it mattered little in what kind or size of vehicle an individual used to come downtown. It mattered little where, when, in what position or for how long he left this vehicle standing in the public streets. Those days have gone. There are so many automobiles and trucks in the central business area that parking space along the curb for any significant number of them is absolutely out of the question. There is an ordinance against "second line parking" or the parking of a vehicle parallel to a machine that is parked at the curb. This ordinance, the report says, should be strictly enforced and extended so as to clear the

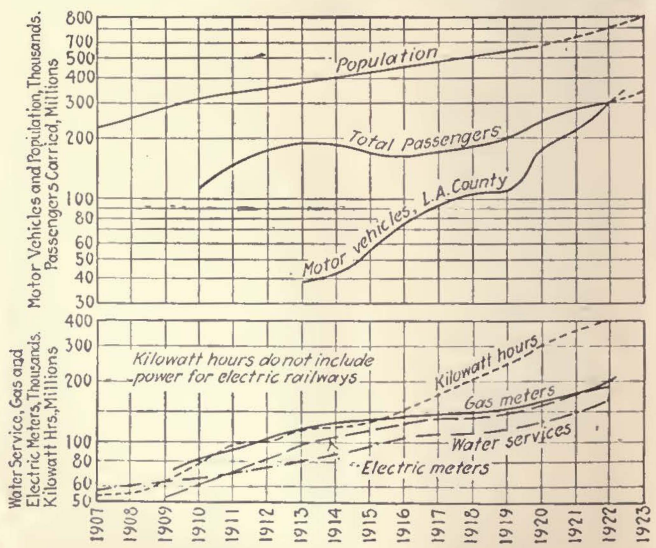


Population and Comparative Growth of Large Cities. At Right, the Population Curves at 600,000 Have Been Superimposed for Comparison

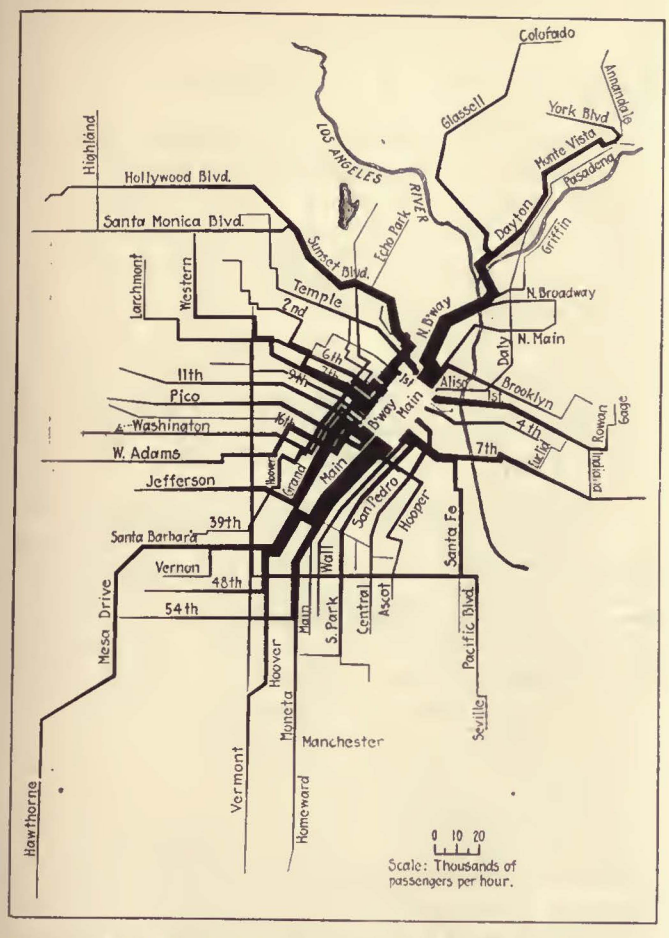
congested area of all automobile parking, leaving curb space for a limited business delivery and pick-up service and for passenger cars just long enough to permit persons to board and alight.

Los Angeles has relatively a small percentage of street area in the congested business section, perhaps a smaller percentage than any other city. There is much interest in street-widening projects, involving millions of dollars, but the least expensive method of widening the streets for the movement of traffic is to eliminate parking. Even single-line parking on certain very narrow streets greatly impedes traffic movement.

Business men in Los Angeles have mistakenly opposed non-parking ordinances, thinking they drive trade away.



Statistics Since 1907 of Population, Passengers Carried on Los Angeles Railway, Use of Other Utilities



Map of Los Angeles Showing Passenger Traffic Flow During P. M. Rush on All Lines of Los Angeles Railway and on City Lines of Pacific Electric Railway

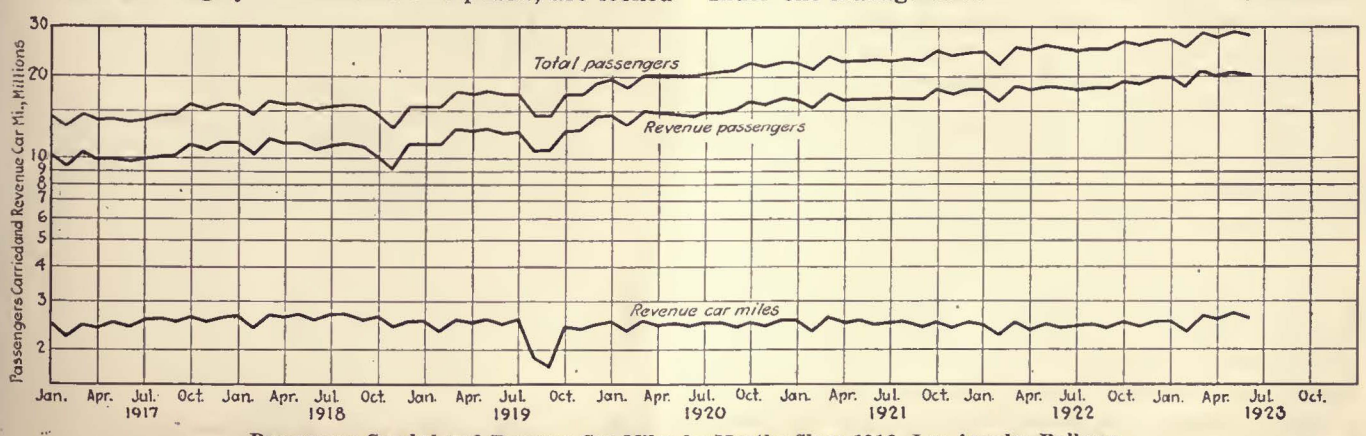
There is not a merchant who could survive on the business he gets solely from customers who park in front of his establishment. The ordinance prohibiting parking in the central congested area, passed in April, 1920, was repealed after a short trial of two or three weeks because of violent opposition on the part of the Broadway Merchants' Association, but they failed to submit actual data in support of their contention or to realize that automobiles parked at the curb do not indicate customers in their stores. Other limited parking ordinances have proved ineffective, partly because they have not been strictly enforced.

Unfortunately, the great mass of the traveling public, being unorganized, is never proportionately represented in hearings and investigations of the traffic problem, and the suggestions of the railway company, whose interests are largely the same as this public, are looked upon as selfish. Nevertheless, the street car rider is entitled to more consideration than he has had in the past. The street car is the unit best adapted to handle mass transportation, and mass transportation is the problem in the congested areas. Recent observations at the corner of Seventh Street and Broadway during the evening rush hour showed 191 street cars and 668 automobiles using Broadway, but the passengers on the street cars totaled 14,325 and those using the automobiles totaled 1,169. It is doubtful if the actual capacity of the streets for automobile movement would be increased more than 50 per cent if the street cars were eliminated entirely.

An accompanying illustration shows an analysis of the time distribution of street railway traffic by twenty-minute periods. Thirty-two per cent of all inbound travel occurs by 9 a.m., 50 per cent by 12:10 p.m., 75 per cent by 4:40 p.m. and 95 per cent by 8:20 p.m. Only 14 per cent of the total outbound travel occurs by 9 a.m., 23 per cent by noon, 50 per cent by 4:40 p.m., 75 per cent by 6:10 p.m., and 90 per cent by 9 p.m. The map on this page shows the distribution by lines of the outbound passengers between 5 p.m. and 6 p.m. The local city passengers on the Pacific Electric Railway are included in this chart, but are in addition to the 55,600 Los Angeles Railway passengers.

Possible Remedies Besides Non-Parking

During the war a great deal of prominence was given to the question of staggered hours for opening and closing of stores, offices, and factories for the purpose of spreading out the rush-hour travel peak. This matter has been discussed in Los Angeles as a possible aid in the relief of traffic congestion, but an examination of the rush-hour peaks shows that while they are pronounced, they are fairly well spread. There are more than 13,000 passengers per twenty-minute period for four consecutive twenty-minute periods in the morning rush inbound, and in the next period there are possibly 12,000 passengers. To be of any material benefit in spreading out the peak, some of the travel would have to be shifted to near 9 o'clock in the morning, and outbound travel to 6:20 to 6:40 p.m. It is very unlikely that any group of employees can arrange to start work at 9 a.m. and can be held after 6 p.m. The staggered-hour plan is of greatest value, practically, when applied to large industrial concerns employing thousands at concentrated points and served by a limited number of street car lines. Too much should not be expected of it in other circumstances, for its application in offices and stores in a central business district would change the hours of a large number of employees not concentrated under one management.



Passengers Carried and Revenue Car-Miles by Months Since 1916, Los Angeles Railway

Some gain has been secured by double berthing or triple berthing of street cars at congested crossings. Another gain would be obtained by an ordinance requiring automobiles, trucks, and other vehicles to stay off the street car track zone except at street intersections. An aggravating situation arises whenever there is a street parade in the central business area. Vehicles can usually detour, but street cars get little consideration. Relief should be sought through the creation of public sentiment by education and publicity demanding municipal regulation of parades, restricting them to streets which will cause a minimum of delay to the city's transportation service. Co-operation with the other utilities may help to reduce interference to street traffic caused by the opening up of manholes and conduits unnecessarily.

Analysis of Adequate Service

Too much stress cannot be laid upon the absolute necessity for a systematic and continuous traffic survey by the schedule department. The only commodity the Los Angeles Railway has to sell is service. The service ought to be adequate—commensurate with the fare.

Adequate service has four outstanding features:

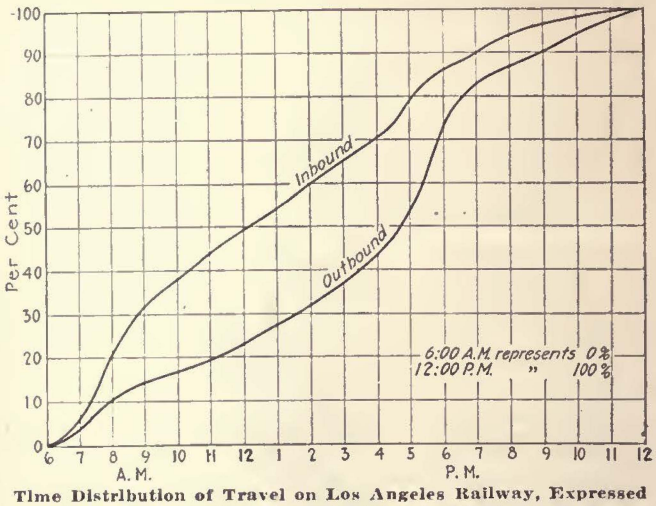
1. Sufficient cars to handle the traffic.
2. Cars operated frequently enough to serve a reasonable convenience.
3. Cars that run with regularity.
4. Cars that run with speed, not recklessly but fast enough to satisfy the passenger that he is getting somewhere.

Commenting briefly on these four points it may be said:

1. "Sufficient cars to handle the traffic" does not mean a seat for every passenger at all times. The American people do not expect it nor want it, though they sometimes think they do. During off-peak periods there should be approximately a seat per passenger after making allowance for those who prefer to stand. Standing by preference is still a real factor on the California type car with its closed center section and open end sections, smoking being permitted in the front open section. During rush hours adequate service contemplates cars loaded to comfortable carrying capacity. The number of standing passengers that may be carried on a car and be within the limits of comfortable carrying capacity is determined by the width of aisles, arrangement of seats, amount of unobstructed floor space and the arrangements of entrances and exits.

2. "Cars operated frequently enough to serve a reasonable convenience." During the off-peak hours the travel on many lines is so light that it becomes a question not of how many cars must run to handle the passengers but how infrequently can they be scheduled and still serve a reasonable convenience. The distance of the territory from the business section of the city, or from some other traffic center, the proximity of other lines and perhaps the density of population in the territory served, are some of the factors having a bearing on the required frequency of cars to serve a reasonable convenience.

3. "Cars that run with regularity," not that the time interval between cars should be the same at all periods, but that cars should be on time at the intervals prescribed in the schedules. In other words, cars must be on time, neither late nor ahead of time. Even a minute makes a difference. If the first car is one minute ahead of time, and the second car is one minute late, and the prospective passenger has just missed the first car, it means that he must wait two minutes longer than the schedule maker intended for him to wait. Not only that, but the second car has a larger load than its share because it followed a time interval two minutes longer than the schedule maker intended. It seems particularly hard to convince old motormen of the disastrous effects on the service of running a minute or two ahead of time.



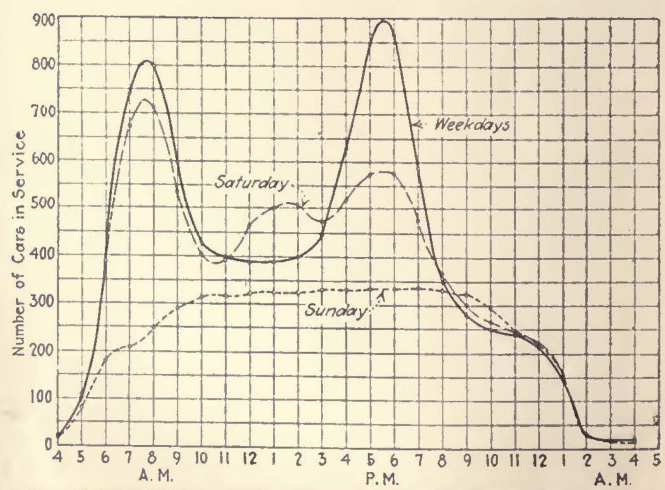
Time Distribution of Travel on Los Angeles Railway, Expressed in Cumulative Percentages by Twenty-Minute Periods

4. The fourth element mentioned as being a factor in adequate service is speed. "Cars that run with speed, not recklessly, but fast enough to satisfy the passenger that he is getting somewhere." Safety first, of course, but up to a certain reasonable limit it cannot be said that accidents increase with speed; speed is not the controlling element in accidents. Slack time in schedules should be taken out. People living in an automobile age demand speedy transportation.

It is at once apparent that the character of the schedules has a vital bearing on items 1, 2 and 4 referred to above as factors in adequate service. Item 3 is largely a matter of supervision and discipline.

The importance of the schedule department of the electric railway is too often overlooked. It is one of the very vital spots of the railway. Correct schedules can show profitable operation on a given fare and satisfy the traveling public with adequate service. Incorrect schedules on the same fare might show too much service and too little return, or too much return and too little service.

It is not possible to put all lines on the same earning



Cars Scheduled for Operation on Los Angeles Railway, April 2, 1923, by One-Hour Periods Throughout the Day

basis because of the variable factors—such as the length of the line, the speed at which it can be operated, the number of passengers carried, their distribution along the line and their distribution by time periods throughout the day. On a flat-fare and a universal-transfer basis some lines will never show a profit. If an attempt were made to reduce the service on these lines to a point that would materially pull down the expense per passenger it would cause such an overcrowding of cars that the traffic offering itself could not be handled, causing a reduction in revenue as well as a reduction in expense so that the net per passenger would still not show a profit. Such a situation prevails on several lines in Los Angeles, notably those which have a high percentage of transfers. The good lines that show a profit must help carry the poor lines that show a loss.

It must therefore appear evident that an adjustment of service to make all lines show approximately the same profit per passenger or to provide the same number of car-seat-miles per passenger is not the goal to be attained. The auditor's daily analysis cannot be used as the measuring stick of the adequacy of the service unless it has been calibrated by actual traffic observations on each line.

Traffic Checking Methods

It is therefore essential that the schedule department should include a permanent traffic checking staff in order that continuous systematic checking be carried on, and in order that the service may be adjusted to the traffic demands. A tentative program has been outlined for checking all lines not less frequently than every thirty days, and particular lines as much oftener as conditions may require. The staff should include at least eight regular checkers. Owing to the limited opportunity to get observations on Saturday and Sunday travel, the checking program should include observations every Saturday and Sunday, allowing checkers a day off in the middle of the week.

The traffic checkers must be accurate in their observations and records, and men with proper qualifications should be selected and trained for this work. Traffic checking is not to be looked upon as a place to use disabled or convalescent trainmen. The records of the traffic checkers form the basis for making schedules, and the need for reliability is beyond argument. New forms have been recommended and are in use for recording and summarizing the traffic data.

The number of cars scheduled for operation by hourly periods during the day on weekdays, Saturdays and Sundays is set forth graphically in an accompanying chart. As will be seen, the morning and afternoon peaks in the week-day schedule are very pronounced, the ratio of cars scheduled in the afternoon peak being 2.3 times the number in service at mid-day, and 3.2 times the number in service at 9 p.m.

The Saturday curve has an entirely different characteristic. The cars in service during the morning peak outnumber those used at any other period. The afternoon 5 p.m. to 6 p.m. peak is much lower than that on weekdays but the number of cars in service at noon is substantially greater than for the corresponding period weekdays. On Sundays, there are no peaks. Approximately the same number of cars is in service from 10 a.m. to 9 p.m.

Planning a Car Repair Shop

A Layout for the Upkeep of 1,000 Cars Which Will Turn Out 2.4 Overhauled Cars and 2.2 Painted Cars a Day—Speed in Repairs and Economy of Man-Power Are the Governing Features

*By Henry S. Day**
Railway Department, Westinghouse Electric & Manufacturing Company

THE car repair shop should be planned to give complete accessibility of equipment, cut down duplicate movements and as far as possible make it practicable progressively to route the work attendent on repairs and overhaul. In the present suggested layout no particular attempt at economy of space or facilities or first cost has been made, the main object sought being plenty of room around cars and trucks, good light, all movement of heavy parts performed with cranes, electric trucks or transfer tables, and all work carried on both by shop and stores department where it cannot be hampered by weather conditions. First costs have been set aside to obtain speed in repairs, short shopping periods and reduction in number of men constituting the shop force.

The principal features of this plan are as follows:

1. Three transfer tables which serve any car in the overhaul section or paint shop and make it possible to move any car without interference of operations or other movements.

2. The grouping of departments to eliminate interference and to reduce to a minimum cross-routing and back-tracking of material and parts.

3. Adequate crane service quickly to move material and parts in process of repair to and from car bodies and trucks undergoing overhaul.

4. A receiving and shipping dock for repair parts for carhouses and other departments incorporated as part of the shop.

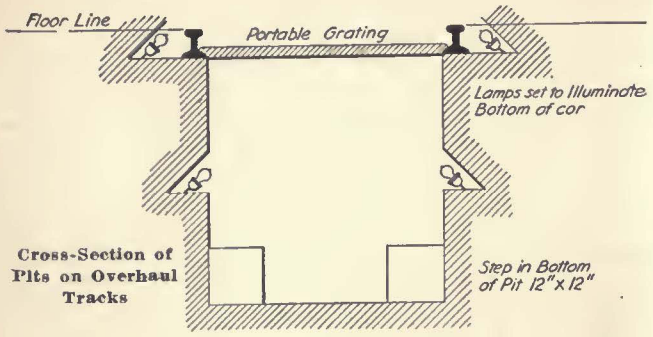
5. Ample light, ventilation and space.

This layout is based on a total of 1,000 cars, each averaging 3,000 miles per month or 36,000 miles per year. On the basis of a mileage of 48,000 the overhaul period is sixteen months and with a painting period of eighteen months the shop would have to produce 2.5 cars overhauled per day and 2.2 cars painted per day.

Operating the shop on a 300 working-day year and a twenty-five-day month, a fifteen-day shopping period and an eight-day period for painting would require twenty-two cars in the shop for overhaul and twenty-two cars in the paint shop at all times.

Allowing 10 per cent of the equipment out of service

*Formerly superintendent of equipment Kansas City Railways.



Cross-Section of Pits on Overhaul Tracks

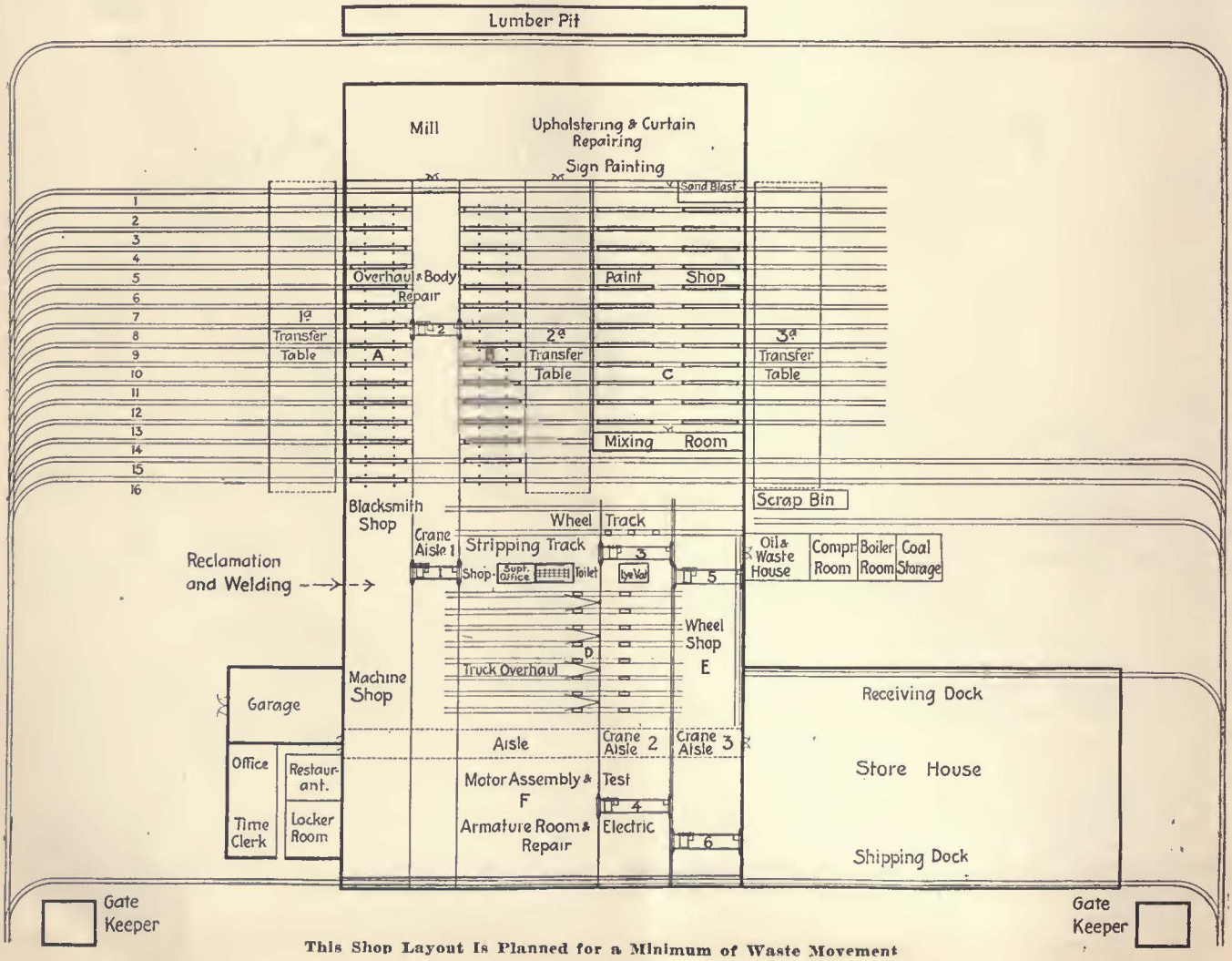
for all causes would give forty-four cars for overhaul and painting and fifty-six cars for wrecks and miscellaneous failures. It is believed that this assumed number of cars and the time required for shopping can be reduced, thereby increasing the capacity of the shop and the number of cars available for service.

In the diagram of the shop layout, it is planned that cars to be overhauled will enter the shop on any tracks from 2 to 14, or on track 1, which is equipped with trolley wire, to transfer table 2*a*. Car spaces on each side of electric crane No. 2 are equipped with stationary air jacks and pits. Unless the car is to be painted it will be completely overhauled in the space originally selected, without further shifting. Trucks will move from under the car on their own power to electric crane aisle No. 1 and by crane to the stripping track. From the stripping track pits crane No. 3 will move the motors to the motor assembly and the wheels to the wheel track back of the stripping track. Truck frames and parts will go into the lye vat and from the lye vat to the truck overhaul tracks. Wheels will be rolled to crane aisle No. 3 through the wheel shop, and after repairs will be dropped by crane No. 5 at the end of the truck overhaul track, where the truck they are intended for is being overhauled. When the truck is completed it will be moved forward to crane aisle No. 1 for delivery back to the car.

Crane aisle No. 1 serves all overhaul cars, blacksmith shop, welding and reclamation, machine shop, armature room and shipping and receiving dock by transfer. No. 2 serves the wheel shop, where all operations on wheels will be carried on, and the receiving and shipping dock by transfer. No. 3 serves the truck overhaul, motor assembly armature room, and end of receiving and shipping dock.

Cross-movements, as from storeroom to machine shop, or armature room to machine shop, will be made by electric lift trucks, as will material moved to and from mill and paint shop. Cars overhauled in overhaul section *A* and not intended for the paint shop would move out of the shop when completed to transfer table No. 1*a* and cars from overhaul section *B* over transfer table No. 2*a* and out of the shop over tracks 15 or 16.

Trolley wire is extended above overhaul sections *A* and *B* and in the paint shop, but not over crane aisle No. 1 except on track 1. Tracks would be laid from transfer table No. 1*a* to No. 3*a*, as the transfer tables



This Shop Layout Is Planned for a Minimum of Waste Movement

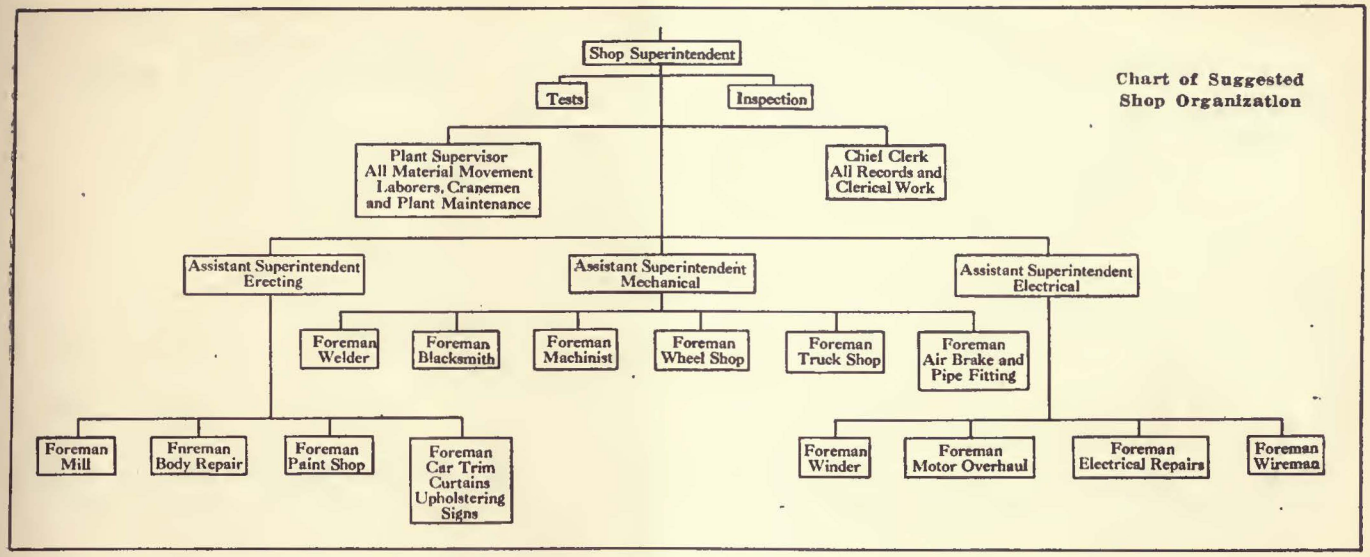


Chart of Suggested Shop Organization

would be of the surface type without pit. With trolley wire extending from overhaul section *B* over the transfer table and through the paint shop, cars can move on their own power from section *B* out. Tracks 2 to 14 in section *B* and 2 to 10 in section *A* would usually be reserved for straight overhaul, leaving tracks 11 to 14 in section *A* for wrecks and emergency body repairs, with tracks 15 and 16 in sections *A* and *B* held for hurry-up work on cars sent in for wheel and motor changes.

All tracks in sections *A* and *B* would have pits covered by portable gratings as shown in the accompanying diagram, to act as a floor when the car was on jacks or blocked up, and to be removed when the car was down on the trucks for final connections and inspection. Dummy trucks would not be necessary as the car would leave the location in which it was overhauled on its own completed trucks, which would be painted in the truck overhaul section. If the car was scheduled for the paint shop it would move in on its own trucks and not again be jacked. The objection of painting trucks in the center of the shop would be overcome by spray painting under a portable hood handled by crane No. 1 and connected to an exhaust duct in the floor.

The lighting scheme in the pits is arranged to floodlight the bottom of the car in each position and would do away to a large extent with the use of extension lamps.

This idea is also carried out in the truck overhaul pits, as shown in the accompanying illustration. These are also arranged so that by the removal of the gratings three standing levels are provided. This will afford greater ease to the truck repair men and consequently get more accuracy and speed. Electric tier lift trucks with projecting beds would be used to move brake cylinders, compressors, grid frames, controllers, etc., from the crane way to the exact location on the car body and would also be used to raise apparatus into position for hanger bolts without additional handling.

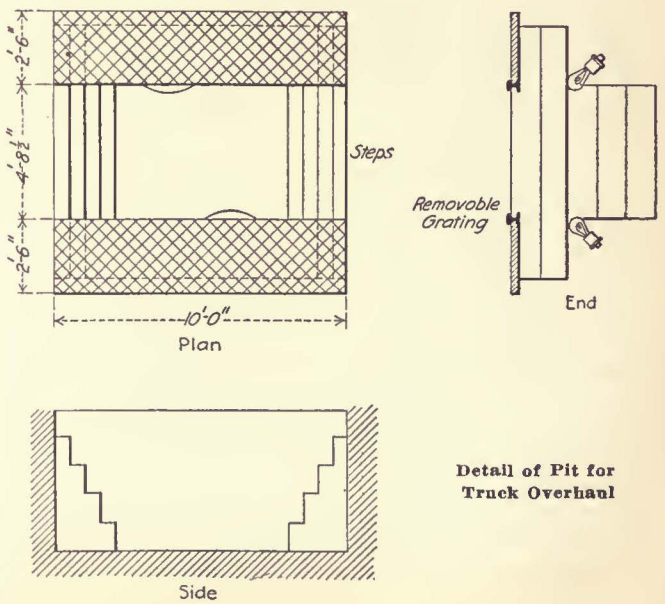
The entire shop would be floodlighted with the addition of individual lighting on all machine tools. Natural light would be from all available space for sash in all walls and swivel sash in the sawtooth roof.

A suggested organization is shown in the diagram. This differs from the average car-shop organization in that the departments are made up in three groups, each section of each group handling classes of work that are closely parallel. Each of these three groups is under an assistant shop superintendent who is a specialist in at least one of the classes of work under him, and who has had close associations with the other classes of work in his own group.

These three assistant superintendents would be individually a car builder, a machinist and an armature winder. They should be capable of using the right judgment and supervision over other classes of work very closely allied. This would eliminate a condition which often exists, of a machinist passing judgment on a paint job, which often happens when a machinist becomes a machine shop foreman and finally a general foreman.

With the suggested arrangement the three assistant shop superintendents carry on and are wholly responsible for the production. They report to a higher man who is primarily an executive, who controls the administration and keeps the production force supplied with cars, material and men, and the plant at all times in proper operating condition to perform the work.

Probably one of the first criticisms of this organization will be that it is too expensive and not necessary, but there is no better investment than plenty of the right kind of supervision. Manufacturers learned long ago that well-trained, well-paid specialized supervision was a requisite for successful manufacturing; and this is a parallel that can be drawn by the electric railway operator with sure results.



Detail of Pit for Truck Overhaul

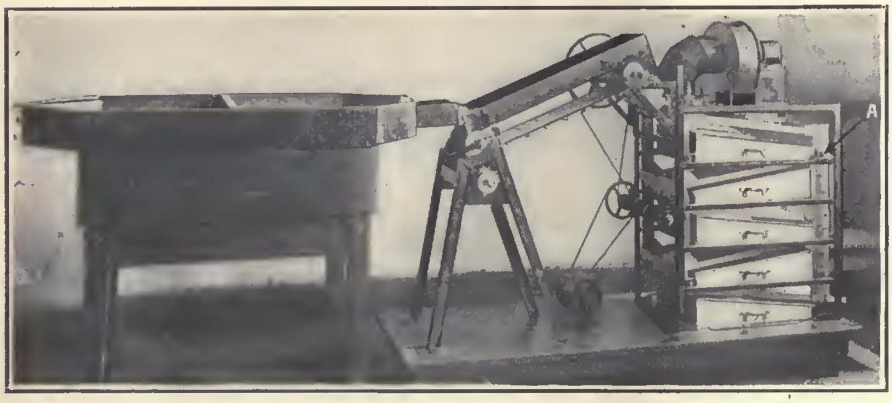
Machine Sorts Receipts from Locked Fare Boxes

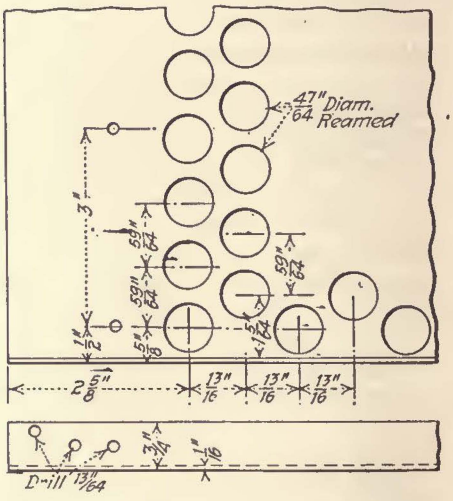
Machine Designed and Built by Kansas City Railways Handles Cash, Tickets and Tokens in Denominations Up to Half Dollars

By R. S. Neal
Assistant Superintendent of Equipment Kansas City Railways

THE problem of counting the day's receipts, which became acute when the Kansas City Railways adopted locked fare boxes to receive cash fares, tokens and paper tickets, was facilitated greatly by the use of a machine for separating the various classes of coins and the paper tickets. When the system was changed, the total receipts for the day were put into the money counting room the morning after their receipt, instead of being handled on the same day, as heretofore.

The fare box used is of the non-registering type and a separate check is not made of the individual conductor. The returns are considered as the receipts of the line or division from which they are collected. The magazine is removed from the fare box on the car at the end of each day and sent to the money room during the night or early the next day. There is a very large proportion of tickets and tokens. On account of this, it was necessary to design a machine that could handle the tickets and tokens, as well as the money.





This Machine Sorts 180,000 Coins and 20,000 Paper Tickets an Hour. At the Right, Part of the Aluminum Tray for Separating Dimes

A separating machine had been in use for several years, but it was not satisfactory. It had been necessary to change the design several times and also to run the machine much faster than the original plans called for in order to handle all the receipts in the required time.

A complete study was made of the amount of money handled and a new machine was designed embracing quite a number of ideas that had not been used previously. For instance, special ball bearings were used on the traveling trays, which we knew would give absolute satisfaction. It was also decided that, on account of the high speed of the machine, with trays which have a reciprocating motion, it would be absolutely necessary to make this machine of the lightest possible material, taking into consideration that it also must have strength to withstand the severe service that would be given it each day.

The receipts, consisting of tickets, tokens and coins, are emptied into a large trough at the end of the separating machine. They are passed along on the traveling belt, which carries them up to the machine proper, dropping them into a small tray immediately under the pipe elbow. At this point, the air suction created by a fan connected to this pipe elbow picks up the paper tickets, but not any of the coins or tokens, carrying them through the fan into a receptacle not shown in this picture. This receptacle is cylindrical and its sides are perforated, which allows the air to escape while retaining the tickets. The coins fall through to the first tray, part of them dropping further into the pan underneath, and the remainder traveling across the tray to the end where they drop down to the next tray. The pan is stationary, and is supported by the frame of the machine.

The trays have a reciprocating motion, traveling on small ball bearings. One of these is marked with the letter *A* on the photograph. There are four of these bearings which support each tray frame. These trays are perforated suitably for the different sized coins. The whole lot of coins travel across the tray, part of them falling through and the remainder dropping at the end to the next tray. In that way there is a gradual separation of all the money that was started at the top. The money moves in a zigzag fashion from one side of the machine to the other as it travels down.

A portion of one of these trays, the one for handling dimes, is shown in the diagram. This tray is made of hard drawn aluminum, with holes of exact size to allow coins of the desired denomination to drop through, while larger ones must travel across the tray. The tray is 11½ in. wide and 23⅜ in. long.

The stationary pans into which the tokens or coins drop are removable. They usually are removed after each batch of money is put through the machine, and are emptied into the machines for wrapping and counting the coins.

The machine itself is driven by one ½-hp. shunt-wound motor, and the fan which picks up the tickets is driven by a ¼-hp. shunt-wound motor.

In order to be absolutely protected two of these machines were put through the shop at the same time. The complete cost of these machines, including the motors and all material, was approximately $700.

In actual work, this machine handles in two and one-quarter hours 45,000 tickets, 275,000 tokens, 11,000 dimes, 90,000 pennies, 26,000 nickels, about seventy-five quarters and very few half dollars. It can be readily seen that a great saving is made in labor by the use of this machine.

Electric Railway Passengers Increased 12 per Cent in Five Years

Preliminary Census Figures Compare 1922 with 1917—More Complete Statistics for Eight States Show a General Gain in Revenue, Although Track Mileage Decreased in Places

THE generally healthy condition of the electric railway industry throughout the United States is shown by the preliminary census figures recently announced by the Department of Commerce. Revenue passengers carried during the year 1922 numbered 12,665,300,050, as compared with 11,304,650,462 in 1917, when the last similar survey was made. This is an increase of 12 per cent for the five-year period, and an increase of 32.7 per cent compared with 1912, when the number was 9,545,554,667.

The total electric railway mileage in the country, however, as reported to the Census Bureau, has been somewhat reduced during the last five years. The survey shows that the miles of single track operated in 1922 aggregated 43,934 as compared with 44,808 miles in 1917, a decrease of 2 per cent. When the latter figure is compared with that for 1912, however, an increase of 7.1 per cent for the ten-year period is found. The largest recent trackage losses have occurred in Massachusetts and Ohio. In Massachusetts there was also a reduction in the number of passengers carried, but in Ohio the number increased more than 60,000,000 in spite of the smaller track mileage.

In most states where the trackage is less, there has been a change in operating methods, with consequent elimination of duplicate mileage, rather than suspension of service. This is shown by the fact that the largest falling off in trackage occurred in those states where the electric railway has been most highly developed, such as Pennsylvania, Ohio, Illinois, Massachusetts, Indiana, New Jersey, etc., whereas most of these states showed a decided increase in the number of revenue passengers carried.

Besides the encouraging aspect of the situation illustrated by the increase in traffic, there is also the fact that the railways in general had the advantage in 1922 of higher rates than they had in 1912, and this has further augmented their revenue. In spite of higher costs and higher taxes, the net income after all deductions has in many cases been more than 100 per cent greater in 1922 than it was five years before. These facts, therefore, point to the conclusion that the electric railway industry in the United States is today in a firmer position than ever before. More detailed figures for the individual states released follow:

	Revenue Passengers 1922	Revenue Passengers 1917	Miles of Single Track Operated 1922	Miles of Single Track Operated 1917
United States	*12,665,300,050	11,304,660,462	43,933.88	44,808.31
New York	3,087,744,368	2,492,325,233	4,792.35	4,773.36
Pennsylvania	1,415,924,112	1,300,087,044	4,423.08	4,462.11
Illinois	1,128,105,714	1,096,803,684	3,414.15	3,441.43
Ohio	872,974,191	811,912,634	3,975.84	4,236.11
California	755,126,337	494,165,724	3,075.75	3,022.08
Massachusetts	732,447,691	834,538,961	2,689.57	3,055.88
Michigan	557,899,672	447,780,173	1,813.94	1,768.37
New Jersey	466,818,827	432,874,767	1,342.93	1,368.06
Missouri	464,602,457	442,755,505	1,038.23	1,093.65
Minnesota	262,782,125	235,943,196	680.89	655.90
Maryland	248,593,711	228,633,563	758.38	774.62
Indiana	241,872,670	191,132,390	2,309.33	2,355.58
Texas	188,555,977	150,400,787	973.69	949.94
Connecticut	185,039,310	206,739,956	1,010.86	1,079.72
Wisconsin	181,374,525	164,995,818	919.44	901.28
District of Columbia	156,242,945	125,535,527	198.54	194.87
Washington	143,428,511	145,922,160	953 57	1,021 69
Rhode Island	143,008.903	113,191,055	402 54	453.61
Louisiana	128,336,883	105,753,068	304 80	330 59
Virginia	116,289,084	112,813,983	553.67	580.68
Kentucky	115,593,599	109,105,583	513 05	515.70
Tennessee	110,369,343	101,824,749	494.53	447.36
Georgia	105,957,665	93,640,506	450 60	449.69
Iowa	95,493,755	103,898,186	1,001.31	1,015.45
West Virginia	91,079,124	76,162,837	422.06	395.15
Colorado	81,613,515	84,623,896	430 81	467.15
Nebraska	76,845,760	74,560,104	206.05	210.99
Alabama	73,520,131	70,343,556	364.50	369.35
Oregon	71,803,754	67,222,935	612 01	603.13
Maine	50,010,345	55,463,285	566.08	571.52
Florida	41,316,572	32,771,128	197.04	83.03
Kansas	37,871,575	40,456,149	581.20	581.69
Oklahoma	35,402,037	30,766,522	323.81	301.51
Utah	33,622.564	40.890.741	477 60	469.40
Arkansas	29,954.017	26,283,177	120 32	121.83
North Carolina	29,619,319	26,915.221	215.55	227.63
Delaware	20,860,564	26,046,911	105.87	101.95
South Carolina	20,211,444	25,042,140	301.40	313.56
New Hampshire	19,650,000	23,405,151	263.46	269.34
Montana	15,254,913	22,196,885	111.26	120.92
Mississippi	8,412,372	10.730,801	97.91	124.17
Vermont	6,949,976	8,738,378	116.11	125.55
Arizona	5,473,890	7,482.895	44.12	52.89
North Dakota	3,378,686	2,840.840	20.66	24.42
Idaho	3,255,578	3,278,906	149.46	155.40
South Dakota	2,022,714	1,914,947	17.20	24.44
New Mexico	1,424,861	1,486,434	11.00	10.95
Wyoming	683,964	1,457,508	22.84	23.05
Nevada	480,000	804,863	4.52	1.56

* Includes 11,852,726 bus passengers carried by motor buses operated as parts of electric railway systems.

South Carolina.—The figures show a slight decrease in track mileage, which was accompanied by a decrease of 21.4 per cent in the number of passengers carried. However, on account of fare increases, gross railway operating revenues increased 21.5 per cent, aggregating $3,368,058 in 1922 as compared with $2,772,841 in 1917, but owing to a more rapid increase in expenses net income decreased from $563,791 in 1917 to only $2,009 in 1922.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	†6	7	.....
Miles of single track‡	332.12	335.73	*1.1
Number of cars, all types	395	458	*13.8
Electric locomotives	16	12	.....
Number of persons employed	1,298	1,499	*13.4
Salaries and wages	$1,497,988	$976,090	53.5
Primary horsepower, total	19,600	36.600	*46.4
Kilowatt capacity of generators	12,000	25,750	*53.4
Current generated, kilowatt-hours	35,895,050	40,878,930	*12.2
Current purchased, kilowatt-hours	30,011,513	62,985,134	*52.4
Passengers carried	22,338,616	28.408,318	*21.4
Revenue car mileage	7,718.687	8,235,764	*6.3
Railway operations, revenues	$3,368,658	$2,772,841	21.5
Railway operations, expenses	$2,721,956	$1,729.594	57.4
Net revenues, railway operations	$646,702	$1,043,247	*38.0
Auxiliary operations, revenues**	$637,628	$993,792	*35.8
Auxiliary operations, expenses	$290,160	$556,906	*47.9
Net revenues, auxiliary operations	$347,468	$436,886	*20.5
Net operating revenues	$994,170	$1,480,133	*32.8
Taxes assignable to railway operations	$227,652	$187,055	21.7
Operating income	$766,518	$1,293,078	*40.7
Non-operating income	$150,329	$137,838	9.1
Gross income	$916,847	$1,430,916	*35.9
Interest and other deductions from gross income	$914,838	$867,125	5.5
Net income	$2,009	$563,791	*99.6

*Indicates decrease.
†One company with 3 miles of track discontinued operations prior to 1922.
‡Includes 55.82 miles in 1922 and 53.91 miles in 1917 lying outside of the state but owned by companies within the state, and excludes 25.10 miles in 1922 and 31.74 miles in 1917 operated in the state but owned by companies outside of the state.
**Chiefly revenue from electric light and power departments of electric railways.

Florida.—The figures show an increase of 7.7 per cent in track mileage, and a gain in the number of passengers

carried of 27.4 per cent. Gross railway operating revenues amounted to $2,466,367 in 1922, an increase of 46.5 per cent as compared with 1917, operating expenses increased 62.9 per cent, and net income from all sources made a gain of 102.1 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	†7	8	.....
Miles of single track	197.04	183.03	7.7
Number of cars, all types	415	333	24.6
Number of persons employed	1,166	1,029	13.3
Salaries and wages	$1,513,284	$886,192	70.8
Primary horsepower, total	32,849	33,905	*3.1
Kilowatt capacity of generators	22,645	24,300	*6.8
Current generated, kilowatt-hours	44,931,299	31,101,546	44.5
Current purchased, kilowatt-hours	4,042,400	971,610	316.1
Passengers carried	49,220,967	38,625,356	27.4
Revenue car mileage	9,057,700	7,208,883	25.6
Railway operations, revenues	$2,466,367	$1,683,350	46.5
Railway operations, expenses	$1,743,830	$1,070,254	62.9
Net revenues, railway operations	$722,537	$613,096	17.9
Auxiliary operations, revenues‡	$1,611,372	$759,604	112.1
Auxiliary operations, expenses	$638,813	$316,853	101.6
Net revenues, auxiliary operations	$972,559	$442,751	119.7
Net operating revenues	$1,695,096	$1,055,847	60.5
Taxes assignable to railway operations	$326,502	$157,561	107.2
Operating income	$1,368,594	$898,286	52.4
Non-operating income	$19,526	$1,560	1,151.7
Gross income	$1,388,120	$899,846	54.3
Interest and other deductions from gross income	$295,171	$358,995	*17.8
Net income	$1,092,949	$540,851	102.1

†One company with 4.04 miles of track discontinued operations prior to 1922.
‡Chiefly revenue from electric light and power departments of electric railways.

New Hampshire.—An increase of 6.2 per cent in track mileage was accompanied by a decrease of 15.5 per cent in passengers carried. However, owing to fare increases, operating revenues increased from $1,250,769 in 1917 to $1,666,029 in 1922, a gain of 33.2 per cent, and net income from all sources increased 28.7 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	14	13	.....
Miles of single track†	216.03	203.37	6.2
Number of cars, all types	346	307	12.7
Electric locomotives	1	2	.....
Number of persons employed	586	609	*3.8
Salaries and wages	$808,136	$481,000	68.0
Primary horsepower, total	2,250	3,982	*43.5
Kilowatt capacity of generators	1,250	2,675	*53.3
Current generated, kilowatt-hours	4,369,770	5,491,065	*20.4
Current purchased, kilowatt-hours	13,298,632	11,006,954	20.8
Passengers carried	22,270,122	26,341,020	*15.5
Revenue car mileage	4,005,831	3,890,158	3.0
Railway operations, revenues	$1,666,029	$1,250,769	33.2
Railway operations, expenses	$1,431,219	$999,087	43.3
Net operating revenues	$234,810	$251,682	*6.7
Taxes assignable to operations	$91,019	$67,404	35.0
Operating income	$143,791	$184,278	*22.0
Non-operating income	$23,887	$6,909	245.7
Gross income	$167,678	$191,187	*12.3
Deductions from gross income	$78,638	$122,011	*35.5
Net income	$89,040	$69,176	28.7

†Excludes 47.43 miles of track in 1922 and 65.97 miles in 1917 operated in the state but owned by companies outside of the state.

Kentucky.—There was a small increase in track mileage, and a gain of 4.4 per cent in the number of passengers carried. Gross railway operating revenues amounted to $8,027,986 in 1922, an increase of 27 per cent as compared with 1917, but on account of the more rapid increase in expenses both net revenue from railway operations and net revenue from all sources decreased by slightly over 13 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	9	11	.....
Miles of single track†	499.52	498.23	0.3
Number of cars, all types	992	1,059	*6.3
Number of persons employed	2,645	2,857	*7.4
Salaries and wages	$3,358,411	$2,233,878	50.3
Primary horsepower, total	44,550	41,710	6.8
Kilowatt capacity of generators	29,500	30,625	*3.7
Current generated, kilowatt-hours	52,192,809	71,257,192	*26.8
Current purchased, kilowatt-hours	28,784,647	30,516,586	*5.7
Passengers carried	147,490,154	141,218,932	4.4
Revenue car mileage	20,371,699	22,865,008	*10.9
Railway operations, revenues	$8,027,986	$6,319,418	27.0
Railway operations, expenses	$5,840,500	$3,789,486	54.1
Net operating revenues	$2,187,486	$2,529,932	*13.5
Taxes assignable to railway operations	$567,115	$517,515	9.6
Operating income	$1,620,371	$2,012,417	*19.5
Non-operating income	$234,704	$149,555	56.9
Gross income	$1,855,075	$2,161,972	*14.2
Deductions from gross income	$1,202,920	$1,410,815	*14.7
Net income	$652,155	$751,157	*13.2

†Includes 1.07 miles in 1922 lying outside of state, but owned by companies within the state, and excludes 22.74 miles in 1922 and 17.47 in 1917 operated in the state, but owned by companies outside of the state.

*Indicates decrease.

Tennessee.—Track mileage increased 9.1 per cent and there was a gain of 6.6 per cent in the number of passengers carried. Gross railway operating revenues amounted to $8,011,437 in 1922, an increase of 48.7 per cent as compared with 1917, and net income from all sources increased 101.8 per cent during the five-year period.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	13	14	.....
Miles of single track†	503.89	462.00	9.1
Number of cars, all types	844	840	0.5
Electric locomotives	3	1	.....
Number of persons employed	2,841	2,963	*4.1
Salaries and wages	$3,654,950	$2,238,014	63.3
Primary horsepower, total	35,200	53,533	*34.2
Kilowatt capacity of generators	25,450	38,205	*33.4
Current generated, kilowatt-hours	29,398,550	90,682,359	*67.6
Current purchased, kilowatt-hours	103,314,847	79,354,017	30.2
Passengers carried	130,767,681	122,655,470	6.6
Revenue car mileage	19,121,967	21,400,684	*10.6
Railway operations, revenues	$8,011,437	$5,386,465	48.7
Railway operations, expenses	$5,376,897	$3,694,943	45.5
Net revenues, railway operations	$2,634,540	$1,691,522	55.7
Auxiliary operations, revenues‡	$1,832,280	$2,132,199	*14.1
Auxiliary operations, expenses	$846,306	$899,831	*5.9
Net revenues, auxiliary operations	$985,974	$1,232,368	*20.0
Net operating revenues	$3,620,514	$2,923,890	23.8
Taxes assignable to railway operations	$944,376	$593,513	59.1
Operating income	$2,676,138	$2,330,377	14.8
Non-operating income	$143,537	$36,333	295.1
Gross income	$2,819,675	$2,366,710	19.1
Interest and other deductions from gross income	$1,561,212	$1,743,020	*10.4
Net income	$1,258,463	$623,690	101.8

†Includes 9.36 miles in 1922 and 14.64 miles in 1917 lying outside of the state but owned by companies within the state. Also includes in 1922, 46.70 miles of track (not equipped with electric power) over which gasoline motor cars are operated.
‡Chiefly revenue from electric light and power departments of electric railways.

Montana.—Gross railway operating revenues amounted to $969,213 in 1922 as compared with $1,178,755 in 1917, a decrease of 17.8 per cent, while the net income from all sources decreased 76.3 per cent. Track mileage shows a decline of 8 per cent, and passenger traffic decreased 32.5 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	†5	6	.....
Miles of single track	111.27	120.92	*8.0
Number of cars, all types	173	184	*6.0
Number of persons employed	334	486	*31.3
Salaries and wages	$556,106	$572,604	*2.9
Current purchased, kilowatt-hours	18,304,263	17,927,151	2.1
Passengers carried	17,522,464	25,948,387	*32.5
Revenue car mileage	2,979,323	3,591,815	*17.1
Railway operations, revenues	$969,213	$1,178,755	*17.8
Railway operations, expenses	$895,625	$961,128	*6.8
Net revenues, railway operations	$73,588	$217,627	*66.2
Auxiliary operations, revenues‡	$354,106	$322,628	9.8
Auxiliary operations, expenses	$171,984	$150,283	14.4
Net revenues, auxiliary operations	$182,122	$172,345	5.7
Net operating revenues	$255,710	$389,972	*34.4
Taxes assignable to railway operations	$96,386	$77,124	25.0
Operating income	$159,324	$312,848	*49.1
Non-operating income	$2,797	$18,500	*84.9
Gross income	$162,121	$331,348	*51.1
Deductions from gross income	$116,373	$138,681	*16.1
Net income	$45,748	$192,667	*76.3

†One company with 6.4 miles of track which reported in 1917 discontinued operations prior to 1922.
‡Chiefly revenues from electric light and power departments of electric railways.

Nevada and Utah.—The track mileage operated in these states in 1922 was practically the same as in 1917, but the number of passengers carried decreased 18.1 per cent. However, on account of fare increases, gross railway operating revenues made a gain of 26.8 per cent, aggregating $4,334,800 in 1922, while railway operating expenses increased 30 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	6	6	.....
Miles of single track†	488.93	488.97	.....
Number of cars, all types	722	518	39.4
Number of persons employed	1,130	1,552	*27.2
Salaries and wages	$1,700,174	$1,389,553	22.4
Current purchased, kilowatt-hours	42,588,598	40,349,995	5.5
Passengers carried	39,790,937	48,561,651	*18.1
Revenue car mileage	9,972,268	9,970,594	.....
Railway operations, revenues	$4,334,800	$3,418,967	26.8
Railway operations, expenses	$2,783,446	$2,141,169	30.0
Net operating revenues	$1,551,354	$1,277,798	21.4
Taxes assignable to railway operations	$322,609	$220,703	4.62
Operating income	$1,228,745	$1,057,095	16.2
Non-operating income	$428,342	$377,486	13.5
Gross income	$1,657,087	$1,434,581	15.5
Deductions from gross income	$1,638,498	$1,466,913	11.7
Net income	$18,589	‡$32,332	.....

†Includes 6.81 miles in 1922 and 8.01 miles in 1917 operated outside of the state, but owned by companies within the state.
‡Deficit.

The Readers' Forum

The Weekly Pass as a Simple Zoning Expedient

UNITED RAILWAYS OF ST. LOUIS, MO.

Oct. 16, 1923.

To the Editors:

Almost any street railway man will admit that the distance fare is right in principle, that it is more equitable between different passengers than the flat fare, and that from the company's standpoint it has the advantages of getting more revenue from the long-haul passenger without driving him away and of putting the cars in a better position to compete with the sidewalks and jitneys for the short-distance business. With all these advantages, however, distance or zone fares have been adopted in very few cities. Managements have hesitated to urge them on account of the difficulties introduced in fare collection. Doubtless, too, they would meet with opposition from a considerable part of the public.

The distance fare principle can, however, be introduced to a large degree without increasing fare collection troubles, and probably without marked public opposition, by means of the weekly pass. The method is applicable to any surface system on which fare collection is entirely pay-as-you-enter or entirely pay-as-you-leave and to any rapid transit system which collects its fares at the entrance to the stations. It is simply to divide the single fare area, which will remain a single fare area so far as cash and ticket fares are concerned, into pass sections, and issue a distinct pass for each section, good for transportation if presented within that section. Then the holder of a section pass could ride at will within the limits of the section designated. If he made a trip between a point within the zone and one without, he could use the pass only one way, and on the opposing trip would be obliged to pay the full cash or ticket fare, unless he also possessed a pass good in the section at the other end of the trip. If he had a pass good anywhere on the system he would not of course have any zone passes, and if such general passes were available there would be no point in his having two section passes, since the price of the latter would presumably be at least half of that of the former.

The section pass would then be a short-haul pass so far as its own section was concerned. On long trips it could be used only one way, and in consequence could be used only half as often as a pass of general acceptability. In view of these facts it could be sold at a less price than that required for the general pass, and so would help the company to get the short-haul business in spite of a high cash fare and a high-priced general pass.

In a circular city with its business district in the center, it might be well to have five primary sections, as follows: Central, northern, eastern, southern, western. The boundary between the central and other sections would be perhaps half way between the business center and the fare limits. Overlapping sections might be provided to care for short rides between points in adjacent primary sections. Or the primary sections might be made to overlap. The number of sections, overlapping or not, which can be provided is limited only by the possibility of printing the respective passes so that the conductors can readily distinguish them.

The plan here outlined is particularly applicable to systems in cities of large area, where the average haul is long, where the fare is consequently so high as to discourage short-haul riding or drive it to competitors and where a low-priced general pass would cut too deeply into the revenue derived from the long-haul business. In cities where these general conditions do not obtain, it may be found useful under some peculiar conditions.

This plan is believed to be original with the writer. Steady reading of the ELECTRIC RAILWAY JOURNAL has failed to bring to his attention any such suggestion. It is offered to the industry in the hope that it will prove useful in solving some of the many problems with which urban railways are confronted.

LAWRENCE H. DOOLITTLE.

Is the Electric Railway Industry Tottering?

NEW YORK, Oct. 29, 1923.

To the Editors:

Within the last five years, according to the Census Bureau, there has been a net loss of nearly 900 miles of electric railway track, or about 2 per cent. Is the electric railway industry tottering?

No. This is not a sign of tottering. Every industry gets overbuilt at times, and of course there has been much track that ought never to have been built.

Other statistics recently published by the Census Bureau show that between 1917 and 1922 there was a loss of traffic by electric railways in nineteen states of the Union. Is this an indication of tottering?

No. It will take more than this to make the industry totter. These passengers have largely deserted temporarily for an extravagant means of transport, namely, private automobile. This tendency is bound to have limits and is bound to correct itself to some extent.

Out of 850-odd electric railways in the United States and Canada only seventeen competed this year for the Coffin Award. Is this significant?

Yes. The industry is certainly dead from its ears up. Here is a practical proposition devised by the most enlightened and practical men in the industry. To qualify, it requires nothing but every-day good management. Or, rather, there is nothing required which should not be done by every management every year to improve its property, yet only seventeen tried. Have the other 833-odd "lain down," or have they failed in all their endeavors to make improvements, or are some of them too modest or lazy to compete? It may be that many have perfect properties and hence have no chance for improvement. It may be that many are too poor. It may be that many were really too busy to prepare elaborate briefs.

Is it too much to expect that every electric railway should go after this award? There is not a motion required that a good manager should not make and that will not show favorably in the income account. It is not necessary to expend capital. The award is made for human effort. The small roads need not be backward, for, like the parable, the man with two talents will not be scorned. What is wanted is good, active thinking, and good thinking action. When the industry gets such stuff, it will not totter. It may have to take some hard cracks, but it will take them standing up.

A FRIEND OF THE INDUSTRY.

Association News & Discussions

Report of A.E.R.A. Committee on Valuation

Weight to Be Given Various Evidences of Value and Study of Present Price Trends Are Principal Aspects Considered—Committee Presents Bases for Determining "Present Value"—Report Is Printed in Full as Adopted by Atlantic City Convention

IN 1915 the committee on valuation presented a report on the general problem of valuation. In 1916 the committee presented a bibliography of valuation literature complete to Jan. 1, 1916, and a code of definitions of terms used in valuation work. For the years 1917-1918-1919 the committee reported that in its judgment fair value should include original cost, appreciation and going concern value, and that in those cases where original cost was not available reproduction cost new with proper overheads should be used as a basis, to which should be added going concern value and development cost. The committee also recommended that when a property was in good operating condition and properly maintained no deduction should be made for accrued depreciation in determining rate-making value.

In 1920 the report of the committee further developed the subjects of "cost of reproduction new" and "going value." The 1921 report discussed the rate of return and the importance of placing this rate high enough to attract new capital. The use of the yard stick method in appraisals was advised. Last year the committee further discussed and commended the use of the yardstick method.

For the current year the committee has devoted itself to a study of the weight which should be given to the various evidences of value and to a study of the present price trends. The report in full follows. The conclusions and recommendations are here summarized:

Conclusions

1. Courts of last resort have up to this time uniformly held that the basis of rate making is the present value of the property, that the ascertainment of that value is not controlled by artificial rules, is not a matter of formulas, but that there must be a reasonable judgment having its basis in a proper consideration of all relevant facts, and, in recent cases, that in the determination of present value the enhanced prices of labor and materials cannot be ignored, and further that present value is not necessarily either "prudent investment," "original cost" or reproduction cost at abnormal prices.

2. That trend prices *based on pre-war price investments* cannot be determined with sufficient accuracy to be used as the basis of valuation.

3. That a careful study of present economic conditions and the underlying causes of variations in the purchasing power of money do not indicate any early return to pre-war price levels, but rather a continuance of present prices with minor fluctuations and possibly a slow decline until the curve of general commodity prices again approximates closely its general trend as established in the period from 1899 to 1915, inclusive, and that, in particular, the conditions governing electric railway construction costs indicate that the curve which represents them will not for ten or fifteen years approximate the trend curve determined by the pre-war period, or, in other words, that construction costs for the next decade at least will remain well above rather than below 150 per cent of corresponding costs in 1913-1914.

Recommendations

1. Our member companies, in approaching the question of valuation before a commission or other regulatory body or before a court, should submit full evidence at least as to original cost, present-day reproduction cost, present and probable future trend of unit costs and direct testimony as to present-day fair value. They should endeavor to reach with the regulatory body a fair, equitable conclusion as to a reasonably stable level of unit costs and an equitable working figure as to such unit costs, if any, as may be admittably still unstable.

2. In the case of properties in serviceable condition and adapted to their purpose, our member companies, in view of controlling court decisions, should take a firm stand for a present plant value approximately equal to reproduction cost at stable unit prices as above and for a fair return upon that value, to which there should of course be added going concern value and other non-physical elements.

Weight to Be Attached to Various Evidences of Value

The Supreme Court of the United States in the leading case of Smyth vs. Ames established the principle that a public utility is entitled to receive from the public a fair return upon the fair value of its property and, the court, though it did not establish any definite rule for the determination of fair value, listed certain evidences of value which in its opinion should, with others, be considered and weighed before fair value can be determined.

The most important evidences of value are:

First—Original cost of construction plus subsequent net capital expenditures.

Second—Amount and market value of stocks and bonds.

Third—Present as compared with original cost of construction.

If the fairness of any particular set of rates is under consideration there must, of course, also be considered the estimated earnings of the utility under the proposed system of rates and the probable cost of operation.

In the gradual development of the theory of valuation since the case of Smyth vs. Ames the various state commissions, state Supreme Courts and various Federal courts, including the Supreme Court itself, have exhibited a growing tendency to ignore the second of these evidences of value and to focus attention more and more upon original cost plus subsequent net capital additions and reproduction cost as of the time of the inquiry.

During the pre-war period the difficulty or even the impossibility of determining the original cost of many properties, together with the fact that in many cases reproduction cost as of the time of the inquiry was not widely different from the normal construction cost as of the time when the property was originally built, led frequently to reliance in large degree upon cost to reproduce, using the unit prices as of the time of reproduction, unit prices averaged over a term of years prior to the valuation or unit prices determined by careful study of the trend of prices for the various basic commodities involved.

The coming of the war changed the situation materially. Wages and commodity prices rose by leaps and bounds, carrying up with them cost of reproduction at current prices, until, at the peak, cost of reproduction at current prices exceeded original cost or pre-war reproduction cost by 100 per cent or more. Regulatory bodies, therefore, found themselves suddenly confronted by two problems. In valuing a new property, which of the two measures of value, easily comparable in the pre-war period but now widely divergent, should be given controlling weight? In valuing a property which had previously been valued, should the new valuation be limited only to subsequent capital additions or should the whole problem

be reopened and reconsidered on the basis of present-day conditions?

The problems thus presented were complicated by the fact that several minor questions, on the answers to which the main question must necessarily depend, could not be answered. For example, was the price increase permanent or merely temporary? If the former, had we entered upon a new price level, and if so, how high was it? If the latter, would prices promptly return to their pre-war level or would this return be long delayed?

Under these conditions we would naturally expect to find a wide divergence between the various regulatory bodies as to the weight which should be attached to the various evidences of value. This expectation is fully realized when we make a study of recent commission decisions. It is doubtful, in fact, whether any two state commissions hold exactly the same point of view toward the problem.

As indicated above, they pay practically no regard, however, to the amount or market value of securities, and the various differences which are found between them grow chiefly out of their treatment of the elements of original cost and reproduction cost.

Disregarding minor differences, however, it is possible to group the commissions under certain general classifications as listed below:

Group I. Reproduction Cost Considered

Class A.—Commissions belonging to this class refuse to recognize either original cost or reproduction cost as of the present date as controlling and have no definite method of relative weighting for these two evidences of value.

In general, they consider all evidences of value which are presented and all other matters or circumstances which they feel have any bearing upon the case, and then announce a value which they believe to be the fair value under all of the circumstances. Certain of the decisions rendered by the commissions in this class lean strongly toward original cost so far as the final value is concerned, and others lean strongly toward reproduction cost under present-day prices, but the commissions themselves disclaim any recognition of either element as, in general, controlling.

Class B. — The commissions in this class regard reproduction cost under present-day prices or those probably in force in the period while the rate is in effect as dominant or controlling.

Class C.—The commissions in this class recognize as dominant a reproduction cost based not upon present prices but upon average prices over a five-year or ten-year period prior to the time of the valuation.

Class D.—The commission in this class regards the investment value as controlling for new properties, but when a property is more than ten years old the commission is disposed to follow reproduction cost based on unit prices for the ten-year average.

Class E.—The commissions in this class hold that since rates are to be effective for a future period they should be related to the value as of that period, and that therefore fair value for rate making is reproduction cost with unit prices as of the time during which the rate will probably be in effect.

Group II. Reproduction Cost Ignored

Class F. — The commissions in this class regard original cost or, in some cases, historical reproduction cost, by which they mean a reproduction cost using for each unit so far as possible the normal cost at the time when it was supposedly installed, as dominant or controlling.

Class G.—The commissions in this class hold that fair value should be the prudent investment.

Group III. Special Theories

Class H.—The commissions in this class use what is sometimes termed the split inventory method. Under this method property installed prior to the war is taken at its fair pre-war value, either as valued at that time by a commission or usually on a reproduction cost as of a definite date or as averaged over a period. To the sum so obtained there is added the actual cost of war and post-war additions. and the sum so secured is taken as fair present-day value.

Class I.—The commissions in this class vary the theory of Class H by allowing on the pre-war property an appreciation for change in price scale. This theory has been worked out most fully by the state of Virginia, which has built a definite working formula for valuation cases.

Class J.—The commissions in this class have taken the position in dealing with applications for revaluation that present fair value is the value formerly found plus the net capital additions to date.

Class K.—The commissions in this class have no general policy.

TABLE I—CLASSIFICATION OF COMMISSIONS

	By decisions in years noted								By Replies	
	1920		1921		1922		1923			
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Class A	1½	6	3	18	7½	30.55	4½	37.50	14	53.84
Class B	½	4	0	0	1½	5.56	2	16.67	½	1.92
Class C	3½	19	2	12	½	1.39	..	...	2	7.69
Class D	..	...	..	...	..	.....	..	.....	1	3.85
Class E	..	...	..	...	½	2.08	..	.....	½	1.92
Total Group I	5½	29	5	30	9½	39.58	6½	54.17	18	69.22
Class F	7½	39	5½	32	6½	27.08	1½	12.50	3	11.54
Class G	..	...	..	...	..	.....	..	.....	1	3.85
Total Group II	7½	39	5½	32	6½	27.08	1½	12.50	4	15.39
Class H	6½	32	4½	26	4½	18.75	2	16.67	2	7.69
Class I	..	...	1	6	2½	10.42	2	16.66	1	3.85
Class J	..	...	1	6	1	4.17	..	.....	..	...
Class K	..	...	..	...	..	.....	..	.....	1	3.85
Total Group III	6½	32	6½	38	8	33.34	4	33.33	4	15.39
Grand total	20	100	17	100	24	100.00	12	100.00	26	100.00

Summary of Commission Decisions

The committee has digested the commission and court decisions as reported in P. U. R. for the years 1920, 1921, 1922 and 1923 to May and classified them under the above plan. The results, so far as the commissions are concerned, are shown in condensed form in Table I, giving for each year the number of commissions whose reports seem to put them in the class indicated and the percentage of the commissions in the class to the total number of commissions reported. Fractions were used where the decisions for a given year seemed to fall in more than one class.

The committee then wrote to each commission asking for an expression of opinion on this question. A number of commissions have made no valuation rulings and others felt that they should not express themselves except through official rulings, but twenty-six of the commissions replied with sufficient fullness to enable the committee to classify them.

The significant thing in this tabulation is the evidence it affords of a steady drift toward Group I and particularly toward Class A.

State Court Decisions

The decisions of the state courts of last resort seem to show less variation than the decisions of the commissions, although there is, of course, a much smaller number of adjudicated cases.

Thus we find in Class A the Supreme Court of Illinois, the Supreme Court of Kansas, the Supreme Court of Missouri, the Supreme Court of New Jersey, the Supreme Court of Appeals of Virginia and the West Virginia Supreme Court of Appeals.

Still in Class A, but with a strong leaning toward Class F, we find the New York Supreme Court.

In Class B we find in 1920 the Michigan Supreme Court.

In Class J, on the question of the treatment to be given to a previous valuation, we find the Washington Supreme Court.

Federal Courts

The Federal courts also incline strongly toward Class A, as will be seen by an examination of the following cases:

United States Court of Appeals of the District of Columbia in re Potomac Electric Power Company vs. Public Utilities Commission, P. U. R. 1922 B, 680.

United States District Court of Min-

nesota in re City of Winona vs. Wisconsin-Minnesota Light & Power Company, P. U. R. 1921 A, 146 and P. U. R. 1922 C. 461.

On the other hand we find in Class B:

United States District Court for Missouri, in St. Joseph Railway, Light & Power Company vs. Public Service Commission, P. U. R. 1921 A, 540.

Galveston Electric Company Cases

Galveston Electric Company vs. Galveston reported in P. U. R. 1922 D, 159, has been perhaps more frequently misinterpreted than any other recent case of the Supreme Court. The company and the municipality both abandoned the evidences of value approved by the case of Smyth vs. Ames and attempted to determine fair value on the reproduction method, using not current prices but the prices assumed as average prices for the future.

The value had been reached in the lower court, not by weighting the various measures of value recognized in Smyth vs. Ames, but by assuming that in the post-war period the country would settle down on a new price plateau and that the company should be allowed reproduction value determined by the unit prices of this new plateau.

The master and the lower court set this new plateau 33⅓ per cent above the pre-war level, while the company contended that it should be from 60 per cent to 70 per cent above the pre-war level.

Both contestants appealed on this point and others to the Supreme Court of the United States, and the question presented to that body was practically this:

Both contestants having agreed to ignore the usual evidences of value and to determine value by an estimate or prophecy as to future economic conditions, is there any thing in the record or anything of which the court shou'd take judicial notice which will make the action of the master in refusing to prophesy a level above 33⅓ per cent reversible error? The United States Supreme Court held that there was nothing which constituted reversible error in this action of the master, but it did not express an approval of the method or express any opinion as to the accuracy of the master's or the company's costs.

Southwestern Bell Case

The case of Houston vs. the Southwestern Bell Telephone Company, reported in P. U. R. 1922 D, 793, unquestionably takes the United States Supreme Court out of Class F, but it does not, as has been sometimes stated, put the Court in Class B. The decision is an unequivocal assertion that the company is allowed to earn a fair return upon its present value or upon the value of the property used and useful at the time when it is used, but there is nowhere in the decision any assertion that present-day reproduction cost and present-day value are identical.

The decision of the United States Supreme Court in the case of Missouri vs. Public Service Commission, dealing with the valuation of the Missouri properties of the Southwestern Bell Telephone Company, was handed down on May 21, 1923.

In this case below the company had put in a valuation showing a reproduction cost as of June 30, 1919, of $35,100,471 and an actual cost as shown by the books of $22,888,943. The latter figure, however, did not include the cost of establishing the business, included in the former figure at $5,594,816.

The commission had not valued the entire property of the company, but had valued the property at three of the exchanges in the state in 1913, 1914 and 1916, the last of these representing, however, less than 9 per cent of the total value of the three exchanges. The company's valuation was made up by exchanges and it was therefore a simple matter to compare the commission's value on these three exchanges with the company's value on the same property.

The commission added to its earlier value on the three exchanges the net capital additions and determined the ratio of the total so secured to the company's reproduction cost. This ratio they applied to the company's reproduction cost of the entire property and reached a value of $20,350,000 or, on a similar process for reproduction cost less depreciation, $20,400,000. This latter figure was fixed as the tentative value of the property.

It is evident that this, as the Supreme Court says, undertakes:

'to value the property without according any weight to the greatly enhanced costs of material, labor, supplies, etc., over those prevailing in 1913, 1914 and 1916."

The court then emphatically reaffirms its former ruling that present value and not cost is the determining factor and repudiates the methods that are followed by the commission in the following terms:

"It is impossible to ascertain what will amount to a fair return upon properties devoted to public service without giving consideration to the cost of labor, supplies, etc., at the time the investigation is made. An honest and intelligent forecast of probable future values, made upon review of all the relevant circumstances, is essential. If the highly important element of present costs is wholly disregarded such a forecast becomes impossible. Estimates for tomorrow cannot ignore prices of today."

From the viewpoint of the Supreme Court, therefore, there was evidently no finding of "present value," but there was in the record testimony (with no substantial evidence to the contrary) that the value was at least 25 per cent in excess of that found by the commission. The Supreme Court found that a value of $25,000,000, slightly less than that fixed by this uncontroverted testimony, would make the rates ordered by the commission confiscatory and therefore reversed the judgment of the lower court sustaining the commission.

This decision did not fix the value of the property of the company at $25,000,000, but merely determined that it was not, as judged by the record, less than that. It did not determine the weight to be given to reproduction cost, but did determine that it cannot be ignored. Finally, it is a demonstration of the importance of presenting testimony as to "present value" as distinct from costs, whether original or reproduction.

The case, however, is particularly important because of the dissenting opinion filed by Justices Brandeis and Holmes, which is a strong presentation of the prudent investment theory.

Atlanta and Bluefield Cases

The Atlanta Gas case and the Bluefield Water Works case were both decided on June 11, 1923.

To those who have regarded the Southwestern Bell Telephone case as holding that present-day reproduction costs are a controlling measure of present value the Atlanta Gas case came as a distinct shock, and many critics, including one justice of the Supreme Court itself, insist that these two cases cannot be reconciled. To those, however, who regarded the Southwestern Bell Telephone Case as holding merely that present-day reproduction prices must be considered and given reasonable weight, it does not seem impossible to reconcile the Atlanta Gas decision with that in the Southwestern Bell Telephone case.

In the Atlanta case the commission below claimed that it had given full consideration to present-day reproduction costs. Both the District Court and the United States Supreme Court found that "the opinion of the commission evinces a full and conscientious consideration of the evidence."

The lower court also held that the commission's statement of the applicable rules of law was sound, and that, while it might differ from the commission as to the application of those rules, the resulting changes in the final figures would not be sufficient to justify a reversal.

The commission in dealing with this case had taken the value of the portions of the plant in existence in January, 1914, and allowed original cost or reproduction cost as of that date undepreciated. To this sum it added $125,000 as a recognition of the appreciation in land values, and also added approximately $1,000,000 of additions made during the period from January, 1914, to September, 1919, at actual cost, although since the hearing came in the last three months of 1921 the strict application of the reproduction cost theory would have shown a reproduction loss upon a part at least of this investment.

The lower court held that this action in this particular case resulted in a figure which gave sufficient weight to present-day unit prices, and therefore sustained the commission, an action which the United States Supreme Court refused to reverse.

In the Southwestern Bell Telephone

case, on the contrary, the commission's figures were based upon 1914 reproduction costs depreciated, no allowance was made for the appreciation of land during the war period, and the additions were entered at cost, which, since the hearing occurred at the end of 1919, was below reproduction cost as of that date. There was therefore no evidence of any consideration whatever of present-day unit prices in the determination of value, and the decision was accordingly reversed by the Supreme Court.

In the Bluefield Water Works case the commission ignored reproduction at present-day prices, ignored testimony as to present fair value, fixed a value below its own revision of the company's reproduction costs on pre-war basis depreciated, below its own engineer's reproduction costs at 1915 prices depreciated, and only 1 per cent to 2 per cent above a depreciated cash investment.

Under these circumstances the Supreme Court held that there had been no recognition of present-day costs in the determination of the value, and therefore reversed the commission.

General Summary of Decisions

If we attempt to examine the various conclusions reached by state commissions and Federal courts it becomes evident at once that there is no uniform rule and apparently no tendency toward a uniform rule by which one may determine the weight to be attached to the various evidences of value. If we attempt to generalize for the country as a whole, the conclusions which we can reach are extremely limited. They are, perhaps, as follows:

(a) The fair value of Smyth vs. Ames is present value.

(b) Original cost is not controlling.

(c) Reproduction cost at current prices is not controlling.

(d) No one of the various set rules by which commissions have reached reproduction cost on the basis of unit prices averaged over a period of years (Class C), or have reached fair value by a split inventory method (Class H), or by a combination of pre-war costs appreciated and subsequent capital investment, has been approved by any court of last resort. It is true that decisions resting upon these theories have been approved, but the approval has been an approval of the decisions because the formula took into consideration all of the evidences of value, rather than an approval of the formula.

(e) The so-called "prudent investment" theory, the "reproduction cost of equivalent plant" theory, and the "reproduction cost of unit prices during the time the rate will probable be in force" theory, while mentioned approvingly by various commissions, have not been approved by the courts.

(f) A commission which adopts a basis of value which clearly and demonstrably shows that it has considered and given reasonable weight to all of the elements of value seems to run little danger of reversal by the courts.

If we forget for a moment the decisions of the various commissions and courts and attempt to approach this subject from a practical economic viewpoint, we find at once that there are two distinct methods of approach to this important question, and that utilities and municipalities alike have shifted from method to method as change in economic conditions made first one and then the other advantageous to their particular ends.

Comparison of Valuation Methods

The first method asks for a return on the investment. It is argued that one of the prime requisites for a successful public utility in a growing American community is a constant and adequate supply of new capital; that new capital must be secured either upon a speculative or upon an investment basis; that the development of the theory of regulation by state and Federal governments has destroyed any chance of a speculative reward, and that therefore the business must be put upon an investment basis or have its supply of new capital dried up. But if the business is to be put upon an investment basis, the investor must be assured that the dollar which he invests in the business will remain in the business subject only to the chance of loss by mismanagement or to loss by such change in the prosperity or in the life and habits of the community as will make it impossible for the business to earn a fair return upon this investment at any charge under which business is possible.

In other words, the investor must be assured that the dollar which he places in the business will not be scaled down because later it proves possible to replace the business or equipment for a less sum. If the investor is given this assurance, however, he must consent on his part that he will not claim any increase in the dollar invested because of a changing scale of construction costs.

There still remain, however, the speculative elements of premature obsolescence, change in population drift or decrease in the investor's return due to a general change in the purchasing power of the dollar. Theoretically, these speculative elements may be compensated by allowing an amortization of obsolescence and by adjusting the rate of return to the change in the purchasing power of the dollar. The fact, however, that the obsolescence may be too great to be amortized by any rate economically possible, and the difficulty of securing commission or court approval of a rate of return which would compensate for the change in the purchasing power of the dollar, still leave a large speculative element in the business, which it would seem impossible to remove by anything short of an absolute governmental guarantee.

The investment theory as commonly discussed is, however, vitally weak in that investment is always expressed in terms of mixed dollars. Dollars invested before the war have an entirely different meaning and weight from dollars spent in the past five years, but they are all thrown in together on the books. The business of every day life is done in terms of the money of today and when the amount of an investment is stated it should be stated in terms of the money of today. The statement of an unweighted mixture of different kinds of money has not true meaning.

The second method does not look to a return upon investment, but to a return upon property or a return upon value. Logically, of course, if a man is to look for return upon value, it must be the value which he now has, not the value which he had at some time in the past or the value which he is to have at some time in the future, and the adherents of this method face at once the prime difficulty in its application, the necessity of determining present value.

If we eliminate for the moment the consideration of the value of the going concern and limit our thought to the idea of plant value, and if we measure value as in ordinary commercial transactions by the price or amount of money at which there will be a relatively free movement of property between a group of buyers and a group of sellers in an open market, neither group being under the compulsion of economic necessity, certain basic facts at once become evident:

First—Present value is not necessarily represented by cost. It may be above cost if construction prices have increased or if drift of population or other phenomena of community development have given an enhanced value to the location of the plant; it may be below cost if construction prices have decreased, if a change in the art has reduced the relative efficiency of the plant, or if drift of population or other phenomena of community development have left the plant in a disadvantageous situation or have destroyed or lessened the demand for its service.

Second—Present value is not necessarily represented by reproduction cost at present prices or at prices averaged over any number of years. If construction costs are temporarily abnormally low the seller will withdraw the property temporarily from the market, or the buyer, convinced that he could not complete the construction during the period of low costs, will offer a sum in advance of reconstruction cost at current prices. If reconstruction costs are temporarily abnormally high the buyer will withdraw from the market unless the seller makes a concession in price in order to move the property. If population drift has left the plant in a disadvantageous situation, if a change in the public habit has lessened the demand for its service, or if the plant itself is in bad condition, the seller must make a concession below reproduction cost in order to move the property.

Third—But if the plant is reasonably adapted to its purpose or by extensions and additions can be made so without scrapping any appreciable portion of it as it now exists, if it is in

good repair, if there is a reasonable market for its service, and if construction costs (including therein cost of land and cost of money) are reasonably stable, present value as defined above is equal to or closely approximates reconstruction cost at current prices.

Abstractly considered, the debate between the adherents of these two methods of approach to the problem of fair return might continue indefinitely, since much is to be said in favor of each of them, but when we come to consider the subject from the practical side a new element enters.

The state or the municipality claims the right to regulate the charges made by a utility and the natural tendency of such regulation is downward. The only limit to this downward regulation is to be found in an appeal to the sense of fairness and good business judgment of the legislative authorities or, when this is not successful, to the restraining hand of the courts.

The power of the courts to restrain a legislative body is found only in the fundamental law, the constitutions of the states or the nation. An examination of these documents reveals the fact that the only restraints on such legislation lie in prohibitions against taking private property for public use without due compensation, or in the prohibition against depriving any person of his property without due process of law, which is construed to mean without a determination and payment of an adequate recompense. It follows, therefore, that so long as the courts continue as at present to hold that the taking of the property for public use comes at the time of the establishment of the rate, rather than at the time the property is first devoted to the public service, the "return on investment theory," whatever may be its economic virtues, has no legal standing or foundation in state or Federal constitutions and that the utility which attempts to base its rights upon this theory will find itself deprived of its final protection against legislative aggression, particularly in view of the recent action of the United States Supreme Court.

Even if the courts should in the future adopt the basis of valuation described under the heading of investment or original cost theory, they could not adequately protect the utilities at times when the price levels may have changed to a point where the property could be duplicated for any material amount under the original cost, because the courts could not, in the absence of appropriate legislation, prohibit either private or municipal competition.

We recommend, therefore:

1. Our member companies, in approaching the question of valuation before a commission or other regulatory body or before a court, should submit full evidence at least as to original cost, present-day reproduction cost, present and probable future trend of unit costs, and direct testimony as to present-day fair value. They should endeavor to reach with the regulatory body a fair, equitable conclusion as to a reasonably stable level of unit costs and an equitable working figure as to such unit costs, if any, as may be admittedly still unstable.

2. In the case of properties in serviceable condition and adapted to their purpose, our member companies, in view of controlling court decisions, should take a firm stand for a present plant value approximately equal to reproduction cost at stable unit prices as above and for a fair return upon that value, to which there should of course be added going concern value and other non-physical elements.

We recognize the fact that this conclusion, if followed, may be said to introduce into the public utility business a speculative element, which we regret, and that it may call for revaluations from time to time, but we recognize the fact that no agreement, even though it be made between the utility and the regulatory body, would be binding upon the successors of the present personnel of the latter, and that under the existing condition of the law such an agreement would not be enforced by the courts in the event of a marked change in price levels. The utility which enters into such an agreement, therefore, merely bars itself from any advantage in the case of an increase of unit costs, without protecting itself against the disadvantage that follows from a decrease of unit costs. Whatever our ideas may be, therefore, as to the soundest economic theory, and the desirability of maintaining the securities of our companies in the investment rather than in the speculative class, the protection of the properties in our care compels us to follow the only theory by which we can retain judicial protection against political aggression.

Price Trends

The 1922 committee on valuation embodied in its report a recommendation "that a study be made of price trends and a method worked out by which they may be used in determining the fair value of the property useful and used by the company at the time of the inquiry." In undertaking to carry out this recommendation the present committee understands that the "trends" in question had reference to pre-war prices and their general upward movement during a period of about twenty years preceding the World War, and that the recommendation was prompted primarily by the method adopted in a number of appraisals made during the period of war disturbances of using, not prices current at the time of the inquiry or at the time of actual construction, but those which might have prevailed at the time of the inquiry if the war had not occurred and pre-war price trends had continued. In accordance with this understanding the "trend prices" discussed herein are the prices obtained by projecting the trend of pre-war prices through the war period to the present or some future date.

The object which engineers who have used trend prices have sought to attain was doubtless to arrive at a value higher than pre-war levels, which some authorities sought to retain, yet lower than would be obtained by using current prices which, until two years ago, were undergoing violent fluctuations and which were commonly rejected by regulatory commissions as abnormal. There has been comparatively little recent use of trend prices in valuation work, but in a 1922 rate case in which the company's appraisal embodied such prices the commission pointed out the difficulties of determining correct trends and the errors which would result from lack of suitable skill and judgment in their selection.

It is the opinion of the committee that it should not report upon this subject without giving careful consideration to price movements and their causes covering a considerable period of time, and that it may include in its report comments as to current price movements and opinions as to future tendencies, as well as such statements as to past trends as it believes may be helpful. The subject, therefore, logically divides itself into three parts: (1) Pre-war prices; (2) war period prices; (3) future prices.

Pre-War Prices

There are available to the committee several carefully prepared wholesale price indexes which conform more closely to the cost of public utility construction than do other general compilation of prices. The most commonly used of these indexes is probably that of the United States Bureau of Labor Statistics covering a continuous series of figures since 1890, embracing at the present time more than four hundred commodities, the prices of which are weighted in proportion to their quantity production. The series from 1913 to date was revised in 1922; the basis of weighting used was the production data contained in the 1919 Census of Manufactures in place of 1909 data previously used. More recently the bureau has revised the balance of the series back to 1890, using 1919 weighting data. The changes from earlier index numbers are quite small prior to 1916, and so the full revised series has been used in the following discussion.

For a fifty-year period prior to this series similar but less extensive and probably less accurate figures were compiled by a congressional committee and embodied in Senate Document No. 1394, commonly known as the "Aldrich Report." Similar indexes have been sytematically compiled in other countries for a somewhat longer period, going back in England to about 1800. Special studies of prices in England have also been carried back for over five centuries prior to regular price compilations. Viewed in perspective these early data are of little value in connection with the present inquiry. They show, as is to be expected, an upward tendency throughout the centuries, the causes of which are too remote for helpful present analysis.

Wholesale prices in the United States

for the entire period of their compilation, excluding the World War and previous war peaks, have shown no marked upward tendency. Prices in England, with similar exclusions, have been closely consistent with those in the United States. It is only during the last thirty years that an extended, definite upward trend has prevailed. During the preceding fifteen years an equally pronounced downward trend occurred. The extent to which such trends are now significant depends upon their fundamental causes. The downward movement ending in 1896 was in part the result of an unprecedented expansion of industry, the introduction of labor-saving machinery and a wide extension of agricultural activity, with corresponingly increased transportation facilities. This period also saw the origin and development of electric public utility service, including electric light and power, electric railways and telephones. The twenty years ending with the outbreak of the World War lacked such pioneer development and expansion but, instead witnessed a marked development of labor organization, attended by curtailment of working hours and restriction of production which to a large extent offset the growth in per capita production normally resulting from increasing labor-saving appliances and contributed to an increase in price levels. If, as it appears, industrial conditions which prevailed during the past thirty years, and which will probably continue in the future to a considerable extent, are substantially different from those previously existing, the usefulness of extending price trend studies beyond this period into the past is doubtful.

Bureau of Labor Index Chosen

After a study of the various price indexes available for this period, the committee has selected, for the purpose of illustrating trends, the all-commodity wholesale data of the Bureau of Labor Statistics as most representative of general price conditions. An index of the Harvard Economic Service covering a much more restricted but more sensitive group of basic materials shows wider fluctuations but almost exactly the same trend. The Dun and Bradstreet indexes show slightly greater and less upward trends, respectively, as should be expected from the different commodities and methods of computation employed.

The committee presents herewith a chart reproducing the all-commodity index of the Bureau of Labor Statistics from 1890 to 1922, inclusive, plotted on semi-logarithmic paper so that on any part of the price curve a certain vertical distance or slope of line represents a uniform percentage or rate of increase. The year 1913, which has been the conventional base of 100 for such curves, is assumed to be the logical point through which a projected trend line should pass. As shown on the accompanying chart, the committee has drawn a trend line following closely the price curve from 1899 to 1913. The line has not been extended through earlier years because of the disturbing effect of business depression and other factors in the preceding years. The projection of this trend line to 1923 gives an index of about 120. An index of 125 is shown in 1926 and of 150 in 1936. The actual wholesale price level is now substantially above this latter point, with an upward tendency, and so, in the absence of recessions in the meantime, the trend index would not equal the actual index until at least fifteen years hence.

In the long run it is to be expected that commodities of various kinds will have prices bearing a reasonably constant relation to each other. This is necessarily the case because otherwise the producers of commodities commanding only a comparatively low price would in time transfer their activities to other more profitable fields. The commodities which are used by the Bureau of Labor Statistics in its index computations are divided into nine general classes. A study of these different class indexes during the period under review shows material departures from the all-commodity average particularly during the war period.

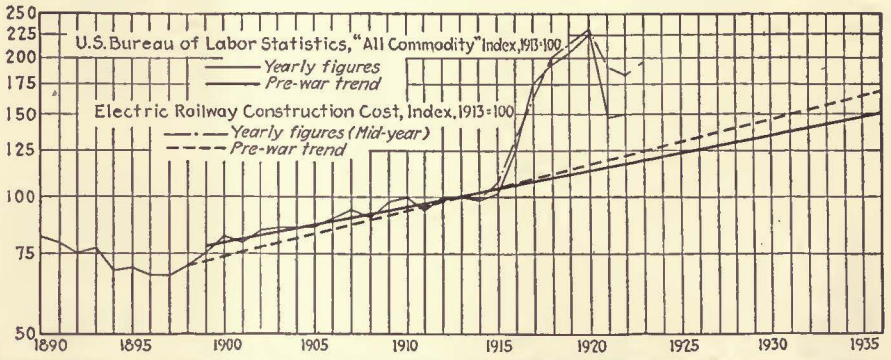


Chart Showing Relation of "All Commodity Index" and "Electric Railway Construction Index" as Compiled by Albert S. Richey

Electric Railway Material Costs

Having in mind that we are concerned primarily with the materials entering into electric railway construction, it is of interest to determine how closely the all-commodity index compares with the two classes of materials included in the Bureau of Labor Statistics series which are most closely associated with electric railway construction requirements. These two classes, building materials and metals and metal products, include about 13 per cent in value of all commodities produced in the United States. A study of the index data shows that during the past thirty years building material prices have followed very closely the all-commodity prices. Metals and metal products, the only other group extensively involved in electric railway construction, show less consistent movements, with an upward but irregular trend.

It is of interest to see how closely more specific indexes of electric railway material correspond with the price curve and trend line accompanying this report. Albert S. Richey, a member of this committee, has compiled an index of electric railway materials for a considerable number of years. For this index he has used fuel, lumber and metals, using the Bureau of Labor Statistics' figures for his combination. A comparison of Mr. Richey's curve from 1914 to date with the Bureau of Labor Statistics' all-commodity curve shows close agreement during the first four years, but materially lower prices for the following two and one-half years, and correspondingly higher levels thereafter. Mr. Richey's curve was not intended as an index to construction cost, having a more direct bearing upon operation and maintenance.

In 1922 Robert M. Feustel, a former member of this committee, completed an exhaustive study of price movements in connection with a valuation of a large railway system. This study included the computation of a series of valuation index numbers for the years from 1892 to 1921, inclusive, weighted in accordance with a recent inventory of the property. The trend of these index numbers shows a reasonable consistency with the all-commodity trend, being slightly less upward and reaching the 150 level at a later date. This particular trend study applies only to one large property, which in certain important respects differs from typical electric railway properties.

The committee has had opportunity to study price data compiled from extensive collections of appraisal and construction cost data made by organizations now represented on the committee, covering a very large proportion of the period under consideration. An analysis has been made of these data and the relation of prices prevailing in the different years determined through a careful weighting of all the various elements entering into public utility construction. In making these appraisals transient fluctuations in prices were commonly ignored, resulting in a curve of prices without the fluctuations shown in the all-commodity index. During the earlier part of the period studied electric railway materials or the labor employed in their assembly in railway properties were somewhat lower than the all-commodity average and a trend line constructed from the weighted indexes of such construction shows a sharper upward tendency than the all-commodity trend; in fact, it reaches 150 level several years earlier,

as is shown by a broken line on the accompanying chart.

It should be pointed out that construction work such as buildings and other parts of electric railway properties requires labor of a different character from that employed in commodity fabrication, and subject to different wage movements. The wages of construction employees have increased more rapidly than those of factory workers and have recently continued at relatively higher levels. For this reason, the application of commodity indexes to construction work involving not only commodities but special labor may not yield reliable results, except after a considerable period of industrial stability.

It is obvious that if trend prices, based upon such different indexes as are herein considered, yield widely variable results when projected into the future, they cannot be used as the basis of accurate computations of property value. When it is further considered that objections may be raised to the limiting of trend studies to the specific period selected herein when the upward tendency has been unusually great, the limitations surrounding the usefulness of trend prices become apparent.

In determinations of property value in which neither historical prices nor those prevailing at the time of the inquiry are acceptable to the parties concerned, trend prices are sometimes used as the basis of a compromise. In cases where the expense of new appraisals is undesirable and appraisals of pre-war property at pre-war prices are available, this property might be valued at trend prices (about 25 per cent higher than pre-war prices), adding to such value the actual cost of subsequently acquired property, the total value thus obtained being somewhat below present cost of reproduction. The committee is of the opinion that such compromises have little scientific or economic justification, and it does not recommend any general use of such methods. The determination of fair value being a matter of sound judgment, the injection of evidence of value based upon complicated and uncertain factors is more apt to hinder than to aid the exercise of such judgment.

War Period Prices

While the violent fluctuations in prices since the beginning of the European war have no bearing upon the trend prices so far discussed, the movements in wholesale prices during the last two years are of interest in their bearing upon prices which may prevail in the future. It was more than a year after the beginning of the war when prices in the United States began to rise. There was a fairly steady increase up to the time the United States entered the war, then a slight recession incident to governmental price fixing, followed by another less uniform increase, continuing until May, 1920, when the maximum monthly level of 247 (Bureau of Labor Statistics, revised, 1913 = 100) was reached. From this peak a precipitate decline continued for one year. Since the middle of 1921 the marked downward movement has ceased, and for more than twelve months the tendency has again been definitely upward. The increase during 1922 was about 12 per cent.

The average of all wholesale prices now corresponds quite closely to the cost of living indexes compiled by the National Industrial Conference Board and others. Inconsistencies still exist between different classes of commodities, but, on the whole, the tendencies of the various groups and of single commodities have been toward the general average. This is particularly true of copper, so important in electrical industries, which, until a few months ago, was radically out of line with other public utility material, but has since moved toward consistency. On the other hand, other metals and building materials, already above the average, are moving further upward under the stimulus of construction activities. Such exceptions to the general trend will continue until demands originating from war-time restrictions are more fully satisfied than has so far been possible.

Electric railway construction costs followed the upward movement of all-commodity prices quite closely during the early part of the war period, but subsequent to the peak have not shown as great a decline, due to the continued high cost of construction materials and labor. A curve showing mid-year cost indexes is given on the chart already referred to.

Until the latter part of 1921 there was justification for designating the prices prevailing during the preceding five years as abnormal. Many people still believed that prices would go back to the pre-war so-called "normal" level, in spite of the active resistance of labor to wage reductions. The committee is not convinced that prices prevailing during and for some years prior to 1913 should now be considered normal any more than equally stable prices at quite different levels at other periods in our history, one of which we may now have entered.

Future Prices

The question as to whether or not future prices will continue on a level comparable with that prevailing during the past two years, or will gradually or abruptly fall toward the pre-war level, is one of great importance to public utilities, in their operating and construction programs and in rate proceedings. Valuations and rates are fixed by regulatory bodies for application to future periods of considerable length. If during such periods declines in operating and construction costs are to be expected, the regulatory commissions will probably take cognizance of such expectations in their decisions. If, on the other hand, prices for a considerable term of years are to remain at present or higher levels, more weight should be given to prevailing prices in valuation and rate determinations.

In spite of the vast amount of study which has been given to the causes of price movements, there is as yet no complete agreement as to what the fundamental causes are. The committee, within the limitations of this report, cannot enter into an extended consideration of this subject, but it appears desirable to discuss certain factors which are clearly pertinent and through which some approximate conclusions may be reached regarding future price movements.

The normal basis of money, in which prices are expressed, is gold. The gold standard has prevailed in the United States except for limited periods during and following the War of 1812 and the Civil War. It was also in effect in most other important nations prior to the World War, but has since been generally abandoned by the European participants in that war. It is commonly recognized that prices move up and down with the existing stock of monetary gold. Increases in prices have followed all such important discoveries of gold as the California, Klondike and Transvaal fields.

Money itself, however, plays only a minor part in commercial transactions. The bulk of our business is carried on through bank credits which do not necessarily bear a direct ratio to the money in circulation although based upon it. A large part of our monetary gold is not in actual circulation but is held in reserve to support issues of federal reserve notes, which, although limited by the reserve, are not otherwise directly related to it. Nearly one-half of our money now in circulation consists of these notes, and their amount is subject to wide variations at the discretion of the Federal Reserve authorities.

Prices are also affected by the speed with which operations involving the use of money or credit are carried on and by the efficiency with which commodities are produced and marketed. An increase in money turn-over has the same tendency to increase prices as an increase in quantity of money; on the other hand, an increase in efficiency of production tends to reduce prices. There are other factors, involved to some extent in those already stated, which will have at least temporary effects upon price levels in this country. They include our restrictive immigration policy, artificial wage levels maintained through labor organizations, foreign trade balances, high taxes and dwindling natural resources.

All these factors and others of less significance are constantly working to influence price levels. With respect to those tending to maintain high prices, it should be noted that our present stock of monetary gold is nearly double the 1913 amount and is still increasing, although at a steadily diminishing rate. Our European war allies owe us in gold more than the entire monetary supply of the world. In the absence of wholesale inter-allied debt cancellation and the development of unprecedented European trade balances, it is difficult to see how the United States can dispose of any large part of its

gold. Bank credits may be expected to expand with steadily improving bank facilities, the turn-over of money may also increase and the issue of Federal Reserve notes may be enlarged—all to the extent that existing industrial activity may at any time require. The present insistent demands for higher wages, from existing levels well in excess of living cost indexes; renewed agitation for shorter hours and improved working conditions, and shortages of farm and industrial labor, with little relief in prospect through immigration, all work strongly against price recessions.

The possibilities of price reductions lie primarily in an increase in productivity through labor-saving machinery, more efficient and willing labor, more working hours and immigration. Wage reductions, desirable within certain limits in the interests of both workers and consumers, are not to be expected on any large scale. More extensive and efficient use of natural resources, such as water powers, is still possible and probable to a helpful extent. It may be possible to reduce our stock of gold or its effects through debt cancellation, increased imports, or by withholding note circulation based upon superfluous stock. The effect of these various factors tending to reduce prices, even in favorable combination, can hardly be expected for the present or in the near future to outweigh the opposing factors, particularly in the construction field where skilled labor is essential.

Present Prices Will Continue

It is, therefore, the opinion of the committee that price levels applicable to electric railway properties as a whole at least equal to those now prevailing will continue for a considerable number of years, after which some recessions may be expected, but not to pre-war levels or any close approach thereto.

It would not be unreasonable to expect that within ten or fifteen years the electric railway price level will approach the projected trend price as shown on the accompanying chart. The committee is of the opinion that more definite predictions are not warranted from the available data.

The committee is not unmindful of the price recessions which have occurred after the close of previous wars in this and other countries. Our Civil War is frequently cited to substantiate a claim that prices will gradually return to pre-war levels. A study of financial history shows that the Civil War price increases were largely due to the issue of greenbacks which were not redeemable in gold until 1879 (fourteen years after the close of the war), at which time prices returned to about the 1860 level. Prices based on gold showed comparatively little fluctuation during the Civil War. Similar reasons, or others showing no greater bearing of past war prices upon the present situation, could be given if further substantiation of present predictions were necessary.

The views with respect to future prices stated herein are shared by all qualified authorities known to the committee, at least to the extent of holding that substantial price recessions are not to be expected before 1930, and that pre-war prices are a closed book.

With the passing of years a steadily increasing proportion of the investment in electric railway property and renewals thereof will have been made on the present plateau of prices, and actual investment will approach more and more nearly the value found through appraisals based on the cost of reproduction at existing prices. The expectation of this future restoration of the consistency between investment and cost of reproduction which existed during the pre-war period of regulation, when the latter basis of value gave results which were generally acceptable, is a further justification for the conclusion stated elsewhere in this report that cost of reproduction based upon stabilized present prices is the most important basis of fair value which courts and commissions alike can use consistently and with justice to all interested parties.

The report was signed by E. G. Bechtel, H. A. Clarke, W. Findlay Downs, J. A. Emery, C. W. Gillespie, F. C. Hamilton, J. B. Klumpp, W. H. Maltbie, L. R. Nash, A. T. Perkins, A. S. Richey, W. H. Sawyer, Frank Silliman, W. B. Tuttle, E. D. Uhlendorf and James P. Barnes, chairman.

New England Club Opens Season with Worth-While Program

Some New Thoughts Brought Out on Light-Weight Cars, Standardization of Air-Brake Equipment, Automatic Substations, Track Construction, and Public Relations—Two Hundred Attend Evening Dinner at Boston

SOME very worth-while talks on practical subjects and an enthusiastic gathering marked the first of the season's meetings for the New England Street Railway Club at Boston on Oct. 25. It was presided over, both afternoon and evening, by the president, Ralph Hood, and there were about 200 present at the evening dinner.

J. C. Thirlwall, General Electric Company, discussed lightweight city and interurban cars and the results obtained. He recalled how some engineers had thought the original safety cars were too light, but he said actual experience has not borne out this fear. The present maintenance cost on the Birney safety cars installed five years ago in Fort Worth, Tex., the original installation, is less than 2 cents per car-mile. The average for all safety cars used in Texas is running about 1.75 cents per car-mile, as against 3.5 cents per car-mile for the older and heavier type cars on the same properties.

Speaking of the installation of light-weight one-man cars in interurban service in the Middle West, Mr. Thirlwall said that for the cars of the Cincinnati, Lawrenceburg & Aurora Railway, which have now been in operation five years and are operating 96,000 miles a year, the maintenance cost for the first six months of 1923 was 1.46 cents per car-mile, and that it has averaged 1.48 cents per car-mile for the five-year period. These cars have netted a total saving of $220,000 in five and a half years on an investment of $100,000, of which $60,000 was almost immediately returned through sale of the old cars and taking down of copper.

The first year of operation of the light-weight one-man cars of the Kentucky Traction & Terminal Company, Lexington, Ky., showed 38 per cent increase in car mileage, 30.5 per cent increase in passengers, 12.7 per cent increase in passenger revenue, a reduction of 37 per cent in expenses, a reduction in the power demand of 350 kw., and an increase in net income of 102 per cent.

The 32,000-lb. cars of the Western Ohio Railway, equipped with 35-hp. motors to maintain the same schedule speed as the heavier cars which they replaced, showed a maintenance cost for the first five months of 1923 of $2,893, compared with a maintenance cost for the old equipment of $5,070 for the first five months of 1922, and a corresponding reduction in power cost from $24,261 for the first five months of 1922, to $15,765 in 1923. These two items alone indicate a saving of more than $10,500 in five months.

He mentioned the cars soon to be delivered to the Indiana, Columbus & Eastern Traction Company, which represent a further development of the light-weight car idea. They will weigh 50,800 lb., seat fifty-six, and are equipped with four 60-hp. tap field motors geared for 55 m.p.h., which they will actually make. The cars which they displace weigh 86,000 lb. and while geared for 60 m.p.h., actually make only 54 m.p.h. on account of the voltage drop which will not prevail with the new cars because of their smaller energy consumption.

From these examples, Mr. Thirlwall commented that it is evident that very material weight reduction can be accomplished in practically all types of cars.

Standardization of Air Brakes for Light Cars Urged

E. W. Davis, Westinghouse Traction Brake Company, talked on the subject of brakes and safety devices as applied to light-weight cars. He spoke

of the advantages which had accrued from the approach to standardization with the Birney safety cars, which enabled the air-brake manufacturers to furnish equipment from stock—a thing which has never been possible with any other electric cars. He said that the standardization of brake equipment had gone very much farther in the steam railroad field than in the electric. For example, one type of triple valve for passenger cars, another type for freight cars, and a third type for locomotives, have almost universal use. By contrast, a great number of different types are required for the electric railway field.

Mr. Davis then discussed briefly the variable load brake which has been found desirable for the light-weight cars where the live load may be a considerable per cent of the total load. The first application of these brakes has been made on double-truck cars, but Mr. Davis said that it was his hope that such brakes might soon be available for use on single-truck safety cars. He said this type of brake ought to be installed on all new cars of the lighter type purchased henceforth, and it might even be worth while to consider putting them on some of the older cars now in service.

In discussing the various types of braking and safety equipment, including door control, Mr. Davis pointed out that it is possible to meet practically any condition the railway may set up, but he urged that if the railway wants the best service from all of the manufacturing organizations, it will be more likely to get it by using something that they are making regularly in large quantities.

To give an idea of the lack of uniformity in equipment used in the electric railway field, Mr. Davis said that he had in mind ten or twelve different companies which had bought cars within the last year, all of which might be classed as light-weight double-truck cars largely for one-man operation, and there were no two cases in which the door operation was the same. In two cases the Brake Company even had to build special brake equipment, and in several other cases it built other parts of equipment which will probably have no application on other properties. Nearly all modern manufacture is conducted by large organizations, and while they can provide some flexibility in their operations, so many special developments are bound to be costly to the consumers.

Charles F. Johnson, of the J. G. Brill Company, spoke briefly on the various types of car bodies applied to light-weight cars.

Field of Automatic Substation Expanding

C. A. Butcher, Westinghouse Electric & Manufacturing Company, discussed the application of automatic substations and said that there are now in operation or on order some 500. He said that the Cleveland Railway is at present contemplating an expansion of its present automatic substation installation to include ultimately thirty automatic substations. There will be a supervisory control, by which it will be possible to open and close any feeder, start or stop any machine, transfer the load from one high-tension line to another at any station, and obtain a continuous graphic curve of the load at each station—all of which is done by means of a two-wire line to each substation, which can also be used as a telephone line.

In Baltimore, four automatic substations are shortly to be installed. An interesting development here is that not only does the location of substations at the load centers reduce materially the cable losses, but it is possible to regulate so as to provide that voltage which will be most economical for the traffic conditions prevailing in the district. By means of various taps on the transformers, the d.c. voltage may be varied from 500 to 600. It was impossible to calculate what the most economical voltage would be, and therefore various taps were provided and they will be tested out over a period of operation to find the most economical voltage for the particular traffic conditions in each district.

Mr. Butcher said that the advent of supervisory control has greatly expanded the field of automatic substations and automatic control of generating stations. He said it was possible now to picture in the future one man sitting in an office building who would have absolute control over the entire generation and utilization of energy in a community.

Referring to Mr. Butcher's comment on the advantage of being able to locate an automatic substation just where it was needed, J. C. Thirlwall said that this was sometimes very difficult on account of the objections to a substation in residential sections. He told how the Los Angeles Railway had overcome this difficulty and had built three automatic substations in high class residential districts and had succeeded in making them absolutely noiseless. He said you could put your ear against the door and could not tell whether the machine was running or not. It cost about $10,000 extra to accomplish this noiseless feature and to give the station a decorative appearance, but the interest on this added investment is earned in the first two months of each year as a result of savings from having the station where it is actually needed.

R. B. Fehr, Rail Welding & Bonding Company, Cleveland, gave a very interesting blackboard discussion of the technique of seam welding of rail joints. The possibilities for making these joints more efficient were outlined as: (1) Careful preparation of the joint at the rail ends and tight bolting to secure good alignment and some initial compression; (2) improved method of welding, including the hand feed method of applying the metal; (3) increasing the section modulus of the joint; (4) applying a thick seam; (5) interrupting the base seam for a distance of 6 in. at the center.

Railway Men Talk Operating Matters at Dinner

While all of the talks at the afternoon meeting were supplied by manufacturers' engineers, railway men occupied the platform entirely after dinner. Edward Dana, general manager Boston Elevated Railway, reported briefly on some aspects of the Atlantic City convention. He paid a tribute to former president C. D. Emmons, saying that a large measure of the success of the convention was attributable to his leadership. He thought it was a healthy sign, not a bad one, that the bus occupied 24 per cent of the exhibit space at the railway convention. He thought the convention marked the full realization that bus and street car will go together in future transportation. He proposed, and the convention voted, a resolution congratulating Britton I. Budd on the success of the Chicago, North Shore & Milwaukee Railroad in being awarded the Charles A. Coffin prize for 1923.

H. M. Steward, superintendent of maintenance Boston Elevated Railway, addressed the meeting on the subject of new track appliances and practice. He spoke of the new tie exhibited at the convention by the International Steel Tie Company, especially adapted for rebuilding concrete track, the tie being so shallow as to permit leaving in the old construction. He also spoke of the Sandsberg sorbitic process of treating rail, which it is claimed will make the rail last from four to six times as long as untreated rail. The Boston Elevated Railway is trying out some of this. He also spoke of the Barbey frictionless rail, consisting of a narrow head rail for use on the inside of curves. Some of this is being used on the Boston Elevated, and it appears to reduce noise and corrugation and give longer life.

Mr. Steward emphasized the great importance of using machines in track construction work to eliminate hand labor as far as possible. He said that this practice had made it possible to build track now at practically no greater cost per mile than twenty years ago. He outlined the practice of the Boston Elevated as follows:

Track construction is done with gangs of not over fifty men. A portable track is put in where possible, so that one track can be completely tied up. If it is necessary to use cross-overs, however, signals are installed to keep delays to traffic to a minimum.

A pavement plow is used to tear up the old pavement, but the blocks are still picked up by hand. The rails are cut up into convenient lengths by means of an acetylene torch. A crane car tears up the track bodily and lays it out to one side. Electric shovels do the excavating, and the newer ones, equipped with caterpillar tractors, are particularly effective. They excavate the material and dump it directly into motor trucks. A steam roller is used

to roll the trench. The new track is assembled in the trench, the ballast distributed, the track aligned and then tamped with pneumatic tampers. Concrete mixers running on the rails are used, and each is accompanied by a loader. The use of loaders cuts the crew down to a minimum, and the scheme followed is to have one batch in the hopper, one in the mixer, and one in the loader simultaneously. The paving is then applied. Of course, welding machines, grinders and miscellaneous tools are used at the proper points in the course of construction.

Mr. Steward said it was only possible to do twelve to fifteen construction jobs in a season, and even this necessitated very quick movement of equipment from one job to another.

Each day the construction foreman on a job orders by 4 o'clock the material and machinery he will need the next day. One man is in the office and does nothing but see to it that his needs are supplied, when needed.

Speaking of rail joints, Mr. Steward mentioned the work of the committee on welded rail joints and said that he was convinced in his own mind that the seam-welded joints will be one of two types used on any property. The seam weld will be used very generally, but one of the other types will be used for special locations.

A Few Remarks on Safety

Fred A. Cummings, Eastern Massachusetts Street Railway, gave a very lively talk on safety and public relations, saying that he was going to talk from the point of view of "the man who is too poor to own an automobile and is obliged to ride on the street car." He said that the best way for a company to pursue the work of safety is to keep everlastingly at the small details of maintaining the cars and plant in perfect condition, and then bring it right home to the men just what it costs for accidents.

Mr. Cummings stated that nearly every railway assumes a niggardly attitude toward the claims department, but that there is no department which needs the inspiration and deserves the attention of the general manager so much. There is too much of the attitude of wanting to settle every claim, regardless of its merit, and not enough of fighting claims out in court, Mr. Cummings contended.

Referring to the proposed bill to come before the Massachusetts Legislature abolishing one-man operation of cars, he said that the various Massachusetts street railways have operated 55,845,819 miles of one-man operation, and that the accident record has been considerably improved, as compared with two-man operation. He said that this was largely due to the greater responsibility felt and discharged by the individual operator. This was attested by the argument he heard an operator make at a carbarn. The operator said, "This chariot is mine. Nobody gets on or off unless I know it. I'm the guy."

The Electric Railways Have Come Back*

Operating Revenue Greater than Five Years Ago—Net Income Two and a Half Times as Great—Buses Have Failed When Required to Give All Local Transportation

By James W. Welsh
Secretary American Electric Railway Association

IT IS a most encouraging sign that an invitation from the Investment Bankers' Association is extended to a representative of the electric railway industry to present a brief review of its status. It has not been long since the mere mention of electric railways in the presence of a banker produced a decided chill in the atmosphere. This disposition probably still exists to some extent, but there also seems to have come a feeling of curiosity as to just what is coming next. Apparently everything that could happen to dampen the enthusiasm of the investor in electric railways has already happened, but the cars still keep running.

They are running in New Jersey after an interruption of 50 days, although for a while the issue looked doubtful, but the damage to business and the inconvenience suffered by the public as a result of the stopping of service proved beyond all doubt the essentiality of street railway service. The authorities insisted upon their return, and the people were glad to get them back. They have been voted back overwhelmingly by three to one in Saginaw, Michigan, where service was suspended for two years while the people were misled with make-shift buses and would-be financial plans all of which failed dismally; they are running in Bridgeport, Conn., where service was suspended for 56 days in 1920; and in Toledo, Ohio, where an interruption of 27 days occurred in 1919, while an effort was made to dispense with their service. They are even running in New York City, where hopes of some have been high that, here, of all places, the great bus adventure might be tried.

From all this the conviction is growing that after all the electric railways are essential in providing transportation service. Everyone likes to have an advance tip, and it is rumored that investment bankers are not above this excusable trait of human nature—The tip is this: *The electric railways have come back!*

As you may be "from Missouri," I will ask you to bear with me through some statistics.

Census Figures Show Growth of 2.5 per Cent a Year

The U. S. Bureau of the Census is just completing its regular five-year census of the electric railway industry. So far the complete financial figures for the country are not available but the traffic figures are: In 1922 out of more than 15 billion passengers including transfers over 12½ billion pay passengers were carried by the electric railway companies in the United States, an increase of one and a quarter billion, or 12 per cent over the previous census of 1917. This is an increase of approximately 2.5 per cent per year while population has increased less than one per cent. Putting this on a unit basis to get the "riding habit," we find there were 117 revenue passengers carried per inhabitant the country over in 1922 as compared with 109 in 1917 and 100 in 1912. These figures definitely put aside the fear that taking the country as a whole, competition from the motor vehicle, either in the form of the common carrier bus and jitney, or the private automobile, is at the expense of the electric railways.

So much for the question of traffic. Now let us consider the matter of fares, for upon these two factors, fares and traffic, hang the revenues of the electric railway. In 1917 the average fare per passenger was 5.1 cents, today it is 7.3 cents and in 1921 it reached 7.5 cents. A trolley ride and a fixed fare no longer are synonomous and the public has come to realize that fares vary in accordance with the cost of service in different cities throughout the country.

Operating revenues of electric railway companies according to Association estimates have increased 47 per cent over 1917 and now are close to a billion dollars annually. The operating ratio which rose from 65 per cent in 1917 to 80 per cent in 1920 for a group of 225 companies fell to 73 per cent in 1922. The net income is approximately 2.5 times the 1917 figures.

The abandonment of electric railway trackage in certain parts of the country has been cited as evidence of the decadence of this mode of transportation and its replacement by another. The government census figures show a track mileage of 43,934 in 1922 as against 44,808 in 1917 or a net loss of 874 amounting to 2 per cent. It is not to be understood, however, that no new extensions have been made. Detail figures on file with our association show that new track developments to the amount of 1,450 miles have been made during the five years while abandonments aggregating 3,320 miles have occurred, the net loss being as above.

One reason for this was that the country was approaching the "saturation point" with respect to electric railways. Practically every community that offered the slightest possibility of successful operation had an electric railway system. And many that did not offer any possibility nevertheless had them anyway, financed usually by real estate speculators who expected to get their money back through increased

*Abstract of address at annual convention of Investment Bankers' Association of America, Washington, D. C., Oct. 29-31, 1923.

land values rather than from the successful operation of the railway, though as to this they were not without hope. Another reason for the decline in construction was the rise in prices of all materials with the opening of the world war. This abandoned trackage represents construction in unprofitable districts where the traffic could not bear the cost of service. Every industry constantly experiences such changes and the sooner it recognizes it, the healthier it is for it.

In many of these places electric railways have installed a bus service rather than have the district without transportation service. A total of about 2,000 miles of bus route is now being operated by railway companies.

Coming to the question of car equipment, our records show that a total of over 13,000 new street cars have been purchased and put in service during this period out of 80,000 in regular operation. These include both replacements and additions to service but they always make friends for the railway. In 1921 there was expended $150,000,000 for improvements and betterments and for the current year it is estimated $250,000,000 in new capital is needed. All of the above facts establish the electric railway as a necessary business with increasing traffic, increasing revenues and increasing facilities.

Nothing to Fear from Bus

Those who fear that the motor bus will replace the electric railway might do well to consider the economic and legal principles involved. It has been definitely proved wherever a complete transportation system serving a whole community has been tried by motor bus that the cost is greater than by electric railway, except in instances where the service is infrequent and the density of traffic light.

Examples of profitable operation of the bus at lower fares are frequently quoted as evidences of its ability to undersell the trolley. The fallacy of this contention lies in comparing a rate of fare on one bus route or a group of favorable routes with that of a whole trolley system serving all parts of the community. It may not be generally understood that the earning capacity of various routes in a community vary through the widest possible range and that where a transportation company provides a universal service many long-haul and poorly patronized routes are carried at the expense of the short riders in the densely populated districts all for the great good of the greatest number.

The principle of co-ordinating all agencies of transportation serving the needs of each community rather than to permit a ruinous and destructive competition to develop has been promulgated by the American Electric Railway Association and is generally recognized as sound economic doctrine and in accordance with the principles of public utility regulation and control.

There is, however, one thing to which I wish to direct your attention as investment bankers. This is the type of prospectus frequently circulated for the purpose of attracting investors to this field. I might cite the results of a careful analysis I recently had made of one of these prospectuses. The figures showed that with a small payment down a bus could be paid for out of earnings in 18 months. The life of a bus was estimated at four years and, during the last two and one-half years, a reserve was set up to replace the vehicle. The plan was cleverly conceived and is exceptionally plausible, except that the earnings of the bus are tremendously exaggerated.

This prospectus states that the average daily earning power of a 26-passenger bus is conservatively estimated at $75. I have good reasons to doubt this. Figures compiled by us, from the operating records of 12 electric railways using buses as adjuncts to their rail cars, show that the average daily gross earnings are approximately $29. It may be said, and with some reasonableness, that these operations do not truly reflect the true earning capacity of a bus, as these buses are used in some cases in the less remunerative territories. However, an investigation of the earnings per bus of some of the most successful independent bus companies in the country, confirms our beliefs that the earnings given in the prospectus are entirely misleading.

For example, the average daily earnings per bus on the Fifth Avenue Coach Company's lines in 1922 were approximately $52. It should be noted that these vehicles are of the double-deck type having almost twice the capacity of those referred to in the prospectus and furthermore a 10-cent fare is charged. Also, the traffic density and other operating features combine to assure to the Fifth Avenue Coach Company a maximum earning power for its buses.

In this connection. it might be pointed out that the operating statement of the Fifth Avenue Coach Company indicated that it would be impossible for it to operate on a 5-cent fare, as the operating cost per passenger exclusive of investment charges and taxes for the year ending June 30, 1922 was approximately 7 cents.

Obviously, the whole argument set up in the prospectus referred to, falls like a house of cards when proper figures are substituted in the operating statement presented.

Buses Regulated in Most States

Let us next consider the attitude of the regulating commissions with respect to responsibility for furnishing transportation services.

Twenty-five states and the District of Columbia have enacted legislation requiring motor vehicle common carriers to obtain a certificate of public convenience and necessity from the state commission as a prerequisite to the establishment of any kind of service.

A distinct trend from a policy of encouraging motor bus lines wherever possible to one of affording adequate protection to existing carriers can be traced in the decisions of eleven commissions on petitions for certificates.

In only two states, Illinois and Nebraska, where the commission has authority to grant certificates of public convenience and necessity, have they shown a tendency to encourage development of bus lines at the expense of the railways, and in the state of Illinois at least the courts have stepped in and reversed the decision of the commission.

In many states the commissions have as complete jurisdiction over bus operations as they have over other public utilities, including electric railways. For instance in nineteen states the commission has authority to investigate and fix the rates of fare charged by bus lines; in fourteen states it prescribes routes and in sixteen states it prescribes schedules for bus lines. Seventeen of the state commissions have issued general orders promulgating rules and regulations for the operation of buses. Thirty-six states have imposed a gasoline tax. There are, in fact, only six states in the union which have taken no official action whatever with regard to the buses.

Other Favorable Conditions

Another fear that at times impairs the credit of the industry is the threat of political oppression. Probably the most effective weapon against the antagonist is the building up of good public relations. Telling the industry's story to the public, however, has become a national watch-word. This is not a spasmodic campaign but is a continuing activity in keeping the public advised of its responsibility in maintaining its transportation service. Coupled with this has been the introduction of all known means of economical operation. This included one-man cars and for the industry there are now 10.000 in operation as compared with less than 1,000 in 1917. Organized safety methods are resulting in a material reduction in the cost of accidents, which for the industry have fallen from 3.24 per cent of gross receipts in 1917 to 2.68 per cent in 1922.

The use of automatic and remotely controlled sub-station equipment as a factor in reducing power costs has received wide application. This together with the use of power saving devices and a more intelligent use of electricity are resulting in material reduction in the total cost of power. The use of electric and metal composition welding processes has effected material savings in the maintenance and repair departments.

Improved relations with labor have been effected in many places with a corresponding increase in efficiency and elimination of loss through strikes. These are but a few of the economies typical of what wide-awake and progressive companies are doing and which are winning for them success beyond their fondest hopes.

Maintenance of Equipment

Old Trolley Poles for Yard Lighting

THE accompanying illustration shows a trolley pole used to support lights in one of the yards of the New York Rapid Transit Corporation. A few years ago, when building its new subway and

By Adding Steps and Bracket, Old Steel Pole Is Utilized for Supporting Lights

elevated lines in Brooklyn, this company constructed elevated structures on several streets which had previously been occupied by surface lines. As the trolley poles of the surface companies could not be used to support the overhead work after the elevated structures had been built, they were taken down and were given to the Rapid Transit Corporation in return for the right to attach the wires of the surface lines to the new elevated structures.

This arrangement gave the Rapid Transit Corporation several hundred trolley poles for which it had no use. While some of these poles could be sold, there were still many left on the hands of the new company and the price received for them was not great. Therefore, when it was desired to light the yards where the subway and elevated cars are stored, a number of these poles were set to support the lighting fixtures and were provided with steps for the cleaning and renewal of the incandescent lamps which were installed, under suitable reflectors, on them. A casting was fitted to the top of the pole to act as a bracket and the whole made a very neat and strong layout at a cost that would not equal that of new pipe of much smaller section if it had had to be purchased especially for this purpose.

Cleaning Motor Parts with an Alkali Bath

By O. A. Norene
Assistant Master Mechanic Omaha & Council Bluffs Street Railway

AN INEXPENSIVE way of thoroughly cleaning armature housings, armature and axle boxings, field coil flanges, spring pads, etc., is to immerse them in a solution of steam-heated industrial alkali cleaner. After remaining in this solution for from one and one-half to two hours the parts are removed and washed with a hose. Field flanges and spring pads, after being passed through the alkali bath, are dipped in insulating varnish and baked.

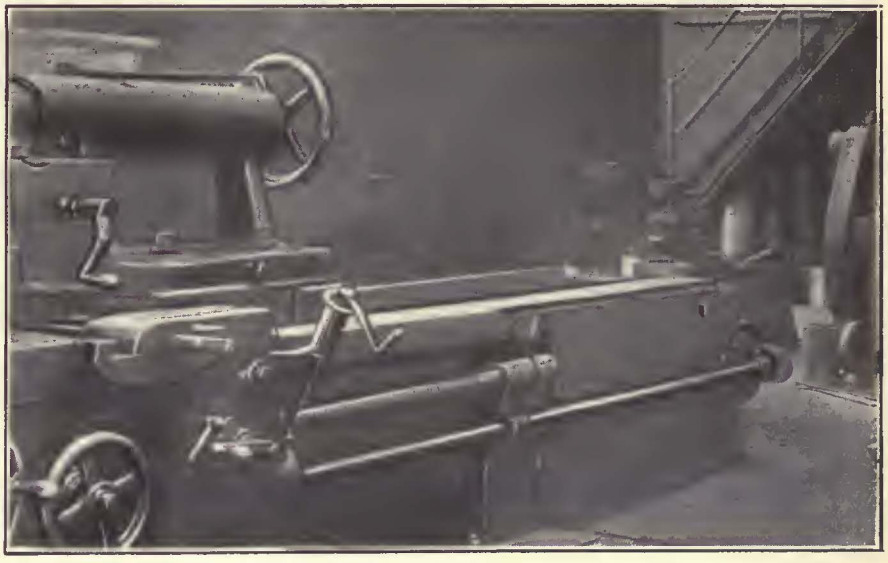
As we are not at the present time equipped in Omaha with large tanks and equipment for handling the heavier parts of motor frames, they are cleaned by compresed air, which removes the loose particles, and the balance is removed with a revolving steel brush operated by the use of a small air grinder motor. This does a much better and cleaner job than the use of gasoline and brush.

Lathe Bed Lengthened on Concrete Support

REQUIRING a few feet extra of bed length on a 36-in. lathe in the machine shop section of the Norfolk & Western repair shops at Bluestone Junction, W. Va., the foreman in charge adopted the unusual expedient shown in the accompanying illustration. Two steel plates, 1¾ in. thick, of the desired length, and of a width corresponding to that of the rails of the lathe bed, were bolted to substantial brackets mounted on the end of the lathe bed. A concrete block was then cast under the extension of the lathe bed, holding the rails firmly in place by means of countersunk anchor bolts in the concrete.

The motor controller, previously removed from the end of the lathe, was mounted on the outer end of the concrete block, the operating rod connecting it with the lathe carriage being lengthened accordingly.

This construction is called into service only occasionally, but it is substantial and serves its purpose.



The Norfolk & Western Railway Found This an Economical Method for Lengthening a Lathe Bed in the Bluestone Junction Shops

New Equipment Available

Small Size Air Motor Hoist

A NEW air motor hoist of small and compact construction is being marketed by the Ingersoll-Rand Company, New York, N. Y. The outstanding characteristics of the new size A hoist are compactness of design, resulting in low headroom and relatively light weight; an automatic brake, which holds the load under all circumstances, even if the air supply be

Air Motor Hoist

disconnected or fail, and a graduated throttle which permits a very close regulation of both the lifting and the lowering speeds.

A balanced three-cylinder air motor is used which operates in either direction and without vibration at any speed or load within the rated capacity of the machine. The throttle graduation on this new hoist is very fine and insures instant and complete control of the hoist at any speed. A safety stop lever is provided which closes the throttle and stops the motor whenever the load is by chance raised to the top of the hoist lift.

The automatic brake is a new feature as it holds the load at any desired position for any length of time regardless of air pressure. The brake consists of a disk attached to the motor shaft and of a brake plunger with a friction face, which is held in contact with the disk by springs whenever the hoist is not operating, i.e., whenever the air supply to the motor is cut off either by throttling or otherwise. It is entirely automatic in its action and requires no attention from the operator.

The motor and gears are both inclosed. The motor operates in a bath of oil and the gears turn in a heavy grease. Oil passages lead to all bearings. Ball bearings or bronze bushings are provided at all points where experience has indicated that they will add to the efficiency or life of the hoist. If the hoist be overloaded, it is only necessary to remove the overload, after which the hoist will start up and work again.

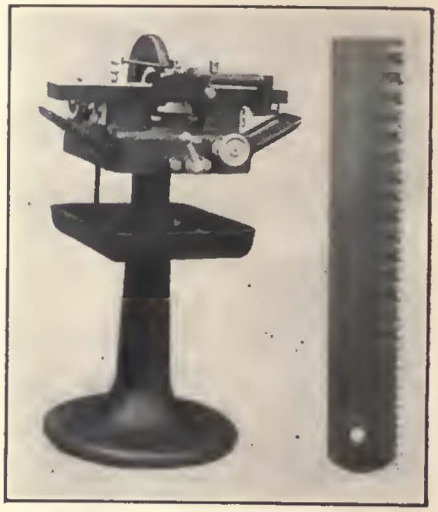
A roller bearing monorail trolley can be provided in place of the top hook if desired. The trolley mounting reduces the headroom necessary for installing and because of its rigidity enables an operator to start a loaded hoist along a runway without difficulty.

Development in Hack Saw Blades and Metal Cutting Machines

THREE new improvements in equipment for sawing metal have been placed on the market by Edward G. Herbert, Ltd., Manchester, England. These include a special hacksaw blade, a saw sharpening machine and a metal sawing machine. All are being marketed under the trade name of "Rapidor."

The saw blades are made of high speed steel containing 18 per cent tungsten, and are hardened in a special way to make them tough and durable. A special feature of the blade is a patent set, which extends beyond the root of the tooth. Blades can be sharpened until the original teeth have been entirely ground away and can be sharpened in any suitable grinding machine, but the manufacturers recommend using the new type "Rapidor" machine.

In a test made of this new hacksaw blade a 4-in. diameter mild steel bar was sawed in a machine making 170 strokes per minute. The quickest cut was made in four and three-quarter minutes and the longest cut

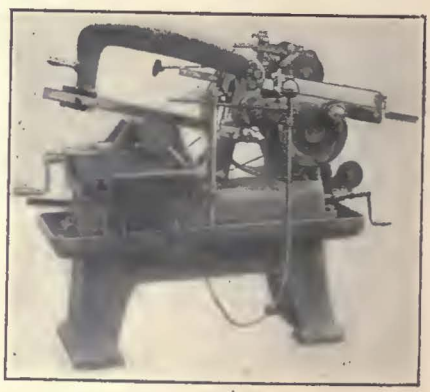


Left—Machine for Sharpening Hacksaw Blades. Right—New Type Hacksaw Blade

in ten minutes, the average time being seven minutes per cut. A total of 367 cuts were made, the saw being sharpened nine times during the test.

The Rapidor sharpening machine provides a new method of sharpening hacksaw blades, which consists of grinding them exactly to models having the correct shape of teeth for quick cutting. The grinding wheel is stationary and the blade moves toward the wheel in contact with the model. Teeth are ground on both faces and the machine will sharpen any size or make of hacksaw blade.

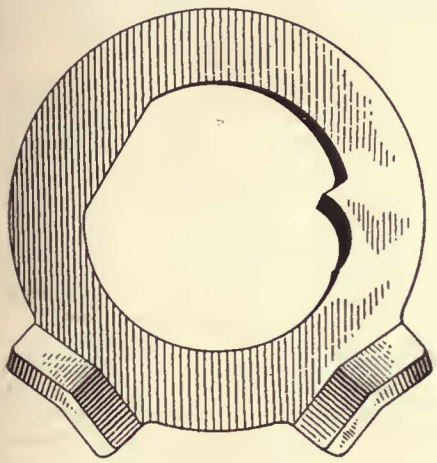
The third development is in a new type of sawing machine. These are made in two sizes, one with a capacity of 6-in. rounds or squares and the other having a capacity up to 10 in. rounds and other sections to 12 in. x 18 in. The saw holders have an indicator to show when the blade is strained sufficiently. This prevents breakage of blades through incorrect tension. A dashpot is fitted with a device which enables a start to be made on a sharp corner or square bar without danger of breaking the teeth of the saw.



High Speed Sawing Machine

Safety Nut Lock for Rail Joints

A NEW type of nut lock which has been given the name of "Bull Dog" has been placed on the electric railway market by the Waynesboro Nut Lock Company, Waynesboro, Pa. This nut lock has two projecting lugs on the outside circumference and a dog projection on the inside.



New Type of Nut Lock

As the nut is screwed down on the bolt, a corner of the nut comes between the lugs. Four different angles are provided on the faces of the lugs, and as the nut is screwed into place the washer turns up, so that the lugs do not need to be bent over in order to hold the nut.

The lock operates on the principle of an alligator wrench. The nut can be tightened but not unscrewed as the dog engages the metal and the greater the force applied the deeper will be the grip of the dog. In order to remove the nut, the lugs are knocked off by a cold chisel or screw driver.

Oil Burner for Car Heating

A SELF-GENERATING oil burner for installation in stoves now used for hot air and hot water heating systems in passenger cars is being marketed by the Chausse Oil Burner Company, Detroit, Mich. A number of equipments have already been completed and installed on electric railway cars for a period of testing.

A collar is furnished to go between the door and the firepot of the ordinary stove. This makes the door about ½ in. further away than usual from the firepot and gives room for pipe to be run into the stove. Under the body of the car a 30-gal. high-pressure oil tank is installed. This size tank is sufficient for about thirty hours continuous service, and from 5 to 20 lb. air pressure is required to force the oil up through the piping to the burner in the car. Air pressure is obtained from the ordinary compressor tank through a reducing valve, but in case of compressor failure enough pressure will remain in the tank to operate the heater for several hours.

The oil is forced up through a series of pipes to the gas-generating burner in the stove. To light the burner it is necessary only to open a valve and throw a piece of burning newspaper into the fire pot. A feature of this system is that the regulating valve is not on the fuel pipe, but on the gas pipe. This makes it possible for the burner to be turned down in mild weather without causing carbonization. Distillate or furnace oil is ordinarily used, but old transformer oil, crankcase and compressor drainings or kerosene may be used.

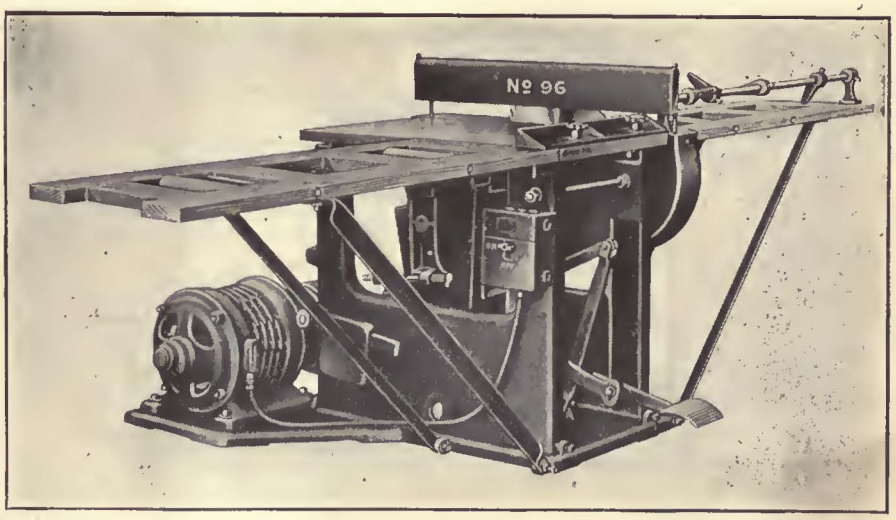
An important item is the safety valve to extinguish the flame instantly in case of collision, derailment or overturning of the car. It operates also in case the car catches on fire. This valve, however, is not affected by ordinary coupling shock. In case the fire in the burner goes out, a valve automatically shuts off the flow of oil, which will not commence again until the burner is lighted.

In one recent test the burner is said to have raised the temperature of a cold car to 76 deg. F. in twenty-one minutes. The complete outfit, without fuel, weighs 70 lb., of which 45 lb. is in the tank and 25 lb. in the burner and safety devices.

High-Speed Under-Swing Cut-Off Saw

THE general method of mounting cut-off saws is to suspend them either from the wall or ceiling. A radical departure from this is now being marketed by the Oliver Machinery Company, Grand Rapids, Mich., in its new No. 96 high-speed under-swing cut-off saw. This saw is of the under-slung type and is made for either belt or motor drive. By pressing a foot treadle the saw is brought forward to cut up 2-in. material up to 22 in. wide or 4-in. up to 16 in. wide. The saw returns by releasing the pressure on the treadle. A spring is used in connection with the foot treadle to give a quick return and insure rapid operation.

The saw is guarded by an adjustable guard and has an inclosed sawdust chute. The main part of the table is cast iron, 22 in. x 36 in. and is 33 in. high. Two auxiliary tables or extensions are furnished, fitted with two rollers each, and the right hand section is fitted with a positive stop gage with three adjustable stops. The forward and back stroke of the saw arbor is adjustable for short or long strokes and the spring mechanism prevents jerking and jarring on both the forward and return adjustment of the saw.



Under-Slung Cut-Off Saw with Self-Contained Motor Drive

For belt drive a countershaft is furnished and for motor drive an extended sole plate in place of the countershaft. The saw arbor itself can be locked in a stationary position, so that it can be used as a rip saw, and by using the miter gage it can be made to serve like the ordinary stationary arbor cut-off saw for cross-cutting work.

The News of the Industry

One-Man Operation Attacked

City of Oakland Repudiates Previous Action and Seeks to Coerce Local Railway

The city of Oakland, Cal., through its elected officials, is up in arms against the San Francisco-Oakland Terminal Railways. There is no doubt that most of the moves made against the railway are political in character, but they have nevertheless had the effect of embarrassing the company. The railway has been made the butt in disputes over service, fares and one-man cars. As a matter of fact, however, the one-man car has been singled out by the city as most vulnerable for attack. Accordingly the one-man cars have been banned, as was indicated in the ELECTRIC RAILWAY JOURNAL for Oct. 20, page 722, the city would do.

On its part, the railway has refused to comply with the order and continues to operate this type of equipment. In fact, the company has challenged the city with respect to its authority in this matter, jurisdiction over the operation of the railway having been transferred to the State Railroad Commission in 1914.

It had been anticipated that perhaps the city would seek to use its police power to enforce its one-man car order, but instead it retaliated by literally declaring war on the railway. The city started at once to negotiate with the Peerless Stage Company for a franchised bus service, indicated that it would revoke the jitney prohibitory ordinance and then purchased and put into operation a twenty-nine-passenger Fageol safety coach on Telegraph Avenue. Two more buses have been ordered for early delivery, and the Council has declared that as soon as funds can be made available more buses will be added paralleling the railway lines and serving new districts. The fare on the city bus is 1 cent less than that charged by the railway.

The railway is telling its side of the controversy to the public through the *Key Route News* and in large newspaper space. The company says that the Railroad Commission after receiving a favorable report on the one-man safety cars from W. J. Handford, its service inspector, recommended on Aug. 13, 1918, the purchase of twenty-five Birney one-man safety cars as a matter of economy in the company's operations. At that time there was an ordinance which prohibited the operation of cars by one man, but the company, desiring to act upon the recommendation of the Railroad Commission, presented the entire matter to the City Council, indicating that it contemplated the purchase of twenty-five Birney one-man safety cars. As a result the ordinance which prohibited operation of cars by one man was repealed. This was in the fall of 1918. Among those who voted favorably on the repeal measure when it was before the Council was the present Mayor, Mr. Davis.

The railway, with the approval of the Railroad Commission and the consent of the City Council, proceeded to purchase the cars at a cost of $168,445. This purchase and its financing were approved by the Railroad Commission on June 7, 1920. These are the cars against which protest is now made. As the company explains:

> These cars were put in service in August, 1920, and have been operated more than 2,600,000 miles and have carried more than 13,700,000 passengers, in safety, without protest or complaint, until, politically, they were claimed to be unsafe, by the passage of the last ordinance, a few days ago.

In a subsequent statement the company said:

> From what we have said it sufficiently appears that the company has made investments approaching $1,000,000 in cars of this character. It has operated cars of this type upon the streets of Oakland for more than three years without protest or opposition. This has been done with the consent and approval of the Railroad Commission of the State of California, to which the citizens of Oakland surrendered the powers to consider and act upon such matters. The company cannot surrender the right to operate this equipment, thereby submitting to the confiscation of this property, without a judicial determination of the question whether its operation is to be carried on in accord with the regulations and subject to the approval of the Railroad Commission of the State of California, or the City Council of the city of Oakland.
>
> Our company cannot operate under two masters. The law vests jurisdiction in one or the other. The question is: Which?
>
> All parties in interest will be benefited by the determination of this question, and until such determination is had, the company must insist upon its right to continue to operate as heretofore.

With its case thus presented the company explains that it leaves with the public for decision the question of which side to the controversy has acted in good faith.

Although strong appeal had been made for the repeal of the ordinance prohibiting the operation of jitneys the latest advices indicate that the Council has rejected by a vote of three to two the idea of giving the jitneys free rein again.

In the heat of the controversy over the question of the operation of one-man cars, the matter of service and fares has been relegated to the background for the time being, although the fare matter has come up incidentally at the recent hearings in connection with the proceedings before the Railroad Commission looking toward approval by that body of the recently submitted financial reorganization plan.

$36,874,951 Traction Fund

Chicago Re-establishes Relations With Railways, Broken When Thompson Was Mayor

Chicago's traction fund now totals $36,874,951. It was increased to this amount on Oct. 20, when city officials accepted checks totaling $8,189,158 from the railway officials.

Acceptance of this sum, the city's 55 per cent of the net receipts of the railways for four years, was the last step in Mayor Dever's re-establishment of relations with the traction companies which were broken off during former Mayor Thompson's administration.

The checks offered and accepted by the city were the same tendered to and refused by former Mayor Thompson, who had caused the franchise of the Chicago Surface Lines to be canceled by the City Council and who feared that acceptance of the money would prejudice suits pending in the courts to enforce the cancellation. The Chicago City Railway paid $2,809,379, while the Chicago Railways turned over $5,379,758. These two companies are comprised in the Chicago Surface Lines.

Fourteen checks in all were accepted by City Comptroller Martin J. O'Brien. They represented the city's share of the companies' profits payable each year from 1920. The dates and amounts of each check follow:

From the Chicago City Railway:	
April 10, 1920	$442,991
April 9, 1921	737,989
April 10, 1922	685,373
April 10, 1922	390,372
April 10, 1923	276,327
April 10, 1923	276,327
Total	$2,809,379
From the Chicago Railways:	
April 9, 1920	$1,004,372
April 9, 1921	706,626
April 9, 1921	700,000
April 10, 1922	858,367
April 10, 1922	500,000
April 10, 1922	500,000
April 10, 1923	610,393
April 10, 1923	500,000
Total	$5,379,758

Whether the city is entitled to interest on the funds which were held in trust by the companies after the former administration's refusal to accept the checks may still be the subject of controversy. The traction fund was created for subway construction by the terms of the 1907 franchise ordinances under which the companies operate.

The forfeiture suits filed against the railways during the administration of former Mayor Thompson have been dismissed on the motion of Corporation Counsel Busch.

Oklahoma Road Damaged

Canadian River on Rampage Washes Out Track of Interurban—Water Unusually High

Heavy losses to track and roadway were sustained during October by the Oklahoma Railway due to the flood waters of the north fork of the Canadian River. On the morning of Oct. 15 water covered a mile of track on the El Reno Division just east of Banner, Okla., and all through traffic between Oklahoma City and El Reno was discontinued. On the evening of Oct. 15 the flood again struck the El Reno Division and took out 280 ft. of trestle and 100 ft. of dump at the crossing of the Canadian near stop 17. This same rising of the river washed 1,500 ft. of track off the fill near stop 20 and cut out 500 ft. of fill to a maximum depth of 18 ft. at stop 21. The crest of the flood reached Oklahoma City early in the morning of Oct. 16, bringing with it the water loosed by the cutting away of the core wall at the City Reservoir, 8 miles west of the city. The river reached a stage of 22.5 ft., which was 6.2 ft. higher than the record set by the flood of June, 1923.

The Stock Yards line was under water for a distance of ¾ of a mile and badly washed out. The Walker Street line used jointly for city and Norman Division traffic was washed out, 380 ft. of trestle and 1,400 ft. of dump being taken. The Central Avenue Line was under water for ¾ of a mile, track lined off the dump, 140 ft. of trestle washed out and heavy cutting made at various places.

Traffic between Oklahoma City and El Reno was resumed on Oct. 20 after a ferry had been installed at the river crossing at stop 17, the track at stop 20 replaced, a shoo fly constructed around the washout at stop 21, and high-line trolley and feeder line restored. While the tracks on Exchange Avenue were still under water, gangs were put to work, the outbound track was raised on sand bags and light cars were operated on Oct. 21. Traffic between the north and south part of the city was shut down six days. Due to the river changing its course, on South Walker Street and Central Avenue Line, additional trestles will be necessary before traffic can be restored on these two lines. A total of 800 ft. of trestle and approximately 1 mile of track will have to be rebuilt there.

Gerard Swope to Give First Aldred Lecture

Gerard Swope, president of the General Electric Company, has accepted the appointment of first Aldred lecturer at the Massachusetts Institute of Technology, Cambridge. The opening day of the course is Nov. 9. These lectures have been established by J. E. Aldred of Baltimore, who has been responsible for similar lectures bringing leaders in science and industry into other educational curricula, thus tying the interests of engineering students more closely into those of the business world. Other eminent industrialists and engineers are to complete the Cambridge program for the first year, which will consist of twelve lectures. This year's lectures will be open to the faculty, seniors and graduate students of the Institute and to a limited number of outsiders, and will probably be published for general distribution next spring. President Stratton has appointed Prof. D. C. Jackson, head of the department of electrical engineering, and Prof. V. Bush, in charge of graduate work in electrical engineering, to co-operate with Mr. Aldred in this work.

Subway Program Promised by Chicago Mayor

Mayor Dever of Chicago has announced that a committee of experts is making a study of a plan to begin construction of subways soon without waiting the outcome of negotiations for municipal ownership of the local transportation systems. In explaining his position, Mayor Dever said:

> I have never said that subways would have to await a solution of the surface and elevated lines question. Subways will be an integral part of any solution of the transportation problem and as such are now being considered by my advisory staff in its study of plans for the unification of transportation facilities.
>
> A subway system and a comprehensive subway system are two different things. We have enough money in the traction fund, or will have when the Surface Lines' $8,000,000 is added, bringing the total to approximately $40,000,000, to build all the subways necessary for Chicago.
>
> If the only question involved was a financial one we could begin tomorrow to dig subways and build 20 miles of rapid transit lines with the money in hand. But other problems enter into any discussion of the subway question. For instance, it must be determined what we will do with the subways when built. Shall the city operate them or would it be well to lease them to private enterprise? And, if they are leased to an operating company, would it be possible for it to guarantee the city against loss and still maintain a low, reasonable fare?

The Mayor has promised as soon as a conclusion is reached to announce a program which will give Chicago the best possible transportation with the most practical subway system.

Havoc and Destruction Wrought by Flood Waters on Oklahoma Property

New Plan Promised

Five-Cent Fare Inadequate Under Existing Conditions in Jersey—Modified Settlement Plan Coming

Within a short time the Public Service Railway of New Jersey will offer a modified plan for the settlement of the present transportation problem there, free from the objections that were raised to the former plan. Announcement to this effect was made by President T. N. McCarter of the company on Nov. 1. Mr. McCarter said that a month's trial of the 5-cent fare in local areas in the more important municipalities has shown that under existing conditions the 5-cent rate will not produce "the cost of service." His statement follows:

> The experimental 5-cent rate of fare adopted by Public Service Railway at the suggestion of the Board of Public Utility Commissioners has now been in effect in the populous centers of the state for one month. The public, generally, has shown an appreciation of the 5-cent fare plan and a desire that it be made permanent. The results, however, indicate that this will be impossible if the street railway and the buses continue to operate in competition with each other. The number of passengers on the street cars has increased, but not in sufficient numbers to make up for the reduction in fate. Consequently the rate is not producing the revenue received from the former rate before the cessation of service and is not providing the cost of service.
>
> Co-ordination of street railway and bus service under one management with proper state and municipal supervision will furnish the only possible solution of the transportation problem. Such a plan will end uneconomic and wasteful congestion and provide the only hope for the continuance of the 5-cent fare on both cars and buses. The present situation cannot be indefinitely continued.
>
> The railway will undertake to furnish such a co-ordinated railway and bus service and will operate both cars and buses to the extent found necessary to accommodate the traffic. If this requires the acquisition of the buses now legally operating the company is prepared to act. Within a short time the company will offer a modified plan, free from objections that were raised to its former plan, to accomplish the result so necessary for the public convenience. To bring such a plan to a successful consummation will require the active co-operation and assistance of the state and municipal authorities.

The original plan of settlement for the transportation difficulties was suggested by President McCarter on Aug. 21. Very briefly, the company offered to take over competing buses at their then existing physical value and run a co-ordinated bus and car service at a 7-cent fare. City officials opposed increasing the bus fare to 7 cents, as would be done under the Public Service plan. The trolleys continued idle until the chancellor ordered the company to restore operation at the 8-cent rate. At about the same time the cars started, the Public Service filed with the Public Utilities Commission a 10-cent fare schedule. The commission suggested to the company that it try a 5-cent rate within city limits. After deliberation the company announced that it would give the plan a four-month trial beginning on Oct. 1.

New Proposition Submitted.—In accordance with votes recorded by the carmen's unions recently a new proposition has been submitted to the Worcester Consolidated Street Railway and the Springfield Street Railway. It includes demands for wage increases, change to the day rate pay basis and changes in working conditions, all to take effect on Jan. 1. Details of the demands have not been made public, but public conferences will be arranged soon.

Conditions Can't Continue in Youngstown

"A continued deficit in this fund without probability of payment from operating receipts would naturally result in the discontinuance of the street railway service, unless some other means may be found by the city or company of working out the original plan." This is the finding of a special legal committee appointed by the legislative committee of the Chamber of Commerce of Youngstown, Ohio, to make an investigation into the financial condition of the Youngstown Municipal Railway. The abstract of the service-at-cost plan which was in preparation for several months by the committee was submitted and approved at a meeting of the legislative committee. It will be used by the latter committee in the preparation of an exhaustive report on the transportation situation.

The findings refer to the ordinance which gives the company the right to operate under a guarantee on behalf of the city to charge a rate of fare which will earn sufficient revenue to pay the operating allowance and maintenance, repairs and renewals. The report states that this amounts at the present time to 25 cents per car-mile for operating allowance and 7.83 cents for maintenance, repairs and renewals. In addition the gross revenue should pay taxes and a return. The company is further permitted when the stabilizing fund is below $50,000 to increase its rate of fare and when the fund is increased to $150,000 to decrease its fare. The report points out, however, that the guarantee of the city does not impose upon it an obligation that at the rate of fare charged the gross income will be sufficient to pay the stipulated return on its capital value or in fact even to pay the operating cost. Further, the city merely contracts and agrees that the company may operate on this plan, and that in case the stabilizing fund should be found insufficient then the preservation of the stabilizing fund would be purely a company matter.

From the fact that there now exists in the stabilizing fund a deficit of $900,000, it would appear that results under the rates charged have not accorded with the original purpose of the ordinance which was to earn enough from operation to preserve the service at cost without permanently depleting the stabilizing fund.

Kewanee Pays the Price of Neglect

RESIDENTS of Galva and Kewanee, Ill., are paying the price of their neglect of the Galesburg & Kewanee Electric Railway. Like many other humans they didn't recognize a good thing when they had it. Closeness to the object destroyed their sense of appreciation. And so the electric railway, after making a vain fight to keep going, quit and then sold out. The second-hand man has the road now. His husky disciples of destruction are expected to begin their work of demolition most any day. In a sense, the road's problems have been solved for it. But former patrons are beginning to pay the price of their neglect. They are now paying 76 cents to ride one way by bus between Galva and Kewanee instead of 36 cents charged on the defunct interurban. And they are howling. Although service has been shut down only a short time petitions are being circulated beseeching the local Chambers of Commerce to see what they can do about having the service restored.

Improves Service.—The Eastern Wisconsin Electric Company has practically doubled its service accommodations for patrons between Sheboygan and Plymouth.

Truth About Utilities.—The American Development Publicity Association recently published a series of articles in the New York *Evening Mail* on the truth about public utilities.

Wants Statement Corrected.—W. E. Wood, manager of the Houston Electric Company, wishes to correct a statement of John A. Beeler which appeared in the Sept. 22 issue of the ELECTRIC RAILWAY JOURNAL to the effect that the average speed for cars in Houston was 6 m.p.h. Mr. Wood says the correct figure is 9 m.p.h. and has been for some time.

Asks to Remove Tracks.—The Philadelphia Rapid Transit Company has petitioned the commissioners for permission to remove tracks and wires from Christian Street between Sixth and Eighth and from Filbert between Eighth and Ninth. The removal is requested to permit new paving of the streets. An ordinance recently passed by the City Council providing for the removal contains also a clause providing for the relaying of the tracks in the future. if found necessary.

Richmond Committee Ready to Proceed.—Petitions are before the committee on streets of the City Council of Richmond, Va., from practically every civic and commercial organization in the city, asking the committee to proceed with the consideration of the proposed new blanket franchise for the Virginia Railway & Power Company. According to the chairman, the committee is ready to do this, "provided other matters are not injected into the deliberations of the committee by citizens themselves."

Financial and Corporate

$938,467 Earned by Detroit Municipal

The gross revenue of the Department of Street Railways of the City of Detroit for the fiscal year ended June 30, 1923, was $20,196,163 and the operating expenses exclusive of taxes were $14,450,613, leaving a net revenue of $5,745,550. As the charter specifies that taxes shall be levied on the physical property of the entire system the same as though privately owned, a deduction of $639,745 was made for this purpose, leaving an operating income of $5,105,805, which was augmented by non-operating income to $5,178,707. Interest, sinking fund and amortization payments reduced this gross income to $938,467 which was transferred to the profit and loss account. These figures, shown in an accompanying table, are all contained in the department's first annual report, just issued.

The deficit of $2,369 in motor bus operations is stated to be due to the payment of $600 per month rental on the two buses, which however may be applied on the purchase price.

The status of the city's investment is shown in the balance sheet, reproduced herewith. The city has spent over $15,000,000 in new construction and over $21,000,000 represents the property secured from the Detroit United Railways. Against a total of $38,307,785 investment in the property obligations to a total of $34,419,304 are outstanding, of which $15,880,000 represents the outstanding amount of the D. U. R. purchase contract, which has been reduced by payments which will retire the debt by Dec. 31, 1931.

The city is now operating 373 miles of single track and 1,673 passenger cars, of which 1,603 are owned and seventy leased. Of the total 1,171 are two-man motor cars, 252 trailers and 250 one-man. The average number of cars in the shop for repairs, painting and cleaning is 140.

The city operated 49,334,286 revenue passenger car-miles and 86,916 non-

DETROIT DEPARTMENT OF STREET RAILWAYS
CONDENSED INCOME STATEMENT FOR THE FISCAL YEAR ENDED JUNE 30, 1923

Revenue from transportation:		
Passenger revenue	$19,080,465	
Parlor chair and special car revenue	1,817	
		$19,082,282
Revenue from other railway operations:		
Rent of tracks and facilities	$968,657	
Other transportation revenue	145,224	
		1,113,881
Total operating revenue		$20,196,163
Operating expenses:		
Ways and structures	$1,967,576	
Equipment	1,258,988	
Power	2,061,595	
Conducting transportation	7,641,196	
Traffic	1,841	
General and miscellaneous	1,519,417	
Total operating expenses		14,450,613
Net revenue from railway operations		$5,745,550
Deduct taxes assignable to railway:		
Operations	$633,797	
Miscellaneous rents	5,948	
		639,745
Operating income		$5,105,805
Non-operating income:		
Net income from miscellaneous property (rent)	$15,194	
Income from unfunded securities and accounts	52,616	
Income from sinking fund and reserves	5,092	
		72,902
Gross income		$5,178,707
Deductions:		
Interest on bonds and notes	$1,856,496	
Sinking funds on bonds and purchase contract	2,381,294	
Amortization of discount on funded debt	2,450	
Total deduction from gross income		4,240,240
Net income		$938,467
Ratio operating expenses to revenue from transportation		0.7573
Ratio operating expenses to total operating revenue		0.7155
Ratio net income to operating revenue		0.0465

INCOME STATEMENT OF MOTOR BUS OPERATION FOR 7½ MONTHS ENDED JUNE 30, 1923

Revenue from operation		$10,942
Expenses:		
Wages of operators	$5,762	
Other expenses	7,549	
		13,311
Net loss		$2,369

CONDENSED YEARLY PAYROLL SUMMARY

Executive	$75,300
General office	27,208
Claims	64,286
Employment	6,346
Intelligence bureau	24,035
Auditing	123,649
Transportation	6,691,037
Tracks	1,160,257
Electrical	561,263
Equipment	1,254,839
Supplies	607,903
Building construction	256,849
Total	$10,852,972

DETROIT DEPARTMENT OF STREET RAILWAYS
CONDENSED BALANCE SHEET—JUNE 30, 1923

Assets

Road and equipment:		
Ways and structures	$15,618,137	
Ways and structures purchased from D.U.R. (day-to-day lines)	1,605,000	
Ways and structures secured from D.U.R. on purchase contract	19,850,000	
Investments:		
D.S.R. purchase sinking fund and interest reserve account	377,598	
D.S.R. purchase sinking fund and interest reserve account and purchase fund, City of Detroit special assessment bonds	857,050	
Total investment		$36,307,785
Current assets:		
Cash, construction fund	$260,586	
Cash, operation and maintenance fund	385,294	
Cash, purchase fund	560	
Cash, additions and betterments fund	20,895	
Accounts receivable	305,194	
Accrued accounts receivable	1,104,179	
Material, supplies, and uninstalled machinery and equipment	1,882,880	
Interest, dividends, and rents receivable	1,000	
Miscellaneous funds	92,774	
		4,053,362
Unadjusted debits:		
Accrued sinking fund, construction period	233,368	
Prepaid operating expense	5,000	
Prepaid insurance	198,880	
Prepaid taxes	24,684	
		462,932
Total assets		$42,824,079

Liabilities

Long term obligations:		
Construction bonds	$15,000,000	
Less: payment to city sinking fund commission to retire bonds at maturity	416,191	
		14,583,809
Purchase bonds	$4,000,000	
Less: payment to city sinking fund commission to retire bonds at maturity	44,505	
		3,955,495
Additions and betterments bonds	$5,000,000	
Less: bonds authorized unissued	5,000,000	
D.U.R. purchase contract		15,880,000
		$34,419,304
Debt retirements from operation:		
Construction and purchase bonds	$290,071	
Paid D.U.R. on purchase contract	1,200,000	
		$1,490,071
Current liabilities:		
Notes and accounts payable	$883,385	
Inventory of material and supplies and uninstalled machinery purchased from D.U.R.	975,000	
Accrued accounts payable	242,728	
Accrued wages payable	524,422	
Miscellaneous current liabilities	17,746	
		2,643,281
Unadjusted credits:		
City interest fund, construction bonds	276,695	
City sinking fund, construction bonds	233,368	
		510,063
Reserves:		
Injuries and damages	$566,047	
Sinking fund and interest payments	1,486,220	
		2,052,267
Surplus:		
Balance as of June 30, 1922	$510,318	
Net profit for fiscal year ending June 30, 1923	1,198,775	
		1,709,093
Total liabilities		$42,824,079

revenue, making a total of 49,421,202. The passengers carried totaled 471,070,493, of which 357,386,437 were revenue and 113,684,056 transfer.

The total number of employees on the payroll was 6,525. A summary of the payroll is given by departments in an accompanying table which is condensed from that given in the report.

Regarding depreciation; the report states:

> A depreciation charge, as such, was not made during the year, but the gross income was reduced by sinking fund charges which it is believed were larger than any reasonable estimated basis for depreciation, with the result that the net income as here shown affords a proper and accurate basis of comparison with the reports of privately operated utilities.

Considerable attention is given in the report to ways and means for speeding up street car passenger travel in the city of Detroit. By actual riding and timing it takes, during the evening rush hour, from fifteen to eighteen minutes to travel 1 mile in the central business area. It is imperative, states the report, that street car service in this district be placed underground in surface car dips at the earliest possible date.

The "Journal's" Analysis of the Detroit Figures

High Traffic Density a Major Factor in Success of Department of Street Railways—Low Taxes and Interest Rates and Assistance of Other City Departments Also Help to Make a Favorable Showing

THE interest that exists in the railway field regarding the operation of the street railway system of Detroit by the municipality has prompted the ELECTRIC RAILWAY JOURNAL to make a hurried analysis of the figures submitted in the first annual report of the Department of Street Railways, City of Detroit, just issued for the year ended June 30, 1923, as shown on the preceding pages.

Several factors stand out as contributing materially to the measure of success that has been attained. There has been a remarkable increase in population. This, in the absence of any important extensions of track for several years, has resulted in an exceedingly high traffic density—a most favorable situation for the railway. Taxes charged against the railway are much lower in proportion to earnings than for private companies. The street railway department receives favorable treatment as compared with the private company in the matters of paving and rate of interest, and obtains the services of the city legal, purchasing and accounting departments for a large amount of work normally charged against the car rider instead of the taxpayer.

On the factor of growth in population, it may be noted that prior to the acquisition of the car lines in the city by the Department of Street Railways, the Detroit United Railway operated an extensive system, comprising interurban lines extending across Michigan and into Ohio, in addition to the city lines. For 1921, the last year of full operation, the total gross earnings of the entire D.U.R. system were $23,329,067, or only 22 per cent in excess of the revenue of the department for the city lines in Detroit alone in the fiscal year ended June 30, 1923.

POPULATION GROWTH IN DETROIT REMARKABLE

This remarkable growth is due to favorable industrial conditions in the Detroit area which have made the city the fourth in size in the United States and have resulted in a great amount of added street car riding along with the increase in population. This growth in business has not been met with a corresponding increase in track mileage, although a program has been laid out by the city that will increase the trackage materially. The result is that the rate of earning on the existing permanent investment is much higher than the average for street railways in the United States. This is indicated in Table I, which gives a comparison between the Detroit figures and corresponding figures for 121 privately owned urban electric railways reporting to the American Electric Railway Association. The operating revenue per mile of track in Detroit is at the rate of $54,145, as compared with $28,310 for these roads, or more than 90 per cent above the average.

The density of street car travel is indicated by the number of revenue passengers per car-mile, which is 7.2, as compared with 6.6 for the 121 railways. The total passengers per car-mile is 9.5, as compared with 8.4 for the 121 roads. These two ratios average about 10 per cent higher for Detroit. This explains why, with an average fare of 5⅓ cents, as against 6.7 cents for the other roads, the passenger revenue per car-mile for Detroit was 40.8 cents, as compared with 44.6

OPERATING EXPENSES IN DETAIL OF DETROIT MUNICIPAL RAILWAY FOR THE FISCAL YEAR ENDED JUNE 30, 1923

Group I—Way and Structures			
1	Superintendence of way and atructures	$156,973	
2	Ballast	55,672	
3	Ties	17,835	
4	Rails	14,146	
5	Rail fasteninga and joints	27,011	
6	Special work	209.042	
8	Track and roadway labor	572,261	
9	Miscellaneous track and roadway expenses	99,888	
10	Paving	224,022	
11	Cleaning and sanding track	73,219	
12	Removal of snow and ice	59,490	
16	Crossings, fences and signs	7,813	
17	Signal and interlocking apparatus	9,839	
18	Telephone and telegraph lines	771	
19	Miscellaneous way expenses	12,967	
20	Poles and fixtures	33,139	
22	Distribution ayatem	134,722	
23	Miscellaneous electric line expenses	89,380	
24	Buildings, fixtures and grounds	130,386	
28	Equalization—Way and structures	39,000	
	Total		$1,967,576
Group II—Equipment			
29	Superintendence of equipment	$63,245	
30	Passenger and combination cars	734,443	
32	Service equipment	17,244	
33	Electric equipment of cars	281,400	
36	Shop equipment	43,396	
37	Shop expenses	67,876	
38	Vehicles and horses	6,316	
39	Miscellaneous equipment expenses	68	
44	Equalization—equipment	45,000	
	Total		$1,258,988
Group III—Power			
45	Superintendence of power	$29,531	
46	Power plant buildings, fixtures and grounds	10,177	
47	Power plant equipment	72,798	
48	Substation equipment	16,282	
49	Transmission ayatem	282	
52	Power plant employees	147,803	
53	Fuel for power	539,021	
55	Lubricants for power	8,253	
56	Miscellaneous power plant supplies and expenses	8,595	
57	Substation employees	16,467	
58	Substation supplies and expenses	1,919	
59	Power purchased	1,210,466	
	Total		$2,061,594
Group IV—Conducting Transportation			
63	Superintendence of transportation	$279,620	
64	Passenger conductors, motormen and trainmen	6,064,111	
66	Miscellaneous car service employes	65,939	
67	Miscellaneous car service expenses	263,839	
69	Station expenses	28	
70	Carhouse employees	856,362	
71	Carhouse expenses	37,253	
72	Operation of signal and interlocking apparatus	39,886	
73	Operation of telephone and telegraph lines	9,469	
76	Freight and express collection and delivery	154	
78	Other transportation expenses	24,534	
	Total		7,641,195
Group V—Traffic			
80	Advertising	$1,842	
	Total		1,842
Group VI—General and Miscellaneous			
83	Salaries and expenses of general officers	$36,542	
84	Salaries and expenses of general office clerks	152,491	
85	General office supplies and expenses	54,304	
86	Law expenses	1,119	
89	Miscellaneous general expenses	24,217	
92	Injuries and damages	684,693	
93	Insurance	48,522	
94	Stationery and printing	88,444	
95	Stores expense	280,632	
96	Garage and atable expenses	60,670	
97	Rent of tracks and facilities	66,901	
98	Rent of equipment	20,882	
	Total		1,519,417
	Grand Total		$14,450,612

cents. While the base fare was 5 cents in Detroit during the period, an additional cent was charged for a transfer. This charge brought in a material added revenue and offset to some extent the lower base fare.

Analysis of Operating Costs

A comparison of the operations for Detroit with those of the other companies has been worked out on the basis of per cent of gross in Table II. It shows some striking differences. The operating ratio is almost the same for the two, being 71.6 per cent for Detroit as compared with 71.7 per cent for the others. The distribution of the operating costs is quite different, however. In Detroit less was spent proportionally for all items except transportation, which was 6.4 per cent higher. The way and structures expenditures were not materially different in the two cases, although Detroit must have been relieved of a considerable amount of the paving burden, judging by the fact that only $224,022 was spent on this item with 373 miles of track. To offset this, a considerable amount of track in the system taken over from the D.U.R. was in bad condition and has needed excessive repairs. Expenditures for equipment are considerably lower for Detroit, probably due to the large number of new cars that have been placed in service within the year, and on which repairs should be light. Power cost is slightly less in Detroit than for the average. The streets are fairly level, stops are well spaced out, and a large number of trailers and safety cars are in use.

TABLE I—OPERATING STATISTICS OF 121 PRIVATE URBAN ELECTRIC RAILWAYS FOR CALENDAR YEAR 1922 COMPARED WITH DETROIT FOR FISCAL YEAR ENDED JUNE 30, 1923.

	121 Railways	Detroit
Railway operating revenue per mile of single track	$28,310	$54,145
Passenger revenue per mile of single track	$27,593	$51,154
Passenger revenue per car-mile, cents	44.6	40.8
Revenue passengers per mile of single-track	408,968	958,140
Revenue passenger per car-mile	6.6	7.2
Total passengers per mile of single track	522,078	1,262,923
Total passengers per car-mile	8.4	9.5
Transfer passengers, per cent of revenue passengers	26.5	31.8
Car miles per mile of single track	61,828	132,496

The general and miscellaneous expenditures are materially lower in Detroit, being 7.5 cents as compared with 9.4 cents for the 121 private roads. This is due to several things. In the first place, the accident record has been good, and the accruals to the injuries and damages fund have been kept down accordingly. The legal work in connection with claims is handled almost entirely by the city's legal department and is not charged against street railway operations, the total law expenses charged being only $1,111. Then, too, persons are not so likely to bring suit against the city as against a private corporation, either because they feel the cost will come back in the form of taxes, or because they fear that it is useless to expect large judgments against the city. In addition to the accident situation, other city departments are called on to give service to the street railway department as occasion demands. For instance, all purchases are made through the city's purchasing department except in the case of special items.

It is patent that the amount charged to taxes, 3.2 per cent of the gross, is much less than for the usual street railway, being only 43 per cent of that for the other companies. In the charter of the city it is provided that taxes on the physical property of the entire street car system be levied, the same as if privately owned. This does not, however, include taxes at the rate charged in many other cities, which frequently runs 5 to 7 per cent of gross. Furthermore, no federal taxation at all has to be included, as this is a department of the municipality, and hence exempt under the law.

The auxiliary operations of the private companies as reported provided net revenues just about sufficient to offset the lower rate of taxation enjoyed by the city, so that the net operating income is not far different in the two cases. The non-operating income of the private companies is considerably the greater, so that the gross income applicable to bond interest, dividends and surplus is somewhat higher for the 121 roads.

The income deductions in the case of Detroit are considerably more. The city is paying interest on bonds covering the entire investment made in the property. Certain critics have claimed that this is less than the real value of the system, and that the D.U.R. was forced to sell at a loss. Be that as it may, the city is paying interest at the current rate for municipal loans, averaging about 5¼ per cent as against 6 to 8 per cent demanded today from private railways. It is also applying earnings to a sinking fund to retire the bonds over a period of about thirty years. Since the investment will be wiped off the books at the end of that time, the city states that it does not need to set up a depreciation fund in addition.

TABLE II—OPERATING RESULTS OF 121 PRIVATE RAILWAYS FOR 1922 COMPARED WITH DETROIT FOR FISCAL YEAR ENDED JUNE 30, 1923

	Per Cent of Gross		Cents per Car-Mile	
	121 Railways	Detroit	121 Railways	Detroit
Operating revenue	100	100	45.7	40.8
Operating expenses	71.7	71.6	32.8	29.2
Net operating revenue	28.3	28.4	12.9	11.6
Net revenue, auxiliary operations	3.7	0.0	1.7	0.0
Taxes	7.4	3.2	3.4	1.3
Operating income	24.6	25.2	11.2	10.3
Non-operating income	1.7	0.4	0.8	0.2
Gross income	26.3	25.6	12.0	10.5
Income deductions	17.8	21.0	8.2	8.6
Net income	8.5	4.6	3.8	1.9
Operating expenses:				
Way and structures	10.0	9.8	4.6	4.0
Equipment	8.7	6.2	4.0	2.5
Power	10.5	10.2	4.8	4.2
Conducting transportation	31.4	37.9	14.3	15.4
Traffic	0.2	0.0	0.1	0.0
General and miscellaneous	9.4	7.5	4.3	3.1
Undistributed	1.5	4.3	0.7	0.0
Total	71.7	71.6	32.8	29.2

Auction Sales in New York.—At the public auction rooms in New York there were sold on Oct. 31 $2,000 Des Moines & Central Iowa Electric Company 5 per cent bonds due 1937, interest March and September 84 per cent; and forty shares Interborough Consolidated Corporation $11 lot.

Files Judgment. — Judgment for $7,832 has been taken by the Fowler State Bank at Rantoul against the Kankakee & Urbana Traction Company, Urbana, Ill., in Circuit Court during a special session of the court. The sum represented money advanced to the company by the bank.

Partial Abandonment Permitted. — By permission of the State Public Utilities Commission, the Fort Collins Street Railway, owned by the city of Fort Collins, Col., will abandon and dismantle that part of its roadbed which extends beyond the corporate limits of the city. There was no opposition.

Stockholders Approve Abandonment. —Abandonment of that part of the road from Garden and Stevenson Streets, Seneca Falls, to Cayuga Lake Park, has been voted by the stockholders of the Geneva, Seneca Falls & Auburn Railroad, Seneca Falls, N. Y. Application for the abandonment will be made of the Public Service Commission.

Files Abandonment Petition. — The Buffalo & Lake Erie Traction Company, through its attorneys, has filed a certificate of abandonment in the office of the Secretary of State, of that portion of its line or road known as the Dunkirk and Point Gratiot line. The line is operated in the city of Dunkirk. It is alleged that the further operation of this line is not considered necessary for the public convenience.

Bonds Issued in Exchange. — The Board of Public Utility Commissioners has granted permission to the Trenton & Princeton Traction Company to issue its 6 per cent gold bonds to the amount of $500,000 to be used in exchange for the 4 per cent bonds of the New Jersey & Pennsylvania Traction Company. The board also approved a mortgage given by the former company to the Northern Trust Company, as trustee.

Initial Preferred Dividend. — The United Gas & Electric Company, New York, N. Y., has declared a dividend of thirty-five-thirty-sixths of 1 per cent on the new preferred stock for the period

of July 20 to Oct. 1, putting the stock on a 5 per cent annual basis. The dividend was paid on Oct. 1 to stock of record Sept. 27. The dividend is equivalent to approximately 97 cents on the 64,994 shares of new preferred outstanding.

Considers Abandonment Request.—The Georgia Public Service Commission has taken under advisement a recent request by the Chattanooga Rapid Transit Company, a subsidiary organization of the Chattanooga Railway & Light Company, of Chattanooga, Tenn., to abandon the interurban line operated by the former company between Rossville and Fort Oglethorpe, Ga. Members of the commission visited the line to investigate the advisability of permitting its abandonment.

Property Sold.—The property of the Henderson Traction Company was sold on Oct. 27 by court order to W. H. McCurdy, of Evansville, Ind., for $6,800. Attorney A. H. Funkhouser, of Evansville, made the highest bid. The city of Henderson held prior lien on the property for $1,588 for street oiling tax. The purchaser would not make a statement as to his intentions, but it is understood that he will remove the rails and other equipment and sell it for junk.

Bus Lines Unprofitable.—Street Railway Commissioner Engle of Youngstown, Ohio, recently stated that the buses operated by the Pennsylvania-Ohio Electric Company do not pay. For the month of September the earnings were $21,327, which represented a loss of 2.84 cents per car-mile. The mileage for September was 91,043, with earnings per car-mile of 23.42 cents. According to Mr. Engle's figures the Hillman Street bus is the only line that shows a profit.

Reports a Gain.—For its first quarter of 1923 ended Sept. 30 the Brooklyn-Manhattan Transit Corporation reports a gain of approximately $50,000 in the net operating income compared with the corresponding quarter of 1922. The company received in operating revenue $9,681,053. This was $544,920 more than the Brooklyn Rapid Transit Company received in the same period last year. Operating expenses were $6,485,725 compared with $5,994,057 in 1922. The net income for the period ending Sept. 30 of this year was $814,696.

Denies Abandonment Application.—At a recent hearing before the California Railroad Commission it was brought out that the Nevada County Traction Company operating an electric line between Grass Valley, Calif., and Nevada City since 1901 was insolvent. It was stated that the company had defaulted interest on $60,000 of outstanding bonds since 1921. The loss of revenue was ascribed to the rapid increase of private automobiles. It was stated, however, that the directors had not authorized any application for abandonment or substitution of service and that no application was before the commission. Bus franchises are being sought.

Improvement in Securities Noted.—Public utility securities have improved greatly their investment position in the first half of 1923 as is shown by the decline in the average yield of public utility bonds and in the decrease of the average disparity between municipal credit and public utility credit. This conclusion is based on an analysis by Herbert B. Dorau of the Wisconsin University Research Institute staff of the comparative borrowing power of twenty-five public utility companies and fifteen municipalities.

Lines Sold.—The Galesburg & Kewanee Electric Railway, Galesburg, Ill., has been purchased by Dave Wine, Kewanee, for $50,000. Service on the line has already ceased. While the road was acquired by Mr. Wine primarily for its value as scrap, he announced that he would give the citizens an opportunity to retain the service if arrangements could be made. Immediate cessation of operation was necessitated, he said, in view of the fact that no arrangement had been made by him for protection from liability in case of accidents.

Assessment Left as Recommended.—The Missouri State Board of Equalization has completed final figures on the tax assessments of public service corporations operating in Missouri. The grand total is $381,503,313, which is nearly $2,000,000 less than the total for the same class of property in 1922, and $4,128,945 less than the total recommended by the State Tax Commission. The valuation on street and electric railways amounted to $65,987,881.

The assessment of the United Railways, St. Louis, was left at $44,085,208 as recommended by the State Tax Commission. This is slightly less than the 1922 total.

Property at Newburgh Foreclosed.—The line of the Orange County Traction Company, running from Newburgh to Walden, N. Y., has been sold under the foreclosure of the mortgage against it. The property was bid in by ex-Governor Benjamin B. Odell, president of the company, acting for a committee representing the security holders.

His bid was for $10,000 in addition to liens prior to the mortgage which was being foreclosed. This was held by the National Commercial Bank of Albany as trustee. The prior liens, including mortgage, judgment, interest, taxes, &c., amounted to $579,192. The mortgage foreclosed was to secure $750,000 bonds, of which $324,000 had been issued under the mortgage and on which was due a total of $378,748.

Record for Passenger Traffic.—The Chicago Surface Lines broke all records for passengers carried and receipts on Oct. 20. The receipts for the day were $180,141, the previous high record having been $178,487 on Dec. 23, 1922.

There were carried 2,611,532 cash fare passengers on that day, and it is officially estimated that there were 1,828,060 transfer passengers, so that there was a total of 4,439,592 people transported by the surface lines, or more than the entire population of the city of Chicago. It is probable that the surface lines will break all records for passengers carried this year. Up to Oct. 20 the Surface Lines had carried approximately 587,371,135 cash fare passengers, or 9.37 per cent more than in the same period of 1922.

Increase in Capital Stock Proposed.—The stockholders of the Carolina Power & Light Company Raleigh, N. C., met on Oct. 22 to consider resolutions providing for increase in capital stock from $8,500,000 to $12,000,000, and changing common and preferred stock to a "non-par" basis. The present authorized capitalization is 50,000 shares of common stock and 35,000 shares of preferred stock, par value $100. Under the proposed amendment of the charter there will be an increase of 10,000 shares of common stock and 25,000 shares of preferred stock, making 60,000 shares of each stock. The increase in capital is considered necessary in order to provide in part the cost of further additions in plants and equipment contemplated. The property of the company includes 15 miles of electric railway.

Proposes Bond Issue for Reconstruction.—An issue of $200,000 in utility bonds to finance reconstruction of the Seattle Municipal Railway tracks, trolley wires and special work in the district bounded by Jackson and James Streets and First Avenue South and Third Avenue South is proposed in an ordinance recently introduced in the City Council. The issue is proposed as a substitute for the $150,000 issue passed a few weeks ago, which was found to be insufficient. The bonds will be a lien against the railway, payable out of revenues. Plans for repaving the district have been held up because of lack of funds with which to rebuild the railway. The Seattle Municipal Railway has returned to the light and water department a loan of $175,000 made three months ago, when the railway lacked funds to meet payrolls because of losses accrued under the 5-cent fare experiment.

Opposes Abandonment. — The International Railway, Buffalo, has applied to the Public Service Commission for permission to abandon the Niagara Falls Sugar Street line, with the result that the petition has become a matter of concern to the City Council, city manager, corporation counsel and other officials. Much opposition has been expressed on the proposed abandonment. President Walter McCulloh of the Chamber of Commerce says that the abandonment of this important cross-town car thoroughfare would be deplorable, in view of the fact that the upbuilding of that territory will be but a matter of a short time, when the paving of the streets as now planned is finished. In a rate hearing before the Public Service Commission several months ago, the International Railway set forth figures to show that the company's lines in Niagara Falls had been operating at a loss of some $103,000 a year.

Traffic and Transportation

Change Made in Token Rate

Commission Orders District of Columbia Companies to Sell Three Tokens for Twenty Cents

Electric railways operating in the District of Columbia have been ordered by the Public Utilities Commission to sell three tokens for 20 cents at their carhouses, offices, substations, power station, "and other points convenient to the public," but not on their cars, effective on Nov. 1.

The order modifies to this extent the previous order for the general sale of six tokens for 40 cents. A general sale, by conductors on cars and elsewhere, of three tokens for 20 cents was asked by the Federation of Citizens' Associations on the ground that many persons did not find it convenient to purchase six tokens at a time. In the arguments at the hearing, counsel for the federation asked that if the three-for-20-cents order be denied, a cash fare of 7 cents instead of 8 cents be ordered. This phase was disregarded in the ruling of the commission as being outside the original petition.

While no official estimate has been made of the effect of the new order upon the revenues of the companies, it is not believed that it will be of much consequence, as most purchases of tokens are made on street cars and these are not affected by the order. Tokens heretofore have been sold at the company offices, carhouses and at certain banks in Washington and it is at such places only that three tokens for 20 cents may be purchased hereafter.

Testimony before the commission showed that about 20 per cent of the passengers of the Washington Railway & Electric Company pay the cash fare of 8 cents and it was estimated that if three tokens for 20 cents were sold on cars half of these cash riders would buy tokens and that the resultant loss in revenue to the company would be $104,000 a year, based on the number of passengers carried in the twelve months ended Aug. 31, last. Similar testimony was not introduced for the Capital Traction Company, but the Utilities Commission itself made an estimate that 24 per cent of the passengers of that company pay the cash fare and that, on the same basis of estimates, loss of revenue by a general change in the quantity of tokens sold would be $109,000 a year.

"The evidence submitted indicates that the returns now enjoyed by the railways are no greater than what is considered fair, and are decreasing," the commission asserted in its decision in the case. This sentence is considered especially significant as forecasting the attitude of the commission regarding the general question of railway fares in the District of Columbia, as there has been agitation in Congress and elsewhere for a return to the 5-cent fare.

The effect of the sale of tokens in smaller quantities by the conductors would be to delay traffic movement "to a small extent," the commission asserted, because of the increased number of transactions between conductors and passengers.

"The riders who are in a position to spend 20 cents for three tokens and cannot spend 40 cents for six are probably few in number," the commission concluded in its opinion.

Injunction to Prohibit Buses Denied

An injunction to prohibit the operation of buses along the route of the Maumee Valley Railway, Toledo, was denied in the Lucas County Common Pleas Court on Oct. 25. The court in denying the injunction said that it was opposed to government by injunction proceedings.

The suit, which was brought by Attorney Leroy L. Eastman, representing the railway, charged that the bus companies were operating without first complying with the provisions of the Collister bus law. The Maumee Valley Railway, of which L. G. Van Ness is president, operates on both sides of the Maumee River, south of Toledo. Mr. Van Ness said that the matter would be taken to the Court of Appeals immediately.

Last year the village of Perrysburg, through which the interurban operates, passed an ordinance prohibiting buses from stopping to take on passengers within the corporate limits of the municipality. The bus companies went into court and obtained an injunction against the city. The matter was taken to the Ohio Supreme Court by Attorney Eastman, where he succeeded in having the injunction dissolved.

Will Start Auxiliary Bus Service in Springfield

Following the threat of the City Commission to repeal its anti-bus ordinance and permit general operation of buses on Springfield, Ohio, streets unless the Springfield Street Railway started some kind of service to the Melrose addition in accordance with its franchise terms the company recently notified the commission in special session that it would start auxiliary bus service to connect with cars on Nov. 5. The commission at a regular meeting on Oct. 29 gave the company twenty-four hours to make final reply to its ultimatum demanding service.

A resolution ordering the building of the new track was passed some time ago without a dissenting vote. When the company was approached on the subject it declared it would be impossible to build the extension as a loss of $10,000 had been incurred so far. The matter rested until a delegation of citizens from the Melrose addition appeared before the commission and pressed for action, with the resultant passage of the resolution threatening revocation of the franchise and repeal of the anti-bus statute.

Rehearing Called on Mail Pay

The Interstate Commerce Commission will begin a hearing at Washington on Nov. 19 on the application of the Post Office Department to readjust the compensation of electric railways for handling United States mails. This is a reopening of the case started in July, 1918, when the commission, on its own motion and following the suggestion of a bill enacted by Congress, ordered an investigation to determine reasonable rates for transporting mail by urban and interurban electric railroads and for the incident service.

It will be recalled that in August, 1920, the commission handed down an order which had the effect of increasing the compensation to the carriers, but the results were not satisfactory to the American Electric Railway Association, which filed an application for a rehearing. The Post Office Department in 1922 filed a petition for reopening of the case, on the grounds that conditions had changed since the 1920 order of the commission so as to justify revision downward of the rates.

Testimony and evidence in the case will be presented before an examiner for the commission, beginning Nov. 19, and the proceedings are expected to occupy several weeks. Eventually, arguments will be heard before the commission itself, after the examiner's report has been submitted.

Wisconsin Commission Authorizes Use of More One-Man Cars

The Wisconsin Railroad Commission has granted formal permission to the Wisconsin Public Service Corporation to continue the operation of one-man cars on its Green Bay-Kaukauna interurban line. The company pleaded the need of the strictest economy in operation, and submitted to the commission statements showing the difference in cost of operation that resulted from the change to one-man car operation and also data on accidents.

C. E. Kohlhepp, auditor for the company, said the railway department in Green Bay, including the city and interurban lines, had incurred a deficit of $190,159 in 1922 and a deficit of $94,818 in the first seven months of 1923.

C. E. Warwick, representing the company, testified that the one-man cars with the new safety appliances were as safe as the two-men cars. J. P. Pulliam, vice-president and general manager of the company, said that accidents have been materially reduced the last two years and that step accidents to passengers have practically

ceased with the operation of one-man cars. He said further that the saving resulting from the one-man cars would forestall an increase in rates.

This ruling of the commission followed close on the heels of its decision permitting the Eastern Wisconsin Electric Company to operate one-man cars between Neenah and Fond du Lac.

Traffic Signals to Be Installed in New Orleans

The sum of $17,000 will be spent by the city of New Orleans for the installation of fifty additional electric traffic signals, in the near future, specifications for which are now being prepared by City Engineer Klorer. A traffic tower will be erected at Rampart Street and traffic signals installed from that point at all intersections of Canal Street to Peters Street and at other intersections. This improvement is based upon an agreement reached by the Commission Council of New Orleans with the Canal Street Merchants' Association, which is urging the adoption of that portion of the Beeler report governing regulation of traffic on Canal Street, thereby increasing the parking space for cars and relieving present congestion. The Canal Street Merchants' Association will bear $7,000 of the expense of improvement.

Traffic Solution Prizes Total $1,500

Prizes totaling $1,500 were recently awarded in the traffic problem contest started in the Keith, Proctor & Moss vaudeville theaters, as a constructive contribution to the recent Silver Jubilee celebration of New York City. The winning suggestions were the best of more than 1,200 plans entered in the eliminating contests in twenty vaudeville theaters. All the capital prize-winners submitted their plans through the Palace Theater.

The winner of the first prize, who was the chief engineer of the Board of Estimate, offered three suggestions for the traffic solution in New York City. Among these was the substantial relief for the section adjoining Forty-second Street by making all north and south streets one-way streets, and introducing the block system of traffic control. The winner of the second prize suggested doing away with all sidewalks on principal streets and making arcades in front of stores. Another suggestion included vehicular subways, and still another proposed removing all trolley lines on streets running east and west, and constructing ramp bridges at all east to west crossings.

Taking Action on One-Man Cars

Representatives of local unions in Massachusetts associated with the Amalgamated Association were present at a recent special meeting for the purpose of formulating action on the elimination of one-man cars. They will back a law which provides that no car of any railway shall be operated with fewer than two employees. Further, that the act if enacted by the Legislature shall be submitted for acceptance to the voters of each city and town in which a car is operated by one man and shall take effect in such cities and towns thirty days after acceptance.

Public Told About New Fort Wayne Cars

Letters to all automobile owners in the city, placards posted in practically all garages of the city, car cards and full page advertisements in the local newspapers are being utilized by the Indiana Service Corporation to announce a new type of street car now being placed on the Fort Wayne, Ind., city lines.

"There was a time when we put new types of cars in service and let the general public find out about them as best they could," says J. A. Greenland, superintendent of transportation and traffic. "That day is past, however, and now when we contemplate a change in service, especially such as at present, when the change will affect other street traffic, we make it a point to tell the public all about it."

The announcements are occasioned by the purchase of new type cars, with front entrance and rear exit. Cars now in use have front entrance and exit only.

Cars now in use on the city lines are single truck, front entrance and exit. As Mr. Greenland explains, the rear exit cars are expected to speed up traffic. They are also operated by one man.

There are twenty-five cars of the new type now being added to the city service. Of these, fifteen are new and ten have been rebuilt from double-truck cars formerly in operation and on which two men had been used. All city street cars are now in one-man operation.

Petition for Abolition of One-Man Cars.—Three hundred property owners living along the route of the June Street line of the Worcester Consolidated Street Railway have petitioned the Mayor and Aldermen for the abolition of one-man car service which was started recently.

Grants Bus Franchise.—A franchise has been granted the Monogahela-West Penn Public Service Company, operating lines in northern West Virginia, to operate a bus line between Morgantown and Rivesville. At the latter point connection will be made with the trolley cars for Fairmont. The company is expected to start this service as soon as the necessary equipment can be secured.

School Attendance Helps Railway.—Increased attendance at Teachers' College, resulting in greater patronage of its railway lines, caused a reduction in fare from 8 to 7 cents on the lines of the Waterloo, Cedar Falls & Northern Railway. C. D. Cass, general manager of the company, has promised further cuts "if patronage warrants."

Colored Lights Standardized.—The Tacoma Railway & Power Company has completed standardization of colored lights on the front of the various car lines of the company designed to make it easier for patrons to recognize their cars at night. Each color combination represents a particular car line and the company has advertised the change, so that all may familiarize themselves with their particular light.

Seek Fee Refund. — The Michigan Public Utilities Commission is investigating the operation of a large number of motor buses which have recently discontinued business whose operators are now seeking to get their application fee refunded to them. Most of them operated in a former resort territory and have been operating under a permit issued by the commission requiring their filing of necessary insurance and other papers.

Hears Petition for Increased Fares.—The Public Service Commission late in September held a hearing on the application of the City Railways, Wheeling, W. Va., for an increase in fare on its Mozart Park line in Wheeling. It was claimed by the company that the line was operating at a loss and was used to little extent. There were none present to contest the proposed increase of the company, which was represented by one of the management and Attorney John J. Coniff.

Perfect Thirty-one Days.—Keokuk car operators made their slogan "Thirty-one Days Without an Accident" a reality when they completed their safety first drive for the month of August. Telegrams of congratulation were received by the men shortly after from H. T. Edgar, division manager, and David Daly, district manager of Stone & Webster. Walter H. Burke, local manager of the Keokuk Electric Company, has given the men a dinner in recognition of their achievement. The drive was planned and directed entirely by the car operators.

More One-Man Lines Planned.—Five divisions of the Louisville & Interurban Railway lines will have one-man safety cars in use by Jan. 1, according to Richard H. Wyatt, general superintendent of the Kentucky company. One-man safety cars are to be placed in use on the Orell division Nov. 11 and on the Fern Creek division sometime in December, Mr. Wyatt said. The safety cars are now in use on the Jeffersontown, Prospect and Okolona divisions.

Will Use One-Man Cars.—The Galveston Electric will soon install one-man safety cars in Galveston, according to an announcement by Raymond G. Carroll, vice-president and general manager. The installation of the one-man cars will be gradual, Mr. Carroll said, only one or two cars being put in service at first. It is planned, however, to convert the entire system to the one-man car. Mr. Carroll said that the number of automobiles in use in Galveston is the direct cause of the installation of one-man cars.

New Pass Plan.—Effective Nov. 5, the Pennsylvania-Ohio Electric Company will place in use on its interurban line between Youngstown, Ohio, and New Castle, Pa., two forms of the unlimited-ride weekly pass. One form, selling at $3.75, will be used for transportation from terminal to terminal, or intermediate points, a distance of 19 miles. The other will sell at $1.75 and will be used for transportation between New Castle and Edenburg, or intermediate points. This pass will be of advantage to suburban dwellers going to and from work and also for shopping in New Castle. It also will be of advantage to industrial riders from New Castle to Edenburg.

Dining Chair Coaches Ready.—The Interstate Public Service Company, Indianapolis, Ind., will put into service during the next few weeks Pullman combination dining and chair cars between Louisville and Indianapolis. The cars will be operated during the usual meal hours, and more will be put on as the patronage demands. First definite announcement of this improved service was made by L. M. Brown, general superintendent of the division. The cars, some of which already have been ordered, will be like standard equipment of the kind used on steam roads with the dining room at one end and the chairs at the other, with the kitchen separating them. The order has been referred to previously.

Fare Lowered.—A new fare schedule recently approved by the Public Service Commission authorizes a minimum charge in the fifty-trip commutation book reduced from $5 to $3.75 on the Auburn & Syracuse Electric Railroad. The order became effective Oct. 20. Fares heretofore applying for the sale of such commutation books for transportation to and from Auburn and to and from Syracuse are canceled. Fares to and from Auburn will be obtained by using the interurban commutation fare to and from Soule plus fifty times the regular one-way fare between Soule and Auburn. Fares to and from Syracuse will be obtained by using the interurban commutation fare to and from the city line plus fifty times the one-way city fare.

Petition for Old System.—All night service into Tremont Street subway in Boston was started Oct. 14. Petitions bearing 1,400 names of night workers have been presented to the railway protesting against the early morning car service and petitioning to put the night cars back on Adams Square. It is claimed that only those who work in the immediate neighborhood of Scollay Square, Park Street and Boylston Street stations are at all benefited by the new order. All the others who were used to getting the cars at their doors are forced to walk. It is their contention that conditions would be improved if the old service were restored, because most of them, tired after a night's work, might go from their work to the street and get the cars without a long walk being necessary.

Personal Items

F. de Lancker Heads International Tramways Union

General Manager of the Brussels Tramways Is Elected to Succeed Mr. de Burlet

C. de Burlet, honorary director general of the Société Nationale des Chemins de fer vicinaux of Belgium, resigned on Oct. 9 as president of the Union Internationale de Tramways de Chemins de fer d'intêret local et de Transports Publics Automobiles. Mr. de Burlet has been president of the organization for the last eleven years. In his letter of resignation Mr. de Burlet says that it is with great regret that he retires from the presidency after an active association with the organization for more than forty years, but his advancing years and obligations of health compel him to do so. He feels that the recent convention in Brussels proves that in spite of the war, the association is as important and necessary to the industry as ever, and that the large attendance and notable success of that meeting show that it has taken on a new life and that the crisis in its existence has passed.

Although organized in 1885, the Union Internationale de Tramways de Chemins de fer d'intêret local et de Transports Publics Automobiles has had only three presidents. The first was Gustave Michelet, then general manager of the Brussels Tramways, who was elected president at the organization meeting in Brussels. He continued in the office of president until his death in 1897. He was succeeded by Baron Janssen, then president of the Brussels Tramways, who occupied the office for fifteen years, when he was elected honorary president. Mr. de Burlet at the time of his election was general manager of the Société Nationale des Chemins de fer vicinaux, a large interurban railway property in Belgium under partial government ownership.

Mr. de Lancker, the new president, is general manager of the Brussels Tramways. His election has just been ratified by ballot by the members.

Messrs. Vance and Hendricks in Charge of Purchases of Merged Companies

Harry J. Vance, purchasing agent for the Illinois Power & Light Corporation, with headquarters at Peoria, Ill., has been made purchasing agent for the Illinois Traction, Inc. Mr. Vance will have his headquarters at Chicago.

W. P. Hendricks, for a number of years associated with the William A. Baehr Organization, consulting engineers, Chicago, will be the new purchasing agent for the Illinois Power & Light Corporation, with headquarters at Chicago.

Harry Vance is well known throughout Illinois, having for many years been purchasing agent for the Illinois Traction System, which company became a subsidiary of the Illinois Power & Light Corporation last June.

Otto M. Rau Appointed on Power Survey

Otto M. Rau, an engineering specialist in hydraulics, power generation and natural resources, has been appointed in a consulting capacity on the staff of the Giant Power Survey of the Commonwealth of Pennsylvania. This survey has been started in Pennsylvania at the suggestion of Governor Pinchot. Mr. Rau will be located in a Philadelphia office which has been opened in the Fuller Building and will have charge of studies of power requirements, stations and transmission lines.

Mr. Rau's early experience was gained with the engineering department of the Edison General Electric Company, New York. He later became identified with the Milwaukee Electric Railway & Light Company as chief electrician and general superintendent of the lighting and power department. During the war Mr. Rau acted as consulting engineer to the power section of the Emergency Fleet Corporation. At the close of the war he became connected with Day & Zimmermann of Philadelphia in charge of public utility management and was later with the Stotesbury-Mitten management of the Philadelphia Rapid Transit Company where he did specialized work on pulverized fuels and making superpower studies. His appointment, together with that of Dr. Frederick H. Newell of Braddock, Pa., was made by Morris L. Cooke, director of the power survey and former director of public works in Philadelphia.

Mr. Doerr Leaves Connecticut Company

J. H. Doerr has resigned as roadmaster of the Connecticut Company, effective on Nov. 1, to become Western representative of the Railway Trackwork Company, Philadelphia, Pa. He will be located in Los Angeles, Cal. For the past three years Mr. Doerr has been stationed in Waterbury for the Connecticut Company.

Mr. Doerr was graduated from Sheffield Scientific School, Yale, in 1912, and entered the employ of the Connecticut Company in its maintenance of way engineering department. During his first four years with the Connecticut Company Mr. Doerr's work covered all branches of track engineering from layout to installation. At the completion

of this term of service he left the company and during the following four years engineered and supervised the construction of many industrial and power transportation projects. This work completed, he again associated himself with the Connecticut Company as roadmaster.

William S. Hamilton has resigned as general superintendent of the Schenectady Railway.

Thomas J. Lynch has been appointed general manager of the Schenectady Railway, Schenectady, N. Y.

Nat Ozmon has been appointed to succeed Harry W. Cushman as assistant superintendent of the Tri-City Railway, Davenport.

W. H. Rudisill is superintendent of engineering of the Manila Electric Company and Maurice W. Toby, formerly roadmaster, has now the title of engineer of maintenance of way.

E. Dobson is roadmaster of the Sarnia Street Railway, Sarnia, Ont., replacing in that capacity William Bolton.

C. W. Lightner is superintendent of line construction of the Bakersfield & Kern Electric Railway, Bakersfield, Calif.

F. M. Warnken has succeeded B. K. Noble as superintendent of the West Helena Consolidated Company, Helena, Ark.

R. M. Hannaford is acting chief engineer of the Montreal Tramways. W. F. Graves was formerly chief engineer.

George W. Scott has succeeded Ralph Chandler as second vice-president of the Phoenix Railway, Phoenix, Arizona. L. M. Ford is now treasurer, replacing A. D. Haskell, acting treasurer.

Loren Barton is vice-president of the Glendale & Montrose Railway, Glendale, Calif., succeeding John Treanor. Mr. Barton's office is located in the Corporation Building, Los Angeles.

Huey P. Long, chairman of the Louisiana Public Service Commission, has announced his candidacy for Governor of Lousiana subject to the action of the Democratic voters in the election to be held in January, 1924.

Dan. C. Smith, for seven years manager of the Fort Smith Light & Traction Company, has resigned and accepted a position with the Byllesby Engineering Company of Chicago, operating managers of the local utilities at Fort Smith. Ark.

Arthur E. Scott, manager of the Louisville branch of the Atlantic Tank & Barrel Corporation, Louisville, for a number of years, has recently accepted a position with the Interstate Public Service Company, Indianapolis, as director of public relations.

E. J. Rosenauer, formerly general auditor of the Southern Colorado Power Company, has resigned to become assistant treasurer and general auditor of the Wisconsin-Minnesota Light & Power Company, with headquarters at Eau Claire, Wis. Mr. Rosenauer has been connected with the Byllesby interests for sixteen years, the last ten of which he held the position from which he just resigned.

Obituary

R. J. Morrisson

R. J. Morrisson, general manager of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., died on Oct. 29. Mr. Morrisson had been playing golf that afternoon with Charles Brooks, his predecessor as manager of the property, and left Mr. Brooks to prepare for dinner at Mr. Brooks' residence. When he did not appear Mr. Brooks made inquiries which led to the discovery of Mr. Morrisson's body in the bathroom of his apartment, where it was later established he had been accidentally overcome by carbon monoxide gas.

Mr. Morrisson has been in the public utility business since 1914. At the age of 17 he was secretary to Charles S. Banghart when Mr. Banghart was vice-president and manager of the Binghamton Railway, Binghamton, N. Y. This position he held until May, 1917, when he enlisted in the Eleventh Engineers. He went to France in July, 1917, with that organization. He was there for a period of twenty-two months. After his return from France Mr. Morrisson went to Augusta, Ga., as assistant manager of the Augusta-Aiken Railway & Electric Corporation under Mr. Banghart. This position he held until the fall of 1920. He was then promoted to private secretary to James H. Pardee, president of the J. G. White Management Corporation. This position he held until October, 1922, when he was made manager of the Poughkeepsie & Wappingers Falls Railway. Although Mr. Morrission was a very young man his work indicated that a career lay ahead of him that would have reflected great credit upon him personally and probably would have been a source of pride to the industry itself.

George H. Moseman, for the past twenty-five years New England sales agent for the Weston Electrical Instrument Company, Newark, N. J., with headquarters at Boston, died suddenly Oct. 28 at his home in Brighton. Mr. Moseman was born at Bridgeport, Conn., about seventy years ago.

Harry R. Rochester, Western sales manager of Hale-Kilburn Company, died on Oct. 28, at Atlantic City, after an illness of several weeks. Mr. Rochester was born in Ontario on April 10, 1872. He had been with Hale-Kilburn, with offices in Chicago, since 1912. Funeral services were held in Dayton on Oct. 31.

Charles A. Merrill, in the employ of the Brooklyn-Manhattan Transit Company for twenty-two years, died recently at the age of seventy-one. In 1901 he started serving the Brooklyn company as a conductor. In 1906 he was made a dispatcher. He was night dispatcher at the Franklin Avenue depot at the time of his death.

Lewis Otto Hayes, assistant superintendent of the subway division of the Interborough Rapid Transit Company, New York, N. Y., died recently. He had held the position of assistant superintendent since Jan. 15, 1921. His first railway work was with the Chicago Elevated Railway as train clerk. In 1904 he entered the service of the Interborough Rapid Transit Company as trainmaster on the subway division, holding this position until 1921, when he became assistant superintendent, which position he held at the time of his death. Mr. Hayes was born in Edinburg, Ind., on Dec. 16, 1875.

R. L. Woeber, who crossed the plains in an ox cart and arrived in Denver in 1867, is dead. Mr. Woeber saw the need for better transportation and with his brother organized the Woeber Brothers Carriage Company, one of the first businesses of its kind in the West. The name was later changed to the Woeber Car & Manufacturing Company. Practically every car that traverses the streets of Denver today is marked: "Made by Woeber Car & Manufacturing Company." Mr. Woeber had been sick since last February, when he suffered a paralytic stroke. He was eighty-six years of age.

M. E. Stark, general supervisor of tracks of the Connecticut Company, died recently while on a vacation at Niagara Falls, N. Y. Mr. Stark had been in the employ of the company about twenty-three years. He was born at Silver Creek, Mich., in 1856. He started on railroad work in 1882 at Kennebunkport, Me. In 1885 he went to work for the New York Central at Oswego, N. Y. From Oswego he went to Hudson, N. Y., and entered the employ of the Connecticut Railway & Light Company at Waterbury in 1900. In 1902 Mr. Stark was transferred to Bridgeport as superintendent of tracks of that division, in which capacity he served until Aug. 1, 1923, when he was appointed general supervisor of tracks of the entire system of 802 miles.

Fred J. Green, pioneer Ohio electric railway man, died in Springfield Oct. 4: Mr. Green was born at Stevens Point, Wis., in 1861 and went to Ohio about twenty-five years ago. Former Governor Asa Bushnell of Springfield helped Mr. Green in financing and building the old Dayton, Springfield & Urbana line, now a part of the Indiana, Columbus & Eastern Traction Company. Later they built the Columbus-Springfield line, which eventually was sold to the Indiana, Columbus & Eastern. Then came the construction of the Springfield, Troy & Piqua Traction Company, of which Mr. Green remained president until the sale of the road about three years ago and its subsequent junking by the Schoenthal Company of Columbus. Mr. Green was a member of several fraternal orders which participated in the funeral services held Oct. 6 in Springfield.

Manufactures and the Markets

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

$1,250,000 Transmission Line from Keokuk

An electric, double-circuit, steel-tower transmission line, carrying 66,000 volts, will be built from the big power dam at Keokuk, Iowa, to Galesburg, Ill., by the Illinois Power & Light Corporation, which controls the city and interurban lines formerly included in the Illinois Traction system. The improvement will cost $1,250,000. Work will begin at once under the direction of the engineering department of the Illinois Power & Light Corporation. The engineers expect to have the line finished within a year.

An extension of the line, carrying 33,000 volts, will also be built from Galesburg to Galva, a distance of 23 miles. The entire length of the new line development will be approximately 96 miles.

The new line starts at the dam, owned by the Mississippi River Power Company, Keokuk, Iowa. It will run up the Iowa side of the Mississippi River to Fort Madison, cross the river at this point and then extend in a northeasterly direction to Galesburg, following generally the main line of the Santa Fé Railway.

The Galesburg power plant of the company is now up to its full capacity of 4,500 kw. The new line will be capable of furnishing Galesburg electric users with a capacity of 10,000 kw., sufficient, it is believed, for the next ten years.

The Galesburg and Galva power houses will be kept intact as standby plants for use in times of emergency.

Prices Becoming Stabilized; Manufacturing Active

Market conditions at the present time show a tendency in the direction of more stable prices. The decline which occurred during the early part of the year has apparently ended and there has been a moderate upward movement. However, the earlier tendency was not without its advantages, in that it has produced a more sound price structure today than existed six months ago. It is thought that there is little or no chance of returning to the price level of 1913, and those familiar with economic conditions incline to the belief that the present stabilized price level will continue for some time to come.

Pig iron and copper continue to be weak spots in the metal market. The price of pig iron has declined considerably since last spring and there is no reason to expect improvement in the immediate future. This is not surprising, perhaps, in view of the very high level to which the price of pig iron rose last summer. In spite of the decline, its present price bears about the normal relation to the pre-war price.

Movements in copper prices have had a general downward tendency. Lately, however, the domestic demand has been a little larger. Hope is expressed that with users coming again into the market after holding back for some time, prices may go up. Export prices have risen a little, but no great change in this situation can well be expected until European conditions improve and the copper export trade regains something of its former volume.

Manufacturing activity continues at a healthy rate. Stocks are normal in most lines, and future demands are likely to be for immediate consumption rather than for the upbuilding of reserve stocks. The prevalence of hand-to-mouth buying has produced a situation which appears superficially unsatisfactory. Under the circumstances, however, the volume of forward orders can hardly be taken as a safe guide to market conditions. The consumption of raw materials and the production of finished goods indicate that the present situation is fundamentally sound. The fact that there is relatively little unemployment at present, although the seasonal peak of labor requirements for construction and agriculture has now past, is another indication of a healthy condition of industry.

One important steel company is operating at nearly 90 per cent of capacity, and the rate of operation for the steel industry as a whole is approximately 85 per cent. The United States Steel Corporation has increased its current dividend one-quarter of 1 per cent, or from the established rate of 1¼ per cent to 1½ per cent, quarterly.

Creditors Vote to Extend Payment of Outstanding Accounts

At a special meeting of the creditors of the Missouri Car Company in the Columbia Building, St. Louis, on Oct. 26 a motion was carried to extend half the outstanding accounts until Jan. 1, 1924, and the other half until March 1, 1924. Notes will be made out for the amounts due to the creditors, to whom they will be sent in exchange for the old notes. The plant of the company is covered by a blanket mortgage having precedence over other claims. Creditors are to be taxed 4 per cent of their claims in order to assist Orrin Merry, president of the company, in his program for rehabilitating the company. A committee of three creditors, appointed on Aug. 6, is now working with Mr. Merry in the interest of all the creditors.

Westinghouse Official Decorated. — Guy E. Tripp, chairman of the Westinghouse Electric Company, who is in the Far East in connection with reconstruction work in Japanese cities destroyed by the earthquake, has been decorated by the Japanese government.

ELECTRIC RAILWAY MATERIAL PRICES—OCT. 30, 1923

Metals—New York

Copper, electrolytic, cents per lb.	12.562
Lead, cents per lb.	6.45
Nickel, cents per lb.	29.50
Zinc, cents per lb.	7.00
Tin Straits, cents per lb.	41.50
Aluminum, 98 to 99 per cent, cents per lb.	25.20
Babbitt metal, warehouse, cents per lb.:	
Fair grade	52.00
Commercial	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$4.425
Somerset mine run, Boston	2.50
Pittsburgh mine run, Pittsburgh	1.925
Franklin, Ill., screenings, Chicago	1.45
Central, Ill., screenings, Chicago	1.05
Kansas screenings, Kansas City	2.25

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.15
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.30

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb.	3.75
Sheet iron, galvanized (28 gage), cents per lb.	5.00
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	3.35

Waste—New York

Waste, wool, cents per lb.	13–17
Waste, cotton (100 lb. bale), cents per lb.:	
White	12–14.50
Colored	9–14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$0.95
White lead (100 lb. keg), cents per lb.	11.375
Turpentine (bbl. lots), per gal.	$0.98
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	14.625
Rubber-covered wire, No. 14, per 1,000 ft.	$6.60
Weatherproof wire base, cents per lb.	18.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd.	$3.60
Common, per sq.yd.	3.20
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.79
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f. o. b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	9.75
Light copper, cents per lb.	8.75
Heavy brass, cents per lb.	5.25
Zinc, old scrap, cents per lb.	4.125
Yellow brass, cents per lb. (heavy)	5.75
Lead, heavy, cents per lb.	5.50
Steel car axles, Chicago, net ton	$15.25
Old car wheels, Chicago, gross ton	17.75
Rails (short), Chicago, gross ton	19.75
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	6.75

Rolling Stock

Nic Le Grand, Inc., is installing safety devices on one-man cars of the Saginaw Transit Company.

Eastern Wisconsin Electric Company, Sheboygan, Wis., has placed an order with the St. Louis Car Company for four new Birney safety single-truck cars equipped with the latest safety appliances. Delivery is expected before Jan. 1. The new equipment is planned to give better and speedier service in Sheboygan.

Los Angeles Railway will construct twenty more cars in the main shops at Fifty-fourth Street and South Park Avenue, according to an order of General Manager Kuhrts in the 1924 program of company work. The twenty cars will be similar to the fifty-five cars that are being built in the 1923 program. They will be four-motor cars and equipped for single unit or train operation.

Track and Line

Philadelphia Rapid Transit Company has placed on order with the Lorain Steel Company for 4,000 tons of light rails.

New Jersey & Pennsylvania Traction Company, Trenton, N. J., will lay new rails on West Hanover Street, Trenton, between Willow Street and Green's Place.

Chicago & Joliet Electric Railway, Joliet, Ill., is engaged in eliminating a large grade crossing. The trolley track will pass over both the state highway and a steam railroad.

Hattiesburg Traction Company, Hattiesburg, Miss., is overhauling Hardy Street. The roadbed has been graded, new cross ties placed and the right of way cleaned.

Altoona & Logan Valley Electric Railway, Altoona, Pa., is lengthening all switches for passing purposes between Altoona and Tipton. This is because of the greater traffic that is expected through the opening of a motor speedway at Tipton.

City Railway, Dayton, Ohio, has asked the City Commission for permission to extend its lines several squares beyond the present loop. The company desires to extend the Third Street line from its present terminus at the Dayton and Eaton pike.

Mobile Light & Railroad, Mobile, Ala., will be requested to extend its line down Government Street or nearer to the Louisville & Nashville depot so that persons leaving and arriving by train may have better service and also so that women and children will have protection while traveling.

Chattanooga, Tenn.—The public utilities in Chattanooga, exclusive of the railroads, are spending approximately $952,000 on improvements and additions during the current year. The largest expenditure is by the Tennessee Electric Power Company, which is estimated at $582,000.

Los Angeles Railway started construction of the track on Evergreen Avenue between First Street and Brooklyn, at the Brooklyn Avenue end. This will give a cross-town service for Hollenbeck Heights. The company is also extending its Vermont Avenue line from First to Monroe Street.

Washington Railway & Electric Company has completed physical improvements on its Columbia, or H Street, line at a cost of $361,653, which includes new and heavier rails, a concrete roadbed, new switches and new third rail. The new track extends from Fifteenth and H Streets Northeast to Twelfth Street and New York Avenue Northwest. Heavy rails of especial design were used to carry the trains of the Washington, Baltimore & Annapolis interurban, which reaches its Washington terminal over this route.

Monongahela-West Penn Public Service Company will repair its tracks on Eighth Street from Juliana to Ann Streets in Parkersburg. The present tracks will be replaced with new ones and will probably be laid in a concrete base. A 9-ft. right of way for the tracks extending over the block from Juliana to Ann on Eighth Street has been arranged. The tracks have been in bad condition for some time and arrangements have been made to repair them, but several difficulties were encountered which delayed starting the work.

Power Houses, Shops and Buildings

Empire State Railroad Corporation, Syracuse, N. Y., has awarded a contract for a new station at Minetto and the Public Service Commission has dismissed complaint by residents of Minetto asking for the station facilities.

Public Service Railway, Newark, has informed the City Commission of Trenton that it is now seeking a new site on which to erect a modern terminal for the cars of the Newark-Elizabeth and Camden divisions. Some time ago the company endeavored to secure the old Trenton Bank in the heart of Trenton, but this was taken over for other purposes.

Trade Notes

E. I. Du Pont de Nemours & Company, Fabrikoid Division, Newburgh, N. Y., has appointed Ross F. Hayes, 2 Rector Street, New York City, as Eastern sales agent, railway department, for sale of its Fabrikoid products. Mr. Hayes' territory includes New England, southern and middle Atlantic States.

Traffic Signal Corporation of New York City has filed an amended certificate in the office of the Secretary of State at Albany increasing its capital stock from 500 shares, of which 400 are preferred $100 par value and 100 common non-par value, to 600 shares, of which 200 are preferred $100 par value and 400 shares common no-par value.

F. C. Richmond Machinery Company, representative for the Conveyors Corporation of America, Chicago, has moved its offices and salesrooms to 320 West Second South Street, Salt Lake City. The F. C. Richmond Machinery Company is one of the largest mill supply houses in the West.

Eccles & Smith Company has sold out and is retiring from business both in San Francisco and Los Angeles. Its machine tool business was sold to the Waterhouse & Lester Company and the railway supply business is being taken over by Robert W. Jamison, 637 Mission Street, San Francisco, and C. Eccles in Los Angeles.

The Society for Electrical Development through its directors has authorized the establishment of an office at 527 Rialto Building, San Francisco, in order to render a more personal and intimate service to the electrical industry of the Pacific Coast. Samuel H. Taylor, formerly president, Electric Railway & Manufacturers Supply Company of San Francisco, has been appointed Pacific Coast manager. Mr. Taylor will continue to serve as secretary of the Pacific Coast Electrical Association.

New Advertising Literature

Conveyors Corporation of America, Chicago, Ill., has issued a folder entitled "American Air-Tight Doors."

Wagner Electric Corporation, St. Louis, Mo., has issued Bulletin 134 entitled the Fynn-Weichsel Motor.

Crouse-Hinds Company, Syracuse, N. Y., has issued folder No. 7 entitled "Flanged Obround Condulets." The folder contains a full page spread of the obround condulets, covers and wiring devices.

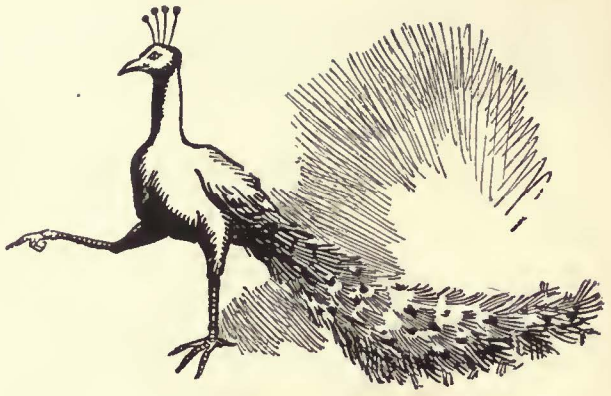
Reo Motor Car Company, Lansing, Mich., has issued a thirty-five-page book on passenger buses on the speed wagon chassis. The company has also issued in pamphlet form a report of a special investigation on the installation of the Richmond Rapid Transit Company, the Detroit City Motor Transportation Company, the Owosso-Flint Bus Line, Inc., the Mason-Lansing Bus Line and Cain Brothers interurban line.

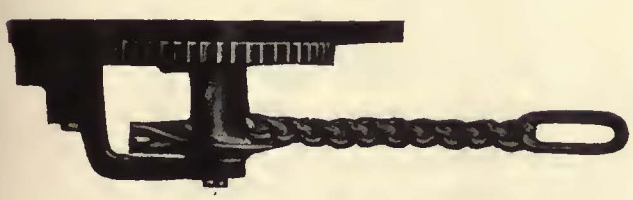
Pioneer High-Speed Machine Knife & Tool Company, Cleveland, has issued a pamphlet announcing the establishment of a new company of craftsmen concentrating on the production of cutting tools of improved quality and marked economy. The company is headed by A. W. Ericson, who has specialized in the manufacture of sheer blades and knives for thirty-one years. The organization is called Pioneer High Speed Machine Knife & Tool Company "because of the years invested in attaining the requisite experience and skill."

Dummy Practice!

Tackle low!

On every college field, these cool November days, the boys are tackling the dummy. It's only practice, of course, but the knowledge of how to tackle correctly, and the experience in actually doing it—may stop the on-rushing opponent in the crucial Fall Game.





Hand Brake Practice Now—

may save the damages later

How many motormen really can make a hand-brake stop? Do you ever give them any training in its use? Or have you got such useless hand-brake equipment that the men have no confidence in it?

It's a noticeable fact that most of the companies which have a regular schedule of hand-brake stops on every route, are the ones which are equipped with Peacock Brakes.

The reason is clear—

PEACOCK BRAKES

Inspire the motorman's confidence as a result of regular practice—

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

Overhead Conductor Bar Construction

Replace your copper by steel

At certain points your traffic is so heavy that the finest trolley wire you can buy will only give a few months service.

At these points, replace the wire by steel or iron bar construction.

Anderson makes a complete line of overhead material necessary for this bar construction.

Starting from the left, the illustration above shows a trough hanger for suspending the trolley wire ear; next is the splicer for joining the wire to the bar; next comes two hangers with clevises; then follows the feeder lug; then a 'U' steel connection for joining the steel bars, and then another hanger.

Below is shown a crossing, section insulator and a frog for this bar construction—everything complete to help you keep down maintenance and replacement costs, where the traffic plays havoc with the wire and other overhead material.

Send for further particulars.

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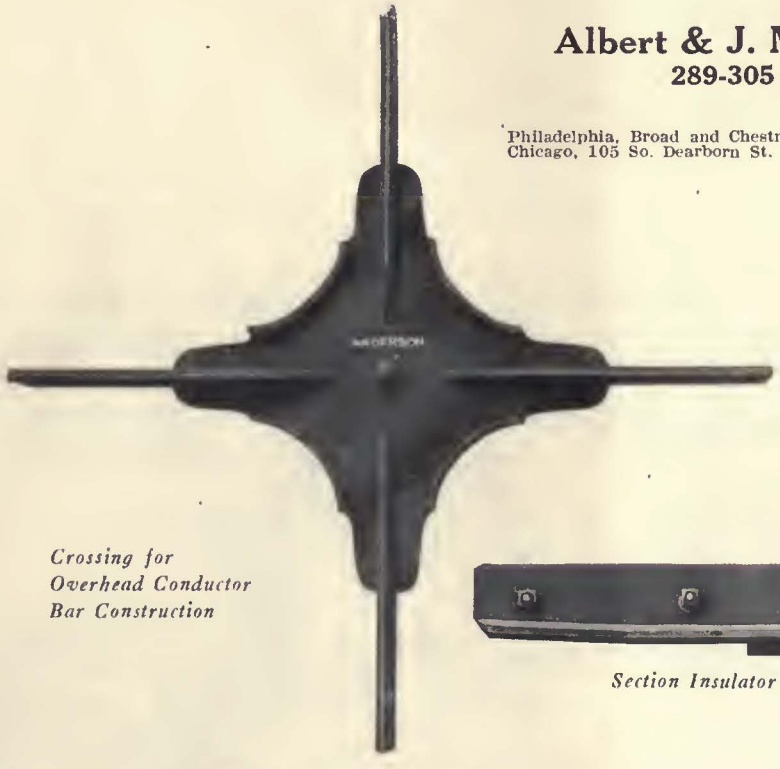
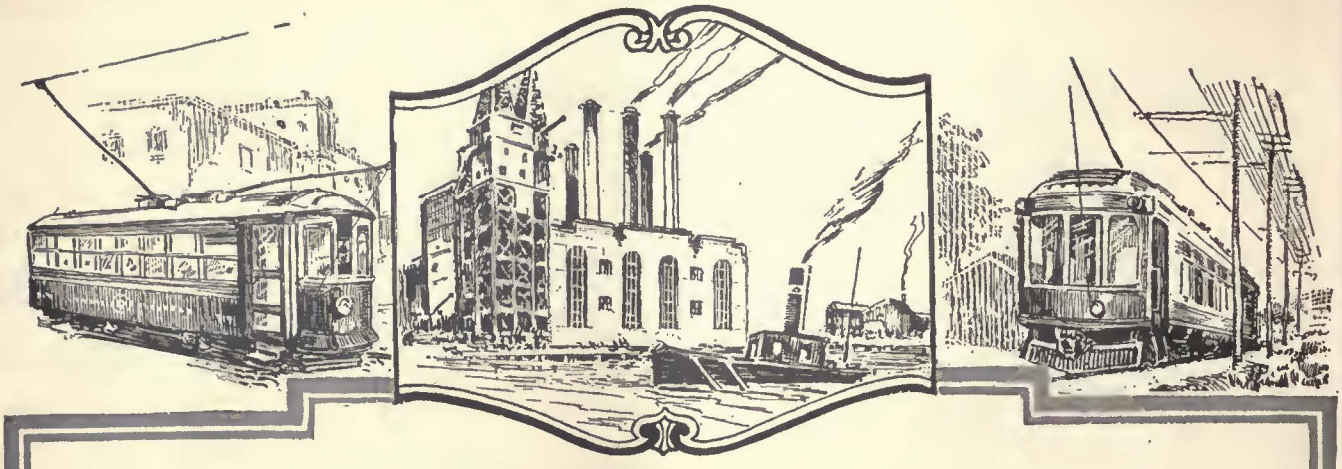


Crossing for Overhead Conductor Bar Construction

Section Insulator for Overhead Bar Construction

Frog for Overhead Bar Construction



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is Passing

Only a few short years ago the majority of Street Railways were purchasing oils on the "guaranteed mileage" basis.

Now you have to go far afield to find roads which adhere to this antiquated method of buying oil.

The old method dropped out because of certain inherent weaknesses.

Of course, when the old system passed out it did so because something better took its place.

And we do not heistate to declare that the correctness of the Texaco plan was largely responsible for inaugurating this newer and better era in Street Railway lubrication.

The Texaco plan is based on

1—Supplying proper lubricants in the right amount.

2—Always regarding Lower Maintenance Cost as the goal for all economies.

3—Unstinted Engineering Service through experienced and capable Lubrication Engineers.

4—A degree of friendly cooperation you have never realized until you took up with Texaco.

When do you want to take it up with us?

THE TEXAS COMPANY

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

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A survey of this kind for the railroads would have saved millions of dollars. This work will mean a great deal to the electric power industry. Prove it to your own satisfaction by examining the book at our expense.

A super-power survey of the whole United States

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Atlas of U.S.A. Electric Power Industry

By Frank G. Baum

Consulting Hydro-Electric Engineer

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Outline of Proposed Constant-Potential Transmission System.
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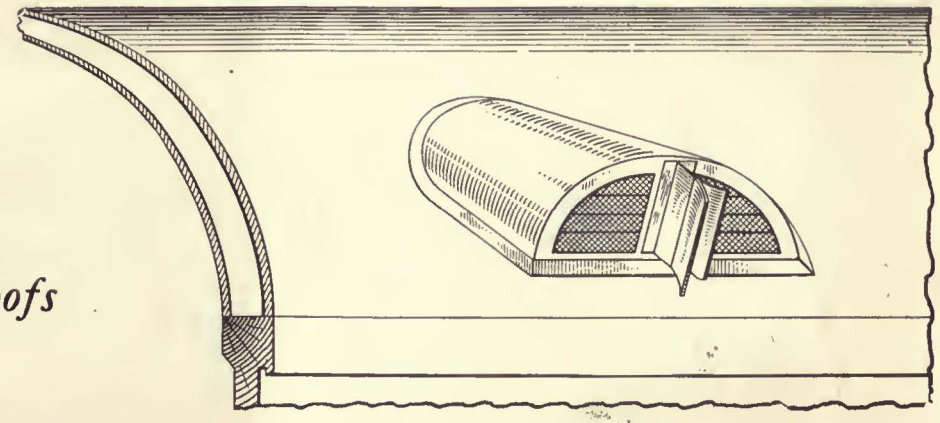

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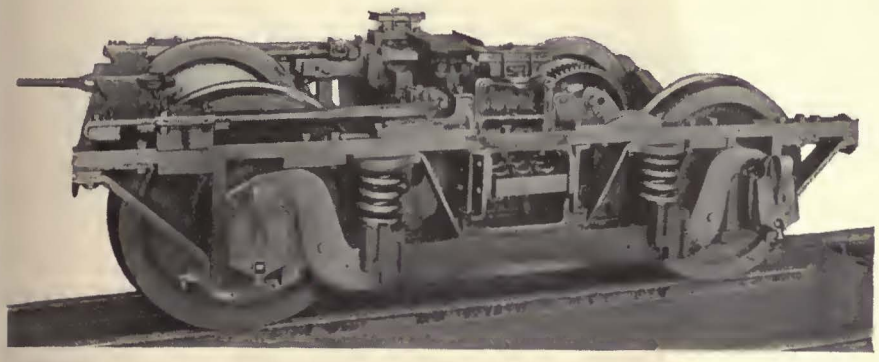

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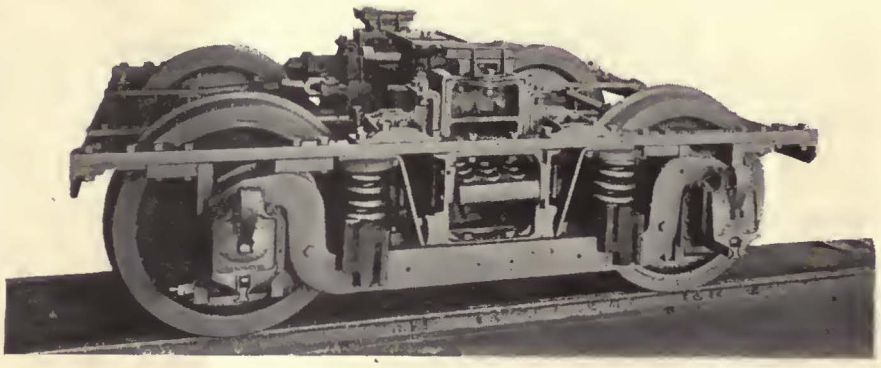

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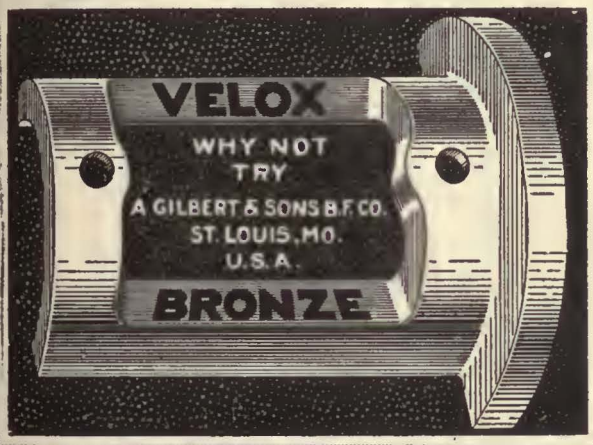

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Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axles, Bus
Timken-Detroit Axle Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The
Barges, Steel
Amer. Bridge Co.
Batteries, Dry
Nichols-Lintern Co.
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
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Baldwin Locomotive Wks.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
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Consolidated Car Heating Co.
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Railway Track-work Co.
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Boilers
Babcock & Wilcox Co., The
Bond Testers
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Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
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Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
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Ohio Brass Co.
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Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
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Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
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American Bridge Co.
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General Electric Co.
Jeandron, W. J.
Le Carbone Co.
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Ingersoll-Rand Co.
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American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
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(See Wires and Cables)
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Irvington Varnish & Ins. Co.
Carbon Brushes
(See Brushes, Carbon)
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Car Panel Safety Switches
Consolidated Car Heating Co.
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Differential Steel Car Co., Inc.
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Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
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Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Works
Perley A.
Wason Mfg. Co.
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Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
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Wharton, Jr., & Co., Inc., Wm.
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Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.
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Helmets, Welding
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Railway Track-work Co.
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Ingersoll-Rand Co.
Hose, Bridge
Ohio Brass Co.
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Allis-Chalmers Mfg. Co.
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Nichols-Lintern Co.
Oskel Equipment Co.
Inspecting Engineers and Chemists
Pittsburgh Testing Laboratory
Instruments, Measuring, Testing and Recording
Economy Elec. Devices Co.
Electric Service Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
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Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co.
Insulating Machinery
Amer. Ins. Machinery Co.
Insulating Silk
Irvington Varnish & Ins. Co.
Insulation (See also Paints)
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse Elec. & M. Co.
Insulators (See also Line Material)
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Insulator Pins
Electric Service Sup. Co.
Hubbard & Co.
Insulators, High Voltage
Lapp Insulator Co., Inc.
Insulation, Slot
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
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Insurance
Travellers Insurance Co.
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Brill Co., The J. G.
Junction Boxes
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General Electric Co.
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Westinghouse Tr. Br. Co.
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International Creosoting & Construction Co.
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Ingersoll-Rand Co.
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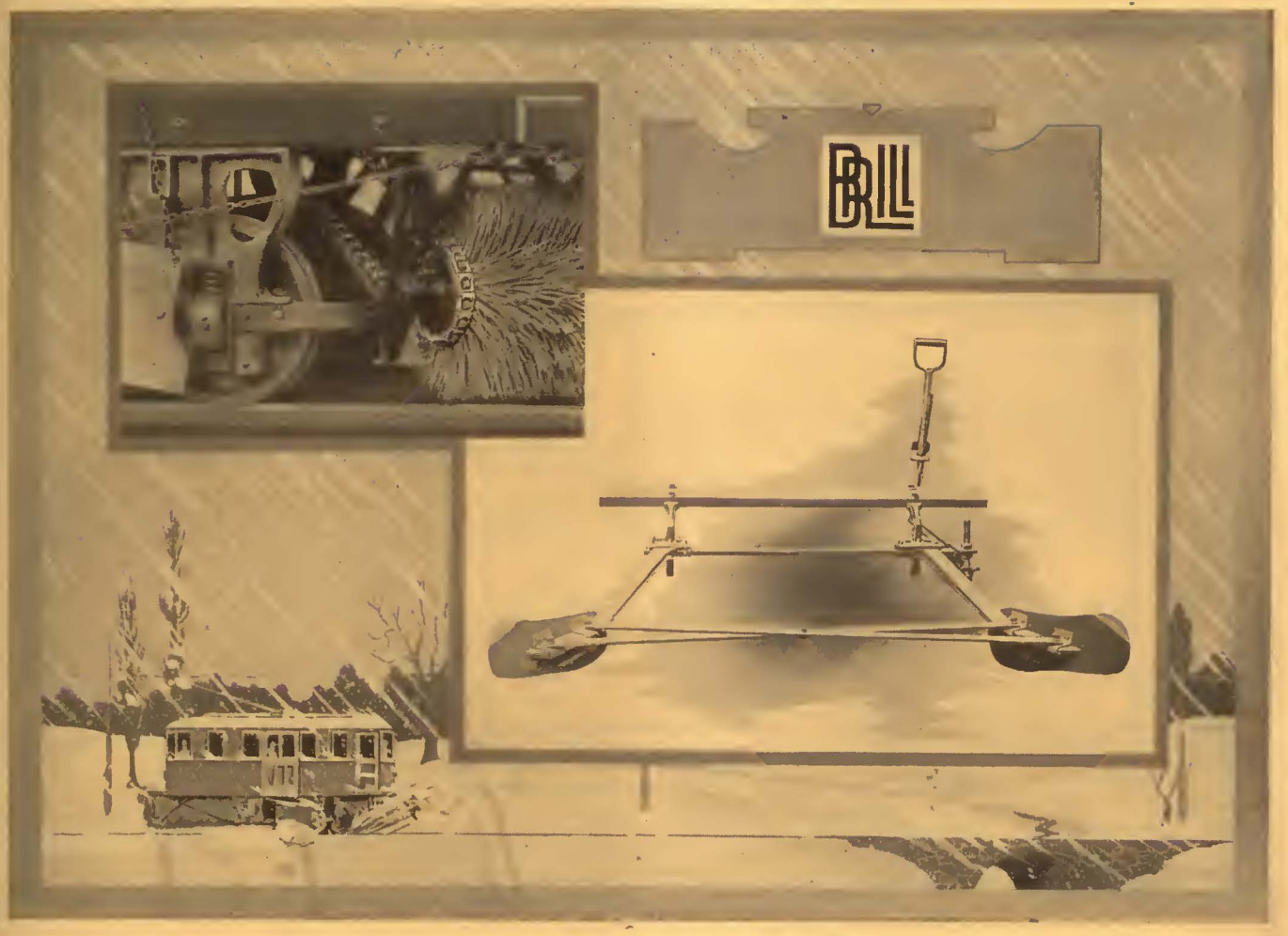

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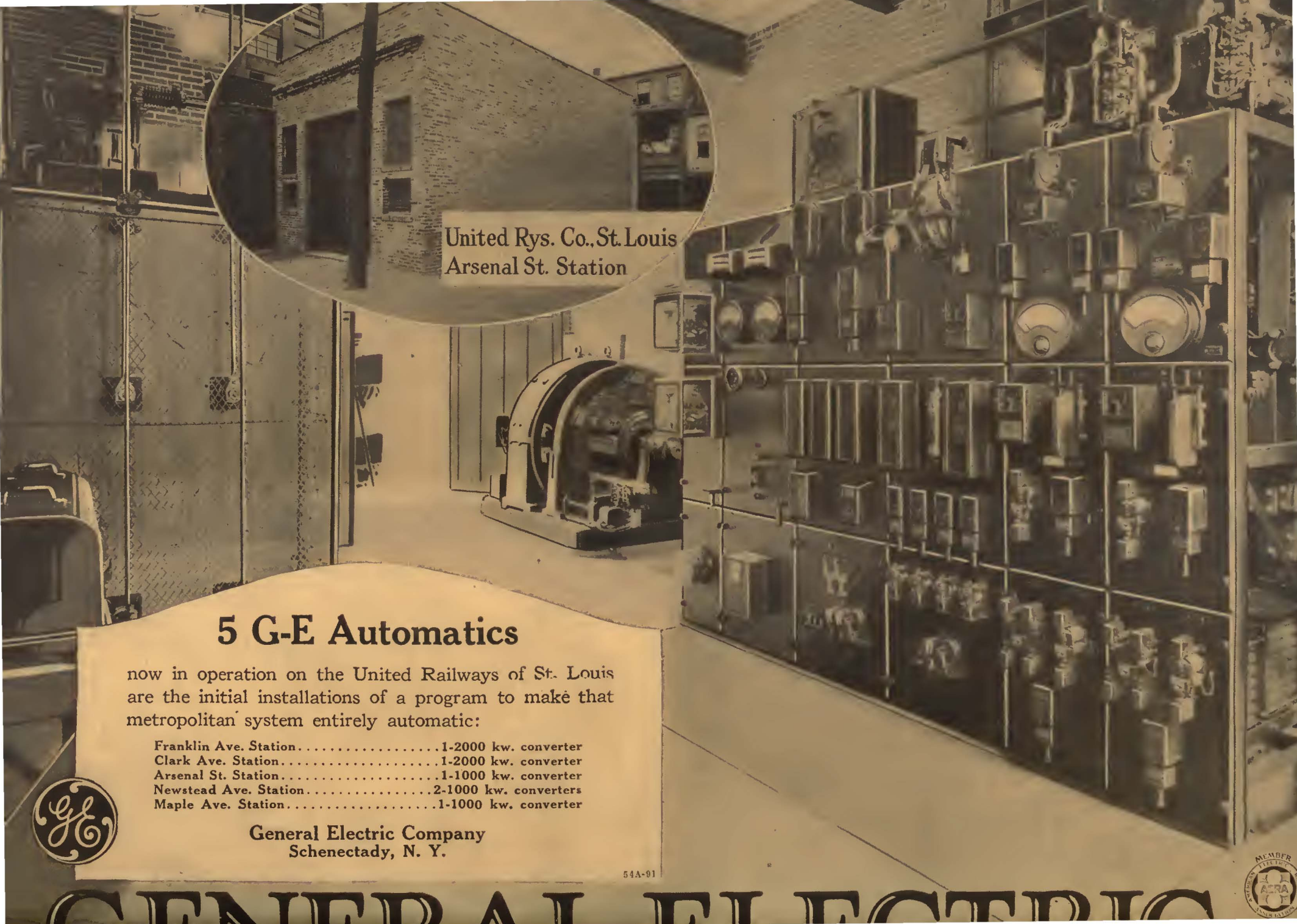

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