

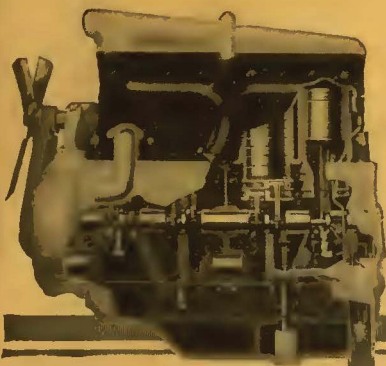
ELECTRIC RAILWAY JOURNAL



REPUBLIC KNIGHT-MOTORED BUS

Knight Sleeve-Valve Motor

ITS POWER actually increases with use. It has no valves to grind. It has no springs to weaken. It is simple in construction, quiet in operation, and rarely needs repair. It has no equal in operating economy.



The Republic Knight-Motored Bus provides profitable supplementary or feeder service to existing railway lines.

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“Operating Conclusion”



“Joe,” said the Vice-President, “the development and improvements in car construction and electrical equipment during the past few years have focused the trend of thought definitely throughout the country upon a light car weighing about 27 to 28 thousand pounds equipped with multiple-unit control for train operation in city service. We should prepare for the return of prosperity, which is well on its way, by replacing our older cars with this new type arranged for train operation during heavy traffic, and single car operation during non-rush periods.”

“That’s the idea, Boss,” replied Joe. “Remarkable savings may be obtained from the use of these new cars and our maintenance expense will be greatly reduced by retiring our old obsolete motors, trucks and control from service.”

“There’s no doubt about it, Joe,” said the Vice-President. “Many companies have found that they have been throwing money away in upkeep without nearly meeting their transportation requirements. These cars are to be as near perfect as it is possible to make them. Therefore, we shall want Westinghouse HL control on each car. Either their No. 508, 25-hp. or their No. 510-A, 35-hp. motors will be large enough for the service.”

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Sales Offices in All Large American Cities



& Manufacturing Co.

East Pittsburgh, Pa.

Westinghouse

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors

HENRY H. NORRIS, Managing Editor

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McGraw-Hill Co., Inc., Tenth Ave. at 36th St., New York
 Cable Address: "Machinist, N. Y."

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 (Published in San Francisco)
Electrical Review and Industrial Engineer
 (Published in Chicago)
American Machinist—European Edition
 (Published in London)

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, the Philippines, Porto Rico, Canal Zone, Cuba, Honduras, Nicaragua, Dominican Republic, Salvador, Peru, Colombia, Bolivia and Shanghai, China. Extra foreign postage in other countries \$3 (total \$7, or 27 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid, to any part of the world, 20 cents.

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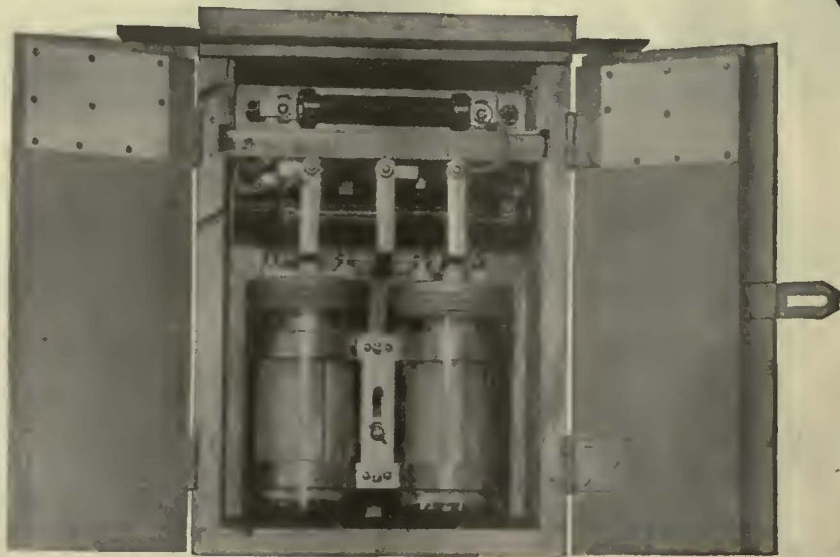
It is because "Electric Railway Journal" conveys knowledge and understanding of methods, equipment, materials and supplies that its advertising pages are used regularly by the principal manufacturers in the electric railway field to help economize selling cost. They know from long experience that these pages help to establish acquaintance and to build faith. The resulting economy enables the advertisers to keep the price down while keeping the quality up.

There is economy in buying advertised products and services just as there is in selling them.

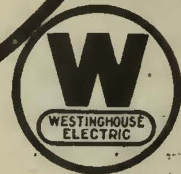
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Type AR



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For Railway and Power Circuits, or
For Car and Station Service, indoor
and outdoor mounting, 0-3600 Volts.



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"H" Emergency Valve

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for jobs.

And good bonds are ready,
too—ready to be put to work
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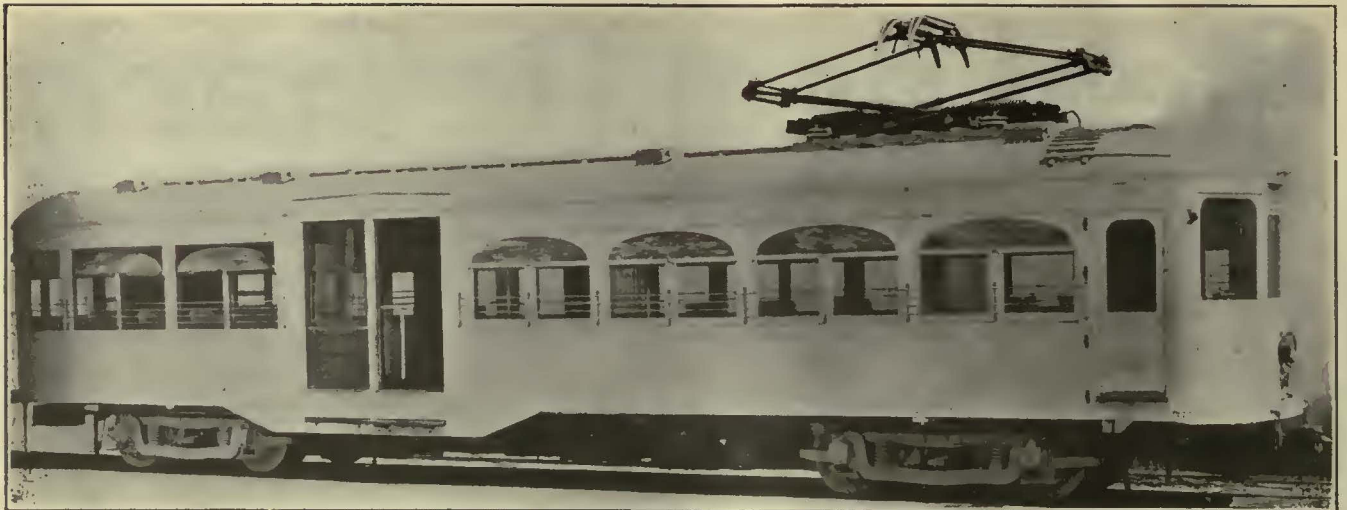
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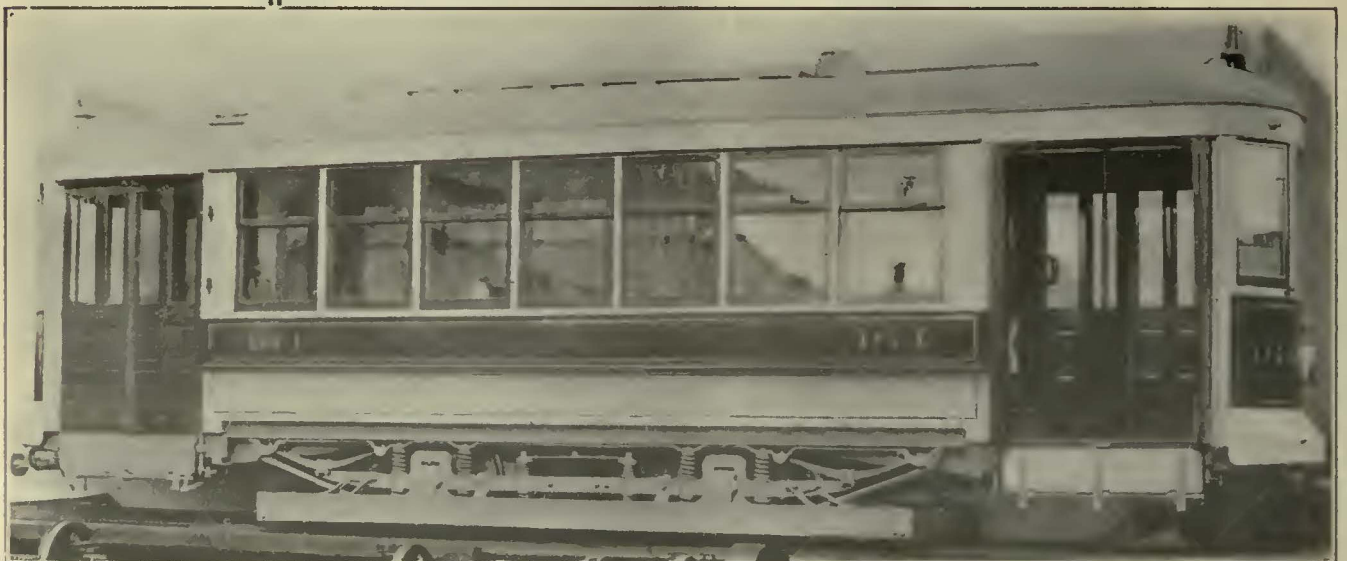
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for car curtains and upholstery

to Frozen Finland

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Chicago New York San Francisco

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- Standard Trolley Harps
- Standard Trolley Wheels
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Anything that keeps your riders good natured and content to ride in your cars is a good investment at any price. For this and the reason of their quality Keystone Car Specialties are builders of Good Will and Economical operation.

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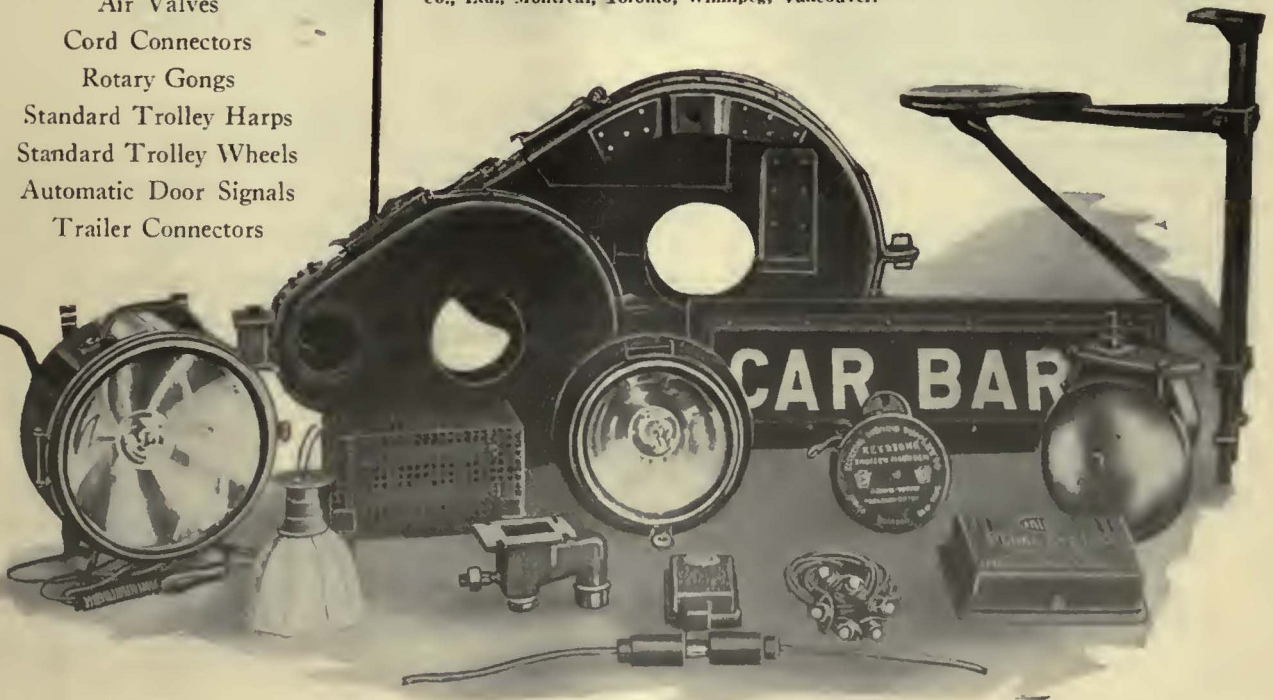
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 No. 14 — “NATIONAL”
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National Pneumatic push-button control placed at car ends permits guard to control *two* cars at once; and there are outside buttons for station guards, too.

Finally, pilot lamps tell both motorman and guards that the doors are closed *right*.

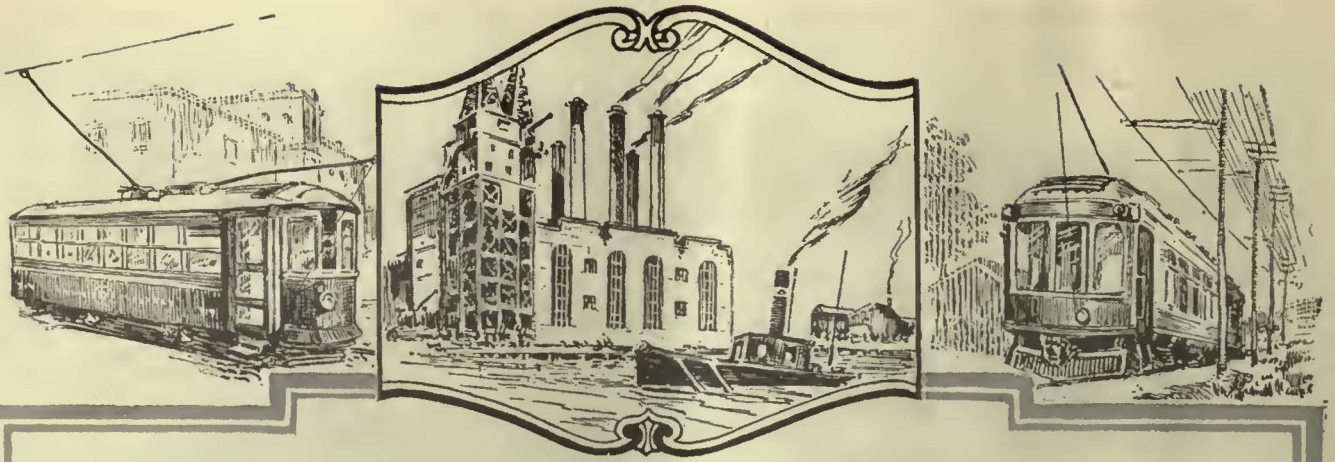
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As you might know, when you buy Texaco Lubricants you get Texaco Service.

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This chart is kept up and studied at Lubrication Headquarters. And that study enables us to help you in a very concrete way.

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The Texaco Lubrication Performance Chart System is like a lighthouse to give warning in time.

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We only give you the benefit of our experience on roads in all parts of the country.

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Standard Helical Gears



Special Drop Forged Blanks

give pinions with a comparable longitudinal and transverse strength.



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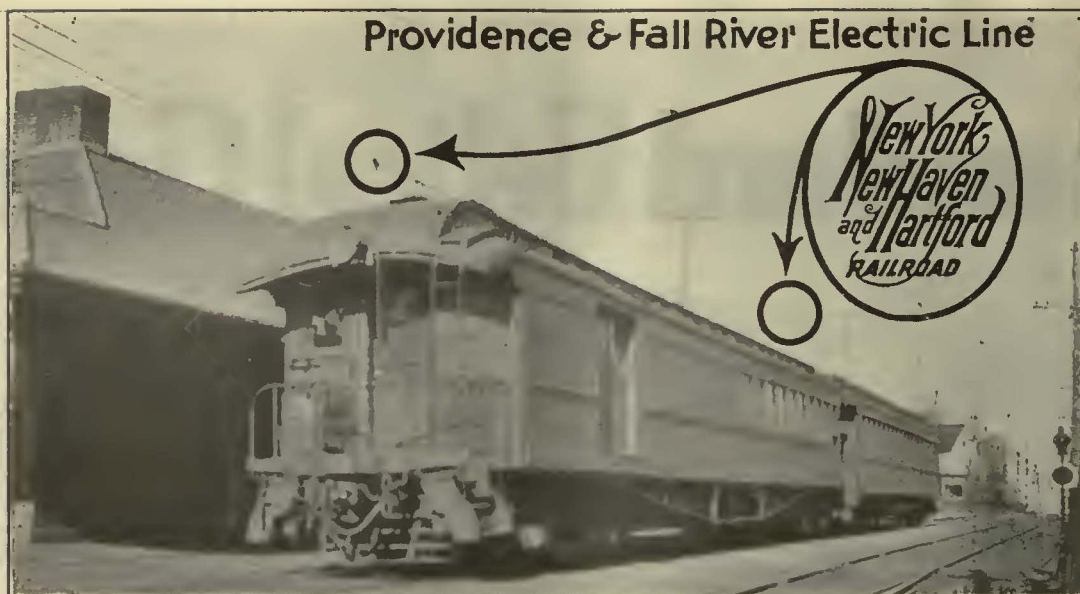
"The results obtained with Helical Gears have been satisfactory to the Company, and our patrons have frequently commented on the noiseless operation of the cars. Taken as a whole, I consider our Helical Gear Equipments exceptionally satisfactory for the service."

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PITTSBURGH  PENNSYLVANIA

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It Meets Every Requirement for Increased Efficiency

*Runs without overheating.
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Maintenance labor reduced over one-half.
Requires no lubrication—no new bushings.
It is a first-class sleet cutter.
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Our engineers prescribe the right oil for the right place and the kind exactly adapted to climatic conditions.

Electric railways under Galena Lubrication have no fear of the lubrication troubles often associated with extremes in weather conditions. It is a part of the responsibility of Galena Service to prevent them and we have yet to hear the first report of its failure.

*"When Galena Service Goes In
Lubrication Troubles Go Out!"*



Galena-Signal Oil Company

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and offices in principal cities



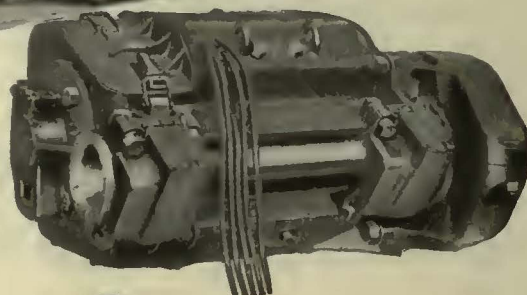
Today interurban electric lines, properly equipped, can successfully compete with steam railroads



Dixie Flyer

THE Interstate Public Service Company has recently equipped its lines with the most modern high speed cars, designed to provide maximum passenger comfort and to make the run between Indianapolis and Louisville with a material saving in time over the fast steam trains.

General Electric substations, G-E-254 motors and PC-12 control are contributing to the success and reliability of this service.



G-E 254 Motor



Master Controller



Motor Controller with cover off

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Volume 59

New York, Saturday, March 11, 1922

Number 10

"A Bond in Every Home"

MRS. FUNK, with her "Bond in Every Home" slogan, which she suggested at Indianapolis last week, has certainly hit pretty close to the mark in her answer to the public relations question. And she told how to do it too—sell to the women, the great sentiment makers of the country.

It was a happy arrangement of speakers at the mid-year dinner. Mr. Ainey, the commissioner, placed the responsibility for public utility operation on management, unhampered but advised by commissions, and pointed out that it was principally through the human factor that problems were solved; Mr. Insull, the owner and manager, placed his full reliance on good "public relations," and Mrs. Funk told how the fundamental desire of both could be obtained through the women.

Women, she said, are interested in the things of local interest—electric railway service, electric light and telephone service. This is, then, the great opportunity for electric railway men. This is particularly true just now as women are taking their place as voters and as women are more and more investing their own money and having a voice in the family's investments.

It was interesting to note the general nodding of heads and other indications of approval among the railway men at the dinner as Mrs. Funk drove these points home. Women are not to be neglected; in fact, if the women can be satisfied, electric railways will have solved "public relations."

Will this idea be capitalized? "A Bond in Every Home"—the women can help put them there!

Some Real Progress on the Overhead Crossing Specifications

THAT was a remarkable gathering of representative engineers which was held in New York City on March 2, under the auspices of the American Engineering Standards Committee, to consider the revision of existing overhead crossing specifications. And the result of the conference was even more remarkable, for a unanimous agreement was reached to co-operate in making such a revision.

Why was this a remarkable result? It was so because the particular subject under consideration was one regarding which there have been widely diverging views. The controversy has been going on for a dozen years. This was possibly the first time that so immediate and complete an agreement has been reached in a technical conference on so vital a subject.

Now, why all this hubbub in the matter of crossings of power lines over other things? Simply this: "The people whose property was to be crossed have wanted the overhead construction to be made ultra-safe. Those who were to do the crossing wanted to do the work cheaply. These points of view are necessarily conflicting; if allowed to control, they inevitably lead to deadlock. This is a consummation known in mathematics as *reductio ad absurdum*. But crossing must

be made, and all that is needed is a reasonable factor of safety. The New York conference shows that a definition of "reasonable" is due to be reached soon.

The American Engineering Standards Committee provides a forum for the discussion of matters of this sort. It furnishes auspices under which conflicting interests can get together without sacrificing dignity. The result in this case augurs well for future co-operation.

Once Again "No Confiscation"

NO MATTER in what manner or on what point of law a case is brought before the Supreme Court in which a question of confiscation of private property, whether devoted to public use or not, must be determined, the court seems always to uphold the sacred principle of non-confiscation without due process of law. The latest example is the "80-cent gas case," the Consolidated Gas Company of New York being the particular company and the legal question being the constitutionality of the New York State law fixing the price of gas at 80 cents per 1,000 cu.ft.

In affirming the decision of the lower court the Supreme Court spoke in no uncertain terms; in fact, it spoke with much stronger language than is its wont.

While the details of the case are of interest, the one thing of importance to other branches of the public utility business is that this merely adds one more bit of evidence, one more piece of assurance, with reference to the legal and moral power to resist confiscation at the hands of uninformed or unprincipled public officials. A continued maintenance of this policy, which seems fully assured, is of course in the very best interests of service to the public. It is only with a feeling of such security that public utility operators can do anything worth while in developing the stability of their properties and in maintaining a satisfactory service.

Turning the Tables in Paving

IT IS not hard to prove to anybody and everybody that the indirect paving tax is a monstrous, obsolete injustice, but it is quite as impossible to get any one to bell the paving cat as it was to bell the original cat after the mice conclave of the famous fable. On the other hand, there is usually frank admission by automobile interests that the paving wear caused by rubber-tired vehicles is not fully compensated by taxation.

Is there no way of belling the paving cat other than stepping up to him frontwise? Yes, there seem to be several ways of sidling up to this terror-striking creature, and the weapon is the motor bus itself! Not long ago, as reported in these columns, a community confronted by the substitution of shuttle bus for direct railway service came to the sudden conclusion that it would rather see the rails renewed than taken away forever—so much rather, indeed, that it waived the paving charge then and there.

Now comes another story. An engineer was addressing a group of the city's most influential men on the modernizing of the local transportation system. He dwelt upon the necessity of more cars for the better routes and of motor bus substitution for cars on the thinner but worn-out rail routes. At the close of the meeting one of the members stepped forward to say privately to the speaker that inasmuch as the city had appropriated but a limited amount for new paving it would be desirable to have advance information as to the exact route of the proposed bus services. Arrangement would then be made to spend the paving funds where they would be of most good to the new transit system! This was real co-operation, for no matter how the municipality might feel toward the elimination of the street railway paving tax, it had no power to amend what is practically a state contract. On the other hand, the fact that the local company was going to operate motor buses gives the city the opportunity to show its good will in a most substantial way, since good paving is the first essential toward economical and attractive motor-bus operation. But the moral? Two strings to a bow are better than one.

Better Materials and Better Methods Are Needed in the Shop

A WALK through the repair shop of an average railway gives an impression of inefficiency in spite of the small number of hard-working men present and the excellent shop system in force. There are apparently too many worn axles and wheels, too many broken or cracked pinions and gears, too many burned field coils or armatures. The railway operator has devoted long hours to his task in trying to keep going without any money, and the worker is liable to feel that he is working under some great handicap in regard to the materials furnished. One sometimes wonders if the manufacturer of railway materials has also been forced by economic conditions to curtail the research and study necessary to bring about desirable improvements in quality.

At quite frequent intervals in the columns of this paper articles on manufacturers' tests and inspection of railway material have been printed. In these an attempt has been made to demonstrate the great care that is exercised by them to insure the maintenance of a high standard of quality. The manufacturer is just as vitally interested in having his materials give good service as is the operator. He realizes that one of the essentials of sound business is to give satisfactory service, and this can only be accomplished if the highest grade of material enters into his product. To offset this fact, at the present time, without doubt, materials are subjected to more severe conditions than ordinarily. In fact the severity of electric railway operating conditions is continually increasing. The present conditions of heavy overload and deferred equipment and track maintenance add one more element of stress to the equipment parts.

There is one point that should not be lost sight of, however, namely, that the scrap heap is an excellent place to study weaknesses of material, and the equipment of electric railways at the present time is certainly in a condition to afford valuable data. The battle-scarred motors, axles, pinions, gears and truck frames will afford suggestions for improving the situation.

Every economy counts and if a better grade of steel, a better lubricant or method of lubrication, a better method for installing and maintaining gearing can be

developed by the manufacturer in co-operation with the railway shops, then every encouragement should be given to research work of this character.

Real Reasons for Being Optimistic

PRESIDENT TODD is optimistic on the outlook for the future. Some there are who will say: "Well, he ought to appear to be even if he really isn't." But he is, and he has real reason to be. In so far as the so-called exigencies of the occasion would permit, Mr. Todd quoted a few statistics at the meeting at Indianapolis to prove that his attitude is properly taken. He looked at a cross-section of the industry for his enthusiasm. Along with most other companies Mr. Todd's own company has suffered in recent years. But he has not allowed that fact to dim his appreciation of the general change for the better that is taking place. The process of recovery for the industry is slow, but it is sure. The latest available association statistics prove it. Necessarily, these are some months old, but the facts they brought out are being substantiated in the annual reports for 1921, now being published. Individual managers here and there may have wished for better results, but the figures are distinctly encouraging.

Both Boston companies have turned in accounts for the year that show remarkable results. In Philadelphia Mr. Mitten hopes to go back to paying dividends after having earned \$1,807,292 net in 1921. In Pittsburgh the receivers showed an increase in net of \$1,073,046. In Columbus arrangements are being made to liquidate back dividends on preferred stocks by increasing that issue and returning to regular payments. In Louisville the showing is distinctly encouraging, although it may not be all that Mr. Barnes could have desired. In San Francisco the reorganized Market Street Railway has been placed on a dividend-paying basis. These are a few instances taken at random. In many places plans are being made to care for the deferred maintenance of the war-time period. Thus in Brooklyn \$1,000,000 is to be spent in 1922 on track alone. In Boston the Elevated is planning to spend \$4,000,000 the coming year.

It was a gruelling experience that the electric railways endured during the war time, but reviewed in the light of the frightful record of industrial companies all over the country during 1920 and 1921, the public utilities have certainly proved their claim to stability.

Concrete Evidence of a More Healthy Financial Condition

SIXTY-ONE of sixty-two electric railway companies in the Middle West which have purchased supplies from a certain manufacturer since Jan. 1 have paid cash within ten days of delivery and obtained the 2 per cent discount thereby. In addition to the indications mentioned above that the electric railways generally were getting on their feet, this nearly 100 per cent record of companies discounting their bills is indeed encouraging evidence of a healthy state of finances. It means that there is a widening margin between revenue and operating expenses, thus providing some surplus with which to work and making it possible to take advantage of such economies as the cash payment discounts. This concrete evidence of a general financial improvement of the industry is most reassuring to both railways and the manufacturers whose welfare is dependent on that of the railways.

Nashville Traffic Survey Completed

City, State and Railway Join in Making a Comprehensive Study of the Vehicular and Passenger Traffic—
 Ross W. Harris Employed to Make the Report—He Used Methods Similar
 to Those Followed by Him in Memphis Survey

WHY is it that so many traction line managers do not seem to appreciate the value and importance of a highly developed schedule organization and close regulation of service? In Nashville the city, the state commission and the Nashville Railway & Light Company have recently co-operated in a survey of traffic on the railway, with the idea of better car routing to handle this traffic with a minimum of expense and delay. Some drastic rules will have to be made affecting the parking of automobiles in the business districts so as to enable the trolley car schedules to be materially increased. This survey was conducted by Ross W. Harris, consulting engineer, Madison, Wis. It is in two parts. In the first the objects sought and the recommendations made are outlined. The second part gives the results of the observations upon which the recommendations are based.

The report has been submitted to the city and the commission, but as yet no final action has been taken to accept the report as a guide nor to put the recommendations into practice. The methods suggested are similar to those which Mr. Harris recommended in his report on the Memphis situation and which have been adopted and put in effect by the receivers of the company, the city of Memphis and the state commission.

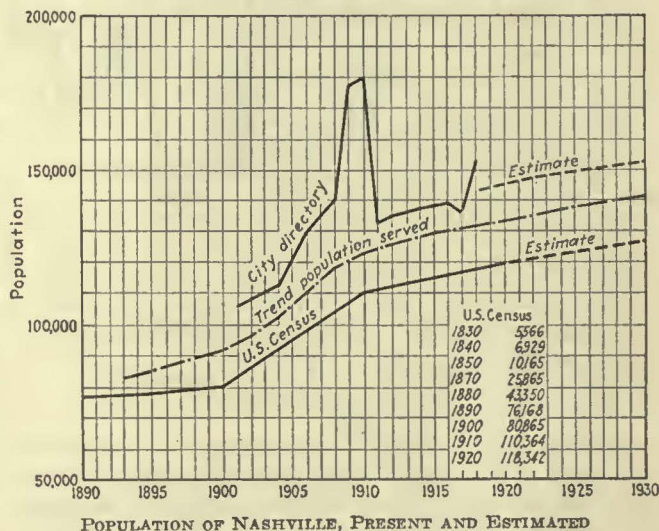
An abstract of the Nashville report follows:

INTRODUCTORY

The primary purpose of a street railway system is to transport passengers to and from their places of employment. It is to this business that the street railway must look for its most substantial form of revenue. In addition to the habitual car riders, there are certain passengers who demand railway service when the weather is good and others when it is bad. Still others are transient and have no resident connection to the territory served. Other elements of service might be termed "indirect." Under this heading come those elements that have a bearing on the social, industrial and commercial welfare of the city. The laboring

The automobile has been developed to a remarkable degree during recent years and some have said that it would greatly impair the usefulness of the street railway. This theory has not been supported by experience, for, concurrent with the increase in the number of automobiles, street railways have expanded, and there is substantial evidence of their continued development. The street railway of today is more firmly imbedded in the life of the community than ever before.

Early in the history of street railways in Nashville the longest possible ride for a single fare was slightly



more than 1.5 miles. Now it is slightly more than 14 miles. Thus with the increasing demand for urban transportation the increase in facilities for rendering service has been a substantial aid to the development of the city in a social, industrial and commercial way.

Street railway service is rendered in large units and thus serves transportation demands with greater ease and less congestion than can the automobile. Even if automobiles were economically possible, the capacity of the streets would be insufficient to accommodate the myriads of small units necessary to serve many thousands of passengers who demand service collectively in short periods of time. No method has ever been suggested and proved practical that is cheaper than trolley car operation.

The problem of transportation is not merely one for the street railway company alone. It should claim the serious attention and constructive co-operation of the public, car rider, operator and investor so that its future may be assured to the benefit of the community.

RESULTS SOUGHT

As a result of a six months study of traffic conditions in Nashville, recommendations are made in order that the following results may be obtained: (a) General improvement of street car service; (b) relief of congestion in the downtown district; (c) greater reliability of street car service; (d) increase of schedule speed of cars; (e) improvement of efficiency in the use of cars

TABLE 1—SHOWING PER CENT OF TOTAL AREA, POPULATION AND TRAFFIC CONTRIBUTED

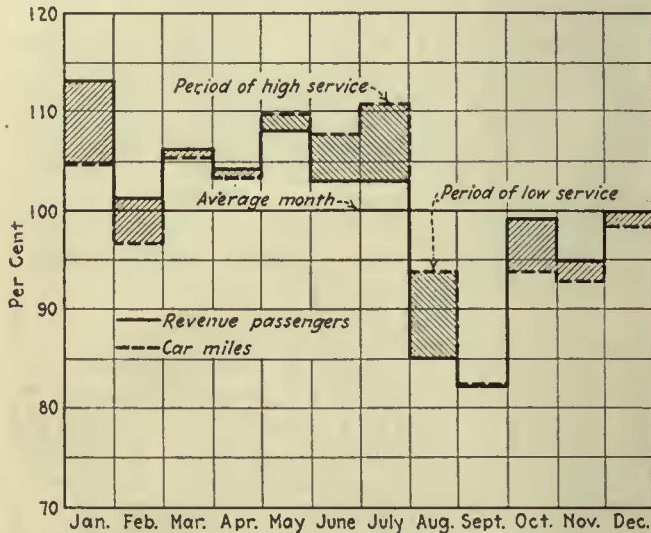
Zone Number	By Half Mile Concentric Zones Centering at Public Square		
	Per Cent Total Area	Per Cent Total City Population	Per Cent Total Traffic Contributed
1	4.29	4.99	46.92
2	12.85	19.53	11.00
3	19.79	30.85	11.32
4	23.43	24.18	11.67
5	16.70	10.48	7.06
6	11.33	4.14	3.61
7	5.37	2.11	2.61
8	3.36	2.03	3.24
9	2.28	1.18	0.77
10	0.60	0.51	1.39
11	.....	.....	0.05
12	.....	.....	0.02
Outside 12th.	.....	.....	0.34
Total	100.00	100.00	100.00

people constitute the regular riders, and to them the street railway is a convenience and a necessity. These people constitute the backbone of the community and their convenience comes first when the question of service is considered.

and a distribution more nearly in proportion to the volume and direction of traffic and its time of occurrence; (f) freer movement of traffic and better use of the carrying capacity of downtown streets; (g) further development of the central business district.

RECOMMENDATIONS

As a guide for distributing service, periodic checks of traffic on each route should be made during rush hours each week, not including Saturday, and at least once a month on Saturdays and Sundays by a permanent force of trained inspectors. From this



TRAFFIC AND CAR-MILES COMPARED WITH MONTHLY AVERAGE FOR YEAR

information there should be determined for each route, just prior to the beginning of each month, an equitable daily line standard that is seasoned with good judgment and policy and predicated on an equitable relation between fare, rate of cost, volume of business, physical conditions along each route and the immediate future business outlook. These standards should be a guide for determining the total car mileage to be operated for each route.

Every effort should be made to establish a system of flexible schedules that can be readily changed on short notice. Such schedules should be limited on one side by the readiness-to-serve element of service and on the other by an equitable relation of the elements of car service. The daily car mileage over that required for readiness-to-serve service should be distributed proportionately to traffic as to its volume, length of ride and time of riding. This traffic may be indicated by that observed at points of maximum loading in excess of that accommodated by cars in readiness-to-serve service.

Ordinances forbidding parking of automobiles on certain downtown streets should be passed immediately. Limitation of the time of parking is alone not sufficient owing to the increasing number of cars. The downtown parking privilege is an extravagant use of valuable roadway to the great disadvantage of moving vehicles, for which purpose street capacity is primarily intended. Left-hand turns should also be prohibited in the downtown districts.

The coupling up of lines which now enter the downtown district from opposite directions and have similar traffic characteristics into single through lines is not

only desirable from the standpoint of service and economical operation but is necessary to avoid congestion that would result from looping all cars in the business district.

Many cars are now operated to the ends of the lines, while the average ride of the passengers is much shorter. This results in many vacant seat-miles and many standing passenger-miles.

The characteristics of street railway travel are such that seat-miles are always in excess of passenger-miles. Nevertheless the proper distribution of service will reduce this ratio to a minimum, consistent with reasonable, adequate and efficient service. The situation therefore justifies the turning back of cars, after readiness-to-serve service is taken care of and whenever physically possible, before they reach the terminal of many of the present routes.

In a small city a central transfer station is advantageous, but the station in Nashville today offers facilities which are inadequate for the traveling public. In other words, the city has outgrown the transfer station.

If the service-at-cost plan is instituted, it is implied that the public is entitled to all the service that a given fare will pay for. That is to say, the patrons of any line are entitled to all the service their patronage will pay for, considering the operating cost and the relation that their line bears to all other lines.

Any change in the present system of routing will make necessary changes in the operating routine followed by the company. Such adjustments are far reaching and can be brought about only by a gradual process. It is advisable that a system of rerouting be put into effect at the earliest practical date that will relieve the present excessive congestion and improve service without materially changing the relation of the system to the present business district.

Report on Traffic Conditions

LAYOUT OF CITY

The city of Nashville has a population of 118,342, residing in an area of 18.44 sq. miles. In addition, several thousand people live just outside the present city limits. The topography is irregular, there being many steep grades, ravines and streams. Many of these grades are in the downtown district where the congestion is greatest. Their presence emphasizes the necessity of safe operation.

The city centers approximately at the Court House and service must be rendered in four directions. The population is very dense in the immediate downtown section. The manufacturing district as well as the residential sections are widely distributed. The streets are narrow at points where the flow of traffic is greatest, and this offers a serious problem that must be solved. Otherwise it will remain a decided handicap to the future development of the city.

The population statistics are shown in the accompanying diagram. The trend of population for the next ten years has also been projected. This estimate is equivalent to an annual increase of 0.56 per cent each year for the next ten years. If the city should be divided up by concentric half-mile zones centering at the public square, 31 per cent of the population will be found in the third zone, or that between the mile and the 1½-mile circle. Ninety per cent of the population lives within 2½ miles of the center of the city. The population density for the whole city is 6,415. The most densely

populated zone is No. 3, which has an area of 3.65 sq. miles and a population density of 10,000. The extent to which these zones contributed to the riding is shown in Table I.

Due to the many influences that have a bearing on the development of riding habit, such as the area of the city, the distribution of population, the relative location of the car rider from his point of employment, the quality of service rendered, the rate of fare, etc., it is very difficult to draw a comparison of the riding habit of one city with that of another, for the reason that the controlling factors are not effective alike in any two cities. There is a prevailing tendency, however, for the riding habit to increase as a city grows. This is evident from an analysis of the statistics for the past seventeen years. In 1903 the rides per capita in Nashville were 139, and in 1920 they were 255. It is estimated that in 1930 the figure will be 332.

VEHICULAR TRAFFIC—PARKING

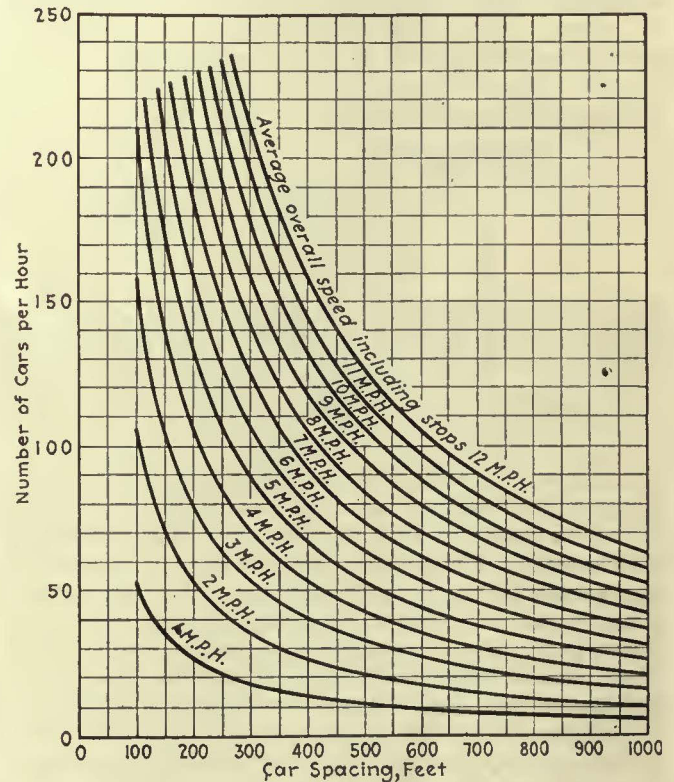
A survey was made of automobiles parked on the streets in the downtown district between 2 p.m. and 5 p.m. on April 15, 1921. At 2 p.m. there were 1,668 parked vehicles, 36 per cent of which were on streets having car lines, and at 5 p.m. there were 1,372 parked vehicles, 40 per cent of which were on streets having car lines. If each automobile complied with the one-hour parking law there were 1,725 automobiles during this time entering or leaving parking spaces on streets with tracks, and twice that number (3,450) of chances of delays to vehicles and cars in these three hours.

Stop-watch observations indicate that about twenty-five seconds are required for an automobile to enter or leave its parking space. Applying this to the aggregate number of vehicles, it would require 1,438 minutes, or twenty-four hours, during the three-hour period to park these automobiles.

In cases where street cars had actually to stop or slow down on account of automobiles entering or leaving parking places the observed average duration of a street car stop was ten seconds, and an average loss of six seconds when a car was required to slow down. The total loss of time when a car comes to a full stop, including that due to drifting and accelerating under such conditions, is twenty seconds.

With these figures as a basis it is estimated that the delay on account of cars having to stop when passing

begin to move with greater frequency, and it is during this period that street car traffic is greatest. Thus the ill effects of parking become more serious. If the parking of automobiles was not permitted, particularly on streets having car lines, much more space would be available for moving vehicles and this would aid the free movement of the street cars. This would also result



THEORETICAL TRACK CAPACITY, ONE TRACK IN ONE DIRECTION PER HOUR

in improvement of the reliability of the street car service, increase in the speed of cars and greater economy in the cost of operating, thus making better service possible.

CARRYING CAPACITY OF STREETS

A survey of the amount of street space available for moving vehicles on the downtown streets was made, with the idea that the railway strip should be entirely reserved for railway passengers. On 31-ft. streets, measured between the curbs, even with single tracks, it was found that when there was automobile parking the space remaining for vehicular traffic was not sufficient to permit cars to pass moving vehicles. The same was true of a 40-ft. street with double tracks.

With the elimination entirely of parking on such streets, the capacity would naturally be greatly increased, and if figured on the basis of one vehicle per foot width of roadway per minute, it would be many times what was actually observed.

An analysis of Table II will indicate that with parking prohibited the normal capacity of the street is far from being used, even with the track space reserved for the exclusive use of street cars. It follows that not only does the parking privilege deprive the moving vehicles of a large share of the use of the street but it also necessitates the use by automobiles of the space which should be given over to the car rider, particularly during rush hours. Further, the parking privilege, as it now prevails, seriously inconveniences the public at

TABLE II—SHOWING TRAFFIC CONDITIONS IN DOWNTOWN SECTIONS

	Width of Street Curb to Curb (Feet)	Width of Car Zone (Feet)	Total Width Outside of Car Zone (Feet)	Normal Vehicular Street Capacity (15 Min. Period)	Parking Allowed	No Parking	Observed Vehicles, Max. 15 Min. Period
Third Avenue...	31.5	8.2 (S.T.)	23.3	0	349	126	
Fourth Avenue...	31.5	8.2 (S.T.)	23.3	0	349	103	
Church Street...	33.2	17.8 (D.T.)	15.4	0	115	107	
Eighth Avenue...	40.0	17.8 (D.T.)	22.2	0	166	94	
Broadway.....	80.0	19.4 (D.T.)	60.6	357	454	188	
Deaderick.....	55.2	18.3 (D.T.)	36.9	179	276	74	

through the downtown district on Church Street, Fourth and Third Avenues from 2 to 7 p.m. daily amounts to one hour and twenty-four minutes. Similar analysis shows that on account of cars having to slow down due to interruption they lose two hours and six minutes. This estimate does not include delay to street cars that is caused by the reduction of street area caused by parked automobiles.

During the evening rush hour the parked machines

large by reducing the amount of carrying capacity available for the use of all street traffic. It must be apparent therefore that privileges accorded the parked automobile are a serious handicap to serving the public requirements properly and cause an inefficient use of valuable street capacity.

There is but one conclusion to be drawn from this analysis, and this is that there is need of more capacity for moving street traffic. Two major plans are available: The first involves street widening, thereby giving

certain streets be reserved principally for the use of street cars and others be used by the faster moving vehicles.

STANDARDS OF SERVICE

In a general sense, street railway service can be said to have two purposes. First, to transport passengers, and, second, to aid in the development of a community. There are also two ways of fixing the standard of service. The choice between these two depends on the answer to the question: Shall service be determined by the existing fare, or shall the fare be made adequate to meet the cost of the service demanded by the public?

Any service standard that does not take into consideration the constantly shifting relation between revenues and cost of service falls short of the purpose for which it is intended. In the past it has been quite common to attempt to establish a standard based upon an average load or number of seats per hundred passengers applied over a given period of time. These methods, however, have not proved successful for the reason that they are not conducive to efficient operation, neither do they guarantee an equitable relation between service, fare and cost.

A standard of service that is based upon the rate of fare, revenue, riding habit, cost of service and distribution of traffic demand in such a way as to maintain an equitable relation between revenues and cost should be developed somewhat as follows: Make an estimate of future revenue for several months, preferably a year, and from this deduct first an amount to maintain the integrity of money invested; that is, a sum sufficient to cover returns, renewals and replacements, maintenance and a small marginal profit and loss. The balance, after an amount is deducted to cover taxes, comprises all the money available for service.

BASING MILEAGE ON MONEY AVAILABLE

The next step is to determine the aggregate mileage that this amount of money will pay for at the prevailing rate of cost, then distribute it to the various months according to seasonal conditions and requirements. The amount of aggregate service thus allocated to the months may next be allotted to each of the various

TABLE III—COST OF SERVICE AND EXCESS SERVICE, 1920

	Per Cent of Average Month							
	Revenue Passenger	Service	Service Excess Over Revenue Passengers	Car Miles Average Month	Excess Mileage	Operating Expense Exclusive of Taxes, Cents per Car-Mile	Cost of Excess Service	
May.....	108.10	109.99	1.89	461,524	8,723	31.2339	\$2,725	
June.....	103.04	107.69	4.65	461,524	21,461	32.8584	7,052	
July.....	103.02	110.73	7.71	461,524	35,584	32.8061	11,674	
August.....	85.09	93.99	8.90	461,524	41,076	38.0215	15,618	
Total.....					106,844		\$37,069	

These 106,844 miles if run in 1920, say July, would cost 32.8061 cents each, or a total of \$35,037.

more space, but such a plan would involve an enormous expense and require extensive readjustments of the downtown district. For this reason its practicability is questionable. The second plan is to obtain additional street capacity by a more efficient use of the present street capacity. This can be accomplished in one of three ways. The car tracks may be removed entirely from certain streets. Second, automobile traffic may be removed entirely. Third, a combined restricted use of the streets by both automobiles and street car traffic can be brought about. This last plan will least inconvenience the public. The regulations regarding parking should be revised, and automobile traffic should be diverted from street car arteries by opening new routes and improving street paving on those streets. Rerouting street cars will also help.

Cases have been noted where one automobile with one passenger has delayed three cars. Many cases have been noted where three or four automobiles have delayed ten or fifteen cars. The average automobile during the rush hours has two passengers, and a small number of people in automobiles can delay a large number riding on street cars. It is thus clear that, taken as a whole, automobile parking delays the movement of many thousands of people daily, and thus increases the cost of rendering street car service, which in turn argues for a higher rate of fare. These delays are most noticeable during rush hours when the maximum number of passengers are inconvenienced.

On Eighth Avenue between Church and Commerce Streets observation on April 21, 1921, showed that out of a total of 906 vehicles but 14 per cent were commercial cars and wagons, all the remainder being pleasure vehicles.

Cars are bulky and require a lot of space. They make frequent stops and at times are slow moving, whereas the automobile is a fast-moving conveyance, not large in size, and cannot render its best service and move freely without danger among the slow-moving street cars. This is especially true in narrow streets, and under such conditions the cars, moving slowly, limit the rapid transit possibilities of the automobile. In turn the car rider is inconvenienced by the great number of automobiles. Hence it is most desirable that

TABLE IV—TOTAL SEATING CAPACITY OF CARS IN VARIOUS CITIES

	Date	Amount	Density Population per Square Mile	Area Served, Square Miles	Total Seating Capacity Per 1,000 Population	Revenue Per 1,000 Passengers
Nashville...	1921	134,000	7,267*	18.44	52.8209†	0.207‡
Memphis...	1920	185,000	7,520*	24.6	55.946†	0.217‡
Minneapolis	1907	276,000	5,208	53.00	60.935	0.249
Detroit.....	1906	367,000	10,295	35.65	71.531	0.267
Milwaukee...	1904	307,000	13,644	22.50	37.817	0.211
Columbus...	1911	187,674	9,268	20.25	70.116	0.240
Indianapolis	1906	206,000	7,043	29.25	56.898	0.232
Toledo.....	1914	184,126	6,461	28.50	64.505	0.266
Kansas City	1904	239,000	9,192	26.00	75.372	0.269
St. Paul....	1907	204,000	3,676	55.50	35.382	0.169

* Includes trend population outside city limits. Density city only 6,602 in Memphis and 6,415 in Nashville.
† Closed equipment only.
‡ 1919 revenue passengers in Memphis and 1920 in Nashville.

routes, and this in turn distributed to weekdays, Saturdays and Sundays, according to the conditions and requirements of each route.

Having thus distributed the service, a line standard can be formulated in the form of earnings per car mile for each route for each month of the year on a weekday, Saturday and Sunday basis. By such procedure all the underlying factors relating to fare, cost, traffic demand, etc., are centralized in the unit "earnings per car-mile." Then, reports of earnings and service for each of the

routes furnish a basis for determining the current earnings of any line, and by a simple division of this amount by the unit "earnings per car-mile" the largest amount of mileage that should be operated on a given date will be indicated.

With the amount of mileage fixed for each line on a given day thus determined, the next problem is to distribute it along the line and throughout the day. This is a matter of schedule design. To do this deduct from the daily mileage justified by earnings the mileage

sibility of changing rates of cost of service, makes it advisable that the line standards be determined prior to the beginning of the month for which they are intended. Such a procedure, it is believed, will distribute service equitably and give to the public all the service a given fare will permit, and to the company assurance that the integrity of its investment will be protected, all of which lends itself to furthering the development of the community.

Whatever service will result from such a procedure must be such as to encourage riding and meet a test by the public as to whether it is satisfactory. Should such service be demonstrated to discourage riding and be unsatisfactory to the public, the rate of fare must be raised immediately a sufficient amount to permit service at cost that will meet requirements.

TABLE V—MINIMUM TIME SPACING

	Church Street, All Points, Seconds	Church Street Between 4th and 5th, Seconds	Church Street Between 5th and 6th, Seconds	Church Street Between 7th and 8th, Seconds
1. On account of car ahead: service stop..	25.000	25.000	25.000	25.000
2. On account of car behind: safety requirements:				
a. Personal element of motorman (decision to act).....	3.000	3.000	3.000	3.000
b. Retardation (half time required for).....	1.810	1.035	1.165	1.915
c. Acceleration (half time required for).....	1.810	1.035	1.165	1.915
d. Time required to run 5 ft. at initial speed.....	0.629	1.099	0.977	0.593
Total minimum time spacing.....	32.249	31.169	31.307	32.423
Use—Seconds.....	32	31	31	32
Distance spacing—feet (initial speed x seconds).....	173	96	108	184
Initial speed, m.p.h.....	5.42	3.10	3.50	5.75
Initial speed, feet per second.....	7.95	4.55	5.13	8.43
Rate of acceleration and retardation m.p.h. per second.....	1.50	1.50	1.50	1.50
Seconds to accelerate or stop car.....	3.62	2.07	2.33	3.83

required on each route to maintain the "readiness-to-serve" element of service, and the balance may then be distributed along the line in a manner somewhat proportional to the length of ride and the distribution of the number of passengers passing the point of maximum loading over and above the number of seats scheduled to pass the point of maximum loading in the "readiness-to-serve" service.

The application of an equitable service standard, as outlined above, requires an efficient schedule department, the duties of which are to collect regularly and systematically observations of traffic requirements at the point of maximum loading and to design schedules in accordance with the standard of service. Difficulties that may accrue when schedules are changed may be overcome by the construction of fabricated schedules, built up in such a manner that each part, in effect, is a schedule complete in every detail but of such nature that each part may be changed without reference to any other part yet still gear in with all other parts forming the complete schedule.

ONLY THE METHOD OF FIXING A SERVICE STANDARD CAN BE PERMANENT

An equitable working standard of itself cannot be permanent for the reason that any one or more of the factors that govern it may and do vary in value and degree of effectiveness. The method of determining a service standard and distributing service, as outlined, requires constant supervision and adjustment on account of variation in the cost of service, changes in the price of materials and labor, the variation of traffic demand, etc. This means that each route will have a standard "earnings per car-mile" which may differ in amount from other routes for the reason that the traffic characteristics will vary the distribution of the available mileage. Likewise each month may have different requirements, and this, together with the pos-

LIMIT OF LOADS

Subject to the limitation of service the loads carried past the maximum loading point over a twenty-minute period should not exceed regularly the normal capacity of the car, i.e., the seating capacity plus one standing passenger for each 3 sq.ft. of standing area. Further, no regularly occurring maximum load should exceed the emergency capacity of the car, which is the seating capacity plus one passenger for each 2 sq.ft. of available standing area.

When two or more types of cars are operated on the same route the capacity of all types involved should govern the average load, but in the case of regularly occurring maximum loads the emergency capacity of the type of car involved should govern.

Recent changes in the economic conditions of the country have been far reaching and have brought about marked decreases in the purchasing power of the dollar and increase in the cost of labor and material. In many lines of industry increases in the prices of commodity have kept pace with the general trend of economic conditions. This is not true in the street railway industry, where materials and wages have increased by large margins without corresponding increases in the rate of fare.

The car rider usually rides at least once every day. This brings to his attention, through his pocketbook, any real or fancied grievances against the transportation system. The car rider has been inclined to view with disfavor any fare increase. In fact, rather than permit an increase he has been content with a lower standard of service. The standard of service now acceptable would not have been satisfactory before the recent change in economic conditions. Thus, the standards of today must be such as will harmonize with a public conception of service much different from that which existed a few years ago.

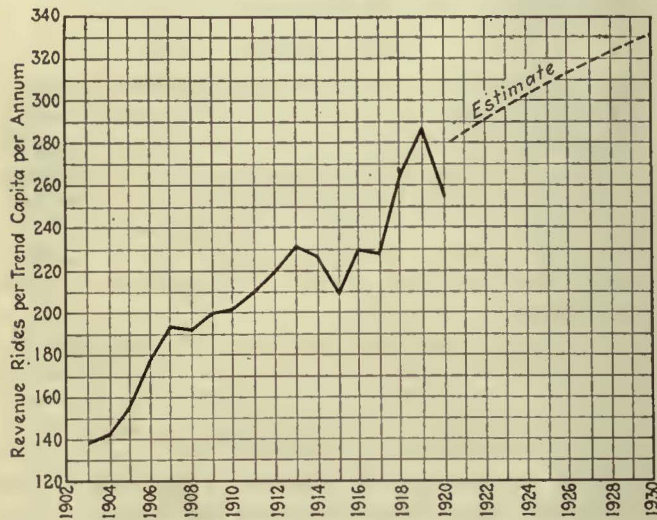
CONTROL OF SERVICE

The demand for service is not at all constant. Variations frequently occur without warning, sometimes by long swings, and frequently by peaks. Superimposed on the increase due to increase of population there may occur seasonal, industrial, weekly or even daily fluctuations. The cost of service must be counter-balanced by revenue originating from traffic demand, as a matter of equity, and outside of the mileage required for the "readiness-to-serve" element of service.

Any lag in putting into effect reduced service after a decline of traffic is a needless expense, and similarly any lag in properly increasing service with an increased

demand is to withhold from the public justifiable service. Much money may be needlessly expended if service does not closely follow the demand for it in an equitable relation. Reference may be made to the diagram on page 396 that illustrates the relative variations of traffic and service on a comparable basis where each month is expressed in a percentage corresponding to the average month for the year under consideration.

To all practical purposes the percentage of service should follow that of traffic, as this is most conducive of equity. With this in mind, the exact service operated and estimated expenses incurred are shown for 1920 in Table III. In all probability the variation of mileage involved in this table is due to short-hour cars. A car that operates twenty hours per day may cost \$2 per



RIDING HABIT IN NASHVILLE, PAST AND ESTIMATED

car per hour, while one that operates but two hours per day will cost a great deal more, possibly as much as \$8 per car hour. Without making a careful analysis of the service cost for short and long-hour car operation it has been taken as reasonable that a car-mile of a short-hour car will cost three times as much as the cost of the average car-mile for the entire system.

CHARACTERISTICS OF TRAFFIC NECESSITATES
SHORT-ROUTING OF CARS

Seldom will a car be loaded to its full capacity through an entire trip. Few passengers ride from one end of a route to the other, and one seat will often accommodate more than one passenger, on a complete trip. Analysis has shown that each route from the center of the city to the outlying districts in Nashville has three distinct zones, a central, a transmission or neutral, and an outer zone. The central zone is located in the business district. The neutral zone, which is just beyond the central zone, contributes less revenue than the other zones, as fewer passengers board the cars there, but in this zone there are usually more passengers riding than seats. It is in this zone that the cars experience their greatest instantaneous load. The outer zone, which is beyond the neutral zone, lies chiefly in the residential district, and here are found the greatest number of vacant seats. The rate at which passengers leave and board the cars depends on the local characteristics of each route, but in any event the load on a car making an outbound trip decreases soon after the neutral zone is left to such an extent that seats become vacant. On a percentage basis, the outer zone fur-

nishes 91.22 per cent of the traffic, the neutral zone 6.42 per cent and the central zone but 2.36 per cent.

An analysis of the data relating to standing passengers and vacant seats shows that there are 5,920 standing passenger-miles, found largely in the neutral zone, and 19,340 vacant seat-miles, chiefly in the outlying zones. In other words, there are 3.27 vacant seat-miles for each standing passenger-mile. A similar survey in the city of Minneapolis in 1912, at a time when the service was considered good, indicated 2.44 vacant seat-miles for each standing passenger-mile. If a comparison is made with these figures, Nashville operates 34 per cent more vacant seat-miles for each standing passenger than Minneapolis, where short-routing of cars is used extensively. In a similar survey made in Memphis, where short-routing was not extensively used and where at the time of the survey service was not considered good, there were 3.57 vacant seat-miles for each standing passenger-mile. In Memphis short-routing of cars will be used more extensively in the future with service distributed more nearly in accordance with "when, where and to the extent" of traffic demand, thus resulting in less vacant seat-miles and better service.

It has been found that the distance that each passenger will ride approximates one-half of the average distance that each car travels when making a one-way trip. The average length of ride in Nashville was determined by observation of all day traffic to be 1.91 miles. A passenger who transferred was considered as having one ride on each line used.

The seating capacity of cars ranges from thirty-two to fifty and averages thirty-nine seats. Excluding open cars that average forty-two seats the average is thirty-eight seats per car.

A series of counts has been made of passengers standing in different sections of the car while in service, and the amount of standing area has been accurately determined by measurements. It has been found that passengers will arrange themselves when standing as follows:

Place	Observed Average Standing Area
Front vestibule, one passenger for each.....	4.17 sq.ft.
Front aisle, one passenger for each.....	4.19 sq.ft.
Center aisle, one passenger for each.....	3.17 sq.ft.
Rear aisle, one passenger for each.....	3.50 sq.ft.
Rear vestibule, one passenger for each.....	4.11 sq.ft.
Car as a whole, one passenger for each.....	3.66 sq.ft.

Guided by these figures, which represent the general run of conditions, 3.5 sq.ft. per passenger has been adopted for use in computing the normal standing capacity of cars. It can be said, therefore, that the closed cars will accommodate on the average twenty-five standing passengers, which is 65 per cent of their average seating capacity. In emergencies, however, standing passengers will voluntarily arrange themselves to occupy much less space. The results of an observation as to the minimum standing space required for passengers is given in the following table:

Place	Observed Minimum Standing Area
Front vestibule, one passenger to each.....	1.02 sq.ft.
Front aisle, one passenger to each.....	1.28 sq.ft.
Center aisle, one passenger to each.....	1.24 sq.ft.
Rear aisle, one passenger to each.....	1.13 sq.ft.
Rear vestibule, one passenger to each.....	1.05 sq.ft.
Car as a whole, one passenger to each.....	1.62 sq.ft.

On the basis of these results the emergency capacity for standing passengers is computed on the basis of 2 sq.ft. per passenger. Table IV gives a comparison

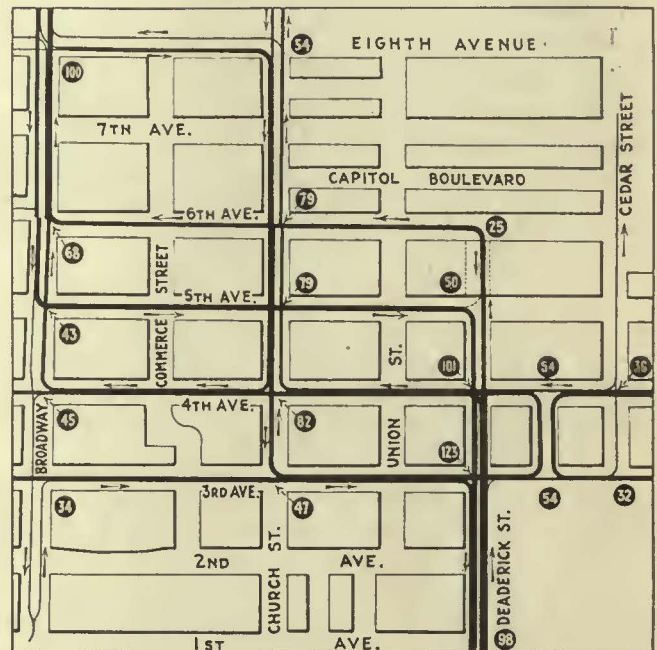
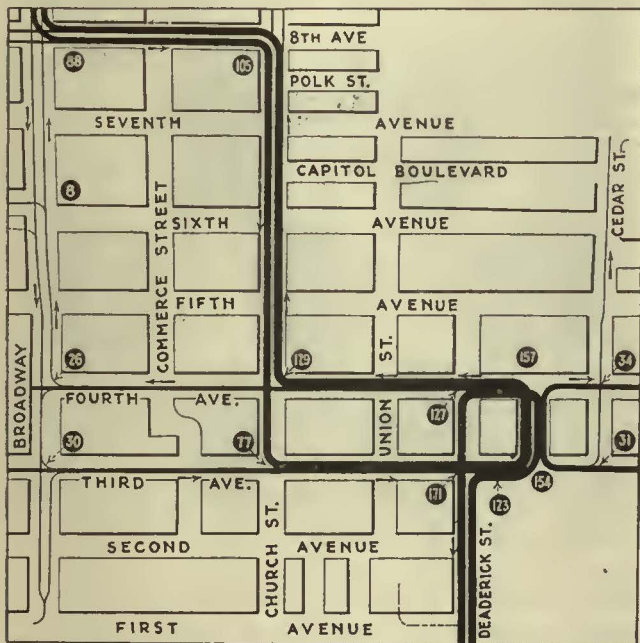
of the total seating capacity available for Nashville with that of other cities. This indicates that Nashville has proportionately the same amount of equipment capacity, but it does not follow that Nashville has too little or too much capacity, for the local standard of service is the controlling factor.

TRACK CAPACITY

The capacity of track is measured by the number of cars that can be moved over it in one direction during a specified time. This number will depend largely upon local conditions. Under ordinary rush-hour traffic conditions good service and economic operations demand the greatest number of cars per hour be such that any

this basis free movement of cars implies that the time spacing between them should not be less than the average length of service stop, plus the time required for the next following car to make a full safety stop of short duration, from initial speed. If there is less time spacing than this, speed, free movement, service reliability or track capacity, or any two or more of them, may be sacrificed, thereby increasing the cost of service and reducing its quality.

On a basis that all cars in the downtown district make all regular stops, the minimum time-spacing between cars should not be less than the time required for the service stop, plus the time for the next following car to make a safety stop (which includes the time lost



MAPS OF DOWNTOWN SECTION IN NASHVILLE SHOWING FORMER AND PROPOSED ROUTING OF CARS

one car will not interfere with the free, safe and rapid movement of any other car.

Track capacity can be defined as follows:

1. Maximum track capacity is the greatest rate expressed in cars per hour at which cars may be operated over one track in one direction without any special consideration for speed, movement of cars or quality of service. If such conditions were to prevail for any considerable length of time good service could not be maintained.

2. Normal track capacity is the greatest rate in cars per hour at which cars may be operated, conducive of free movement, safe operation and reliable service. Under such average conditions good service is possible, although there would not be track capacity to care for much increase of traffic and continued good service.

3. Normal rerouting track capacity is that rate expressed in cars per hour adopted as a standard in questions involving the rerouting of cars, having in mind not only those factors involving good service but also the providing of sufficient track capacity over and above present requirements to provide for the accommodation of future increased service requirements.

If good service is to be maintained cars must move freely. Interference with the free movement of cars by vehicles and other cars must be avoided wherever possible. In Nashville in the downtown district all cars stop at regular points for receiving passengers, and on

while it is coming to a full stop and accelerates to initial speed), plus the time required for the car to run at initial speed, a distance equal to that required between cars when stopped, in service, on the main line track. Table V shows certain minimum spacings figured out on this basis.

SPEED OF CARS BETWEEN STOPS

The average speed between stops varies somewhat with direction, time of day and location. On Church Street during the evening rush hour the average out-bound speed was 4.92 m.p.h., the highest speed was 10.77 m.p.h., the slowest speed was 0.97 m.p.h. and the slowest half-hour average speed noticed for one direction was 3.1 m.p.h. Average half-hour speeds at these times range generally from 3.5 to less than 6 m.p.h., and seldom exceed 6 m.p.h., while in places it is close to 3.1 m.p.h. At such speed cars will be passing a given point in one direction at a rate of about sixty per hour. A comparison between Nashville and Memphis in this particular is of interest. Memphis has an average speed of over 10 m.p.h. with cars passing at the rate of 150 per hour. Complaint has been made that the service in Memphis is poor, but if this is so with this average speed and number of cars per hour, what should be said of the service in Nashville, where the speed is one-third and the car passage almost one-third that in Memphis.

In any consideration of the above it should be borne in mind that the speeds given are maximum speeds obtained between stops and not over-all speeds including stops, which are much less.

LENGTH OF SERVICE STOPS

During rush hours, that is from 5 to 5:30 p.m., the average stop is 18.27 seconds. Of the service stops observed 33 per cent were longer than twenty seconds, and the major portion of such observations were less than thirty-five seconds. However, an occasional stop was observed to be as long as forty seconds, but rarely sixty seconds. Eighty per cent of all service stops noted during rush hours did not require more than twenty-five seconds.

During non-rush conditions even a greater portion of stops observed required less than twenty-five seconds. Since rush hour conditions are the more severe, they must be given primary weight in the matter of track capacity, and, having in mind the factor of service reliability, twenty-five seconds is set as the proper duration of a service stop to be used in connection with the determination of normal track capacity.

NORMAL CAPACITY OF TRACK

At least 5 ft. of free space is considered advisable between cars when stopped and standing on a main line track, as in a blockade. This practice varies somewhat between companies, for some use only enough space to permit one pedestrian to pass between the cars while others allow considerably more.

Many factors influence the number of cars that may be operated on a given track in one direction. If the space on the tracks between consecutive cars is used by vehicles, then the extent to which the full theoretical track capacity may be utilized is materially affected. Hence, when arriving at a particular figure to be used as track capacity the question of practicability in its relation to influences other than those having their source with street cars must be considered.

On Church Street between Fourth and Fifth Avenues, if cars move freely, they might be spaced as close as 135 ft. apart and run at the observed average maximum rush-hour speed between stops of 3.1 m.p.h. However, cars were found to be spaced on an average of 230 ft. apart, or 95 ft. more than required as a minimum safe distance spacing. To this extent the theoretical track capacity at a speed of 3.1 m.p.h. is denied to the car rider, due largely, if not entirely, to vehicular traffic.

IMPROVED METHODS FOR REGULATING VEHICULAR TRAFFIC NECESSARY

The automobile today is practically the exclusive user of the street outside of the street car. The street car is confined to a certain part of the street, while the automobile is adaptable to more varying conditions. Street capacity, particularly on the narrow downtown streets in Nashville, where low speeds are noted, are used very extensively by parked automobiles, and because of the narrow streets the only space left for moving vehicles is on the street car track interspaced among the street cars. In such cases the street car must then proceed, limited in its movement, by conditions as to the vehicular traffic. The solution as to increased speed involves an adjustment of parking privileges and regulations as to the movement of vehicles. The good of the public, and particularly the interest of the car riders, demands an early adjustment of methods of regulating vehicular traffic.

Artistic Fare Tokens Command Premium

Besides Solving the Change Problem These Fare Tokens Are Much Sought After By Tourists and Collectors as Souvenirs

BY DIPL.-ING. K. SIEBER

Manager of the Nürnberg & Fürth Street Railway, Nürnberg, Germany

IN PROPORTION to the decline of the value of money in Germany during the last few years, an increasing want has been felt for small coins for change. First, the gold and silver coins disappeared; then, the copper and nickel coins went, too. Even the supply of iron coins which followed could not be maintained by the



GROUP OF FARE TOKENS IN NÜRNBERG. THE REVERSE SIDE BEARS THE NAME OF THE COMPANY AND THE WORDS "20 PFENNIG"

federal mints. Cities were then authorized to issue paper fractional currency for change. This helped some, but did not relieve the situation fully. The amount of the money thus issued, especially the metal money, was not sufficient, and much of it was retained by collectors, and found its way even beyond the boundaries of Germany. The paper currency, issued for small denominations, such as 10 and 25 pfennigs, proved inconvenient to handle. Moreover, it soon became damaged beyond use.

The street railway companies in Germany constantly urged their patrons to have the correct fare always ready, but the constant scarcity of change made it impossible for them to conform with this request. This reduced the fare receipts considerably, as the conductors could not make change in many cases. This trouble gave several street railway companies the idea that they might issue their own metal money, a plan which turned out quite well.

In Nürnberg, too, the lack of small coins for change was felt. At first the idea of a coin or token to represent "a fare" was considered, but it was rejected because of the large initial cost of coining such a token, and the fact that the frequency with which fares are apt to change made the life of any token rather short. In the spring of 1921 it was decided to reduce the cost of these coins by using their reverse side for advertising purposes. We had already orders for these "ads," but had to abandon the idea on account of the unstable financial conditions at that time.

In the meantime the lack of small change became more and more acute, and in April, 1921, it was decided

to issue octagonal aluminum coins of 20 pfennig denomination, on the reverse side of which would appear interesting views of Nüremberg and Fürth, such as of the memorial statues, fountains, busts of famous artists, etc. These coins were to be used as change and were given for such by the conductors upon presentation of a note of high denomination. The fares were then 60, 80 and 100 pfennigs for rides of respectively 3, 6 and more than 6 km. The coins were valid as currency only of course for street car travel. They were legal tenders to no one else, but we had the right to refuse a ride if the passenger could not present the exact legal fare.

At first the public accepted the new coins with interest but without enthusiasm. The coins came partly back to us, but their use became current also, against our intentions, in retail business transactions throughout the city, though some merchants refused to accept them in payment of goods or for change.

The first issue was 50,000 of each kind. Then the design on the reverse side was changed. Some of these coins turned out to be very attractive and popular in design, and this fact awakened the interest of collectors. Tourists, passing through Nüremberg, liked to take along a "set" of these coins as a souvenir, so that the demand for them increased at such a rate that the manufacturers of the coins, who were undergoing a metal shortage, could not keep up with the demand.

Soon a regular exchange value of these coins was established. It is said that some of them sold at a premium of 2,000 per cent or more. At some of the principal street corners, on racetracks and at other sporting places temporary exchanges were established for the purchase and exchange of the street railway emergency money. For every kind of coin a special value was established, according to the rarity of that



OPEN-AIR EXCHANGE FOR THE PURCHASE AND SALE OF RARE FARE TOKENS

particular coin. Newspapers published poems and short stories dealing with the emergency money, and witty songs were sung on the vaudeville stage to announce the issue of new pictures on coins.

Suddenly the street car conductor became the most popular man in town. Unfortunately, it took but a few minutes for him to be sold out. He was, of course, permitted only to sell the emergency money at par value.

Most of the conductors used the coins to secure for themselves a large amount of change money. They gave, for example, one mark in coins and nine marks in paper money in return for ten marks in change.

Various manufacturers became interested and made up and sold rapidly neat holders for this emergency money. Bracelets and other adornments were made out of the coins.

All told, forty-five different types of token were issued. What is of greatest importance, however, was that the number of travelers on the street railway increased considerably. Many a passenger took a ride on the street railway with the tacit hope of getting one of the rare emergency coins. Otherwise he would have walked. A further value of the tokens lies in the fact that they advertise Nüremberg. Its beauty is carried by them to all parts of the world. Not only were beautiful views of the city circulated in this way, but people were made familiar with the names of such famous men as Albrecht Dürer, Hans Sachs, Peter Vischer, Wenzel Jamnitzer, et al. As a last, and maybe not the least, advantage may be mentioned that in the minds of the populace was awakened an interest in their own country and their own famous past. The school board, in particular, reported that the pupils were greatly helped in learning about the history of the famous men of Nüremberg.

The demand for these coins is very large up to today, but it would be impracticable now to get out a new edition, as the cost of making such coins at the present time would be more than their face value.

Mercury-Arc Rectifier for Bern-Muri-Worb (Switzerland) Electric Railway

DUE to the large increase of traffic on the electric car line connecting Bern, Muri and Worb, Switzerland, it was necessary to enlarge the capacity of the feeding substation at Worb. This contained two 100-kva. motor-generator sets, transforming 15,000-volt, three-phase, 40-cycle current into 650-volt direct current for the road, and operating in parallel with a 330-cell, 259-amp.-hr. storage battery. The contemplated enlargement of this station would have called for an additional 200-kva. unit, and at the same time an increase of the direct-current voltage from 650 to 750. It was also intended to change over from 40 to 50 cycles. The new generator would have had to be wound so as readily to permit of these two changes.

After studying the different possible methods which might accomplish the above, the railway management decided to install one large mercury-arc rectifier, rated at 225 kw., at 750 volts direct current. The efficiency of a rectifier of this type, measured between the terminals of the 15,000-volt feeding transformer and the 750-volt direct-current busbars, is stated to be 94.5 per cent at full load, including the consumption of all auxiliary apparatus, and 93.7 per cent at one-quarter load. The rectifier will operate in parallel with the existing motor generators and the battery.

The installation cost of this rectifier will be higher than that of either a rotary converter or a motor-generator set, but the higher efficiency, the possibility of carrying large overloads, the short-circuit-proof performance, the dependable service and the small maintenance cost were deciding features in favor of the rectifier, which will be built by Brown, Boveri & Company of Zurich.

Necessary Physical and Mental Requirements of Platform Employees

How Compensation Acts and Need for Efficiency and Courtesy Are Forcing Electric Railway Companies to Take Steps to Eliminate Applicants Predisposed to Disability—How Far the Examination Should Be Carried Is Discussed and Work on Chicago Surface Lines Reflected

BY DR. JOHN LEEMING

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PHYSICAL and mental requirements of platform men is a subject that is prominently before us at the present time. Frequent reference is made to it in railway journals and so far as the general employment of labor is concerned medical and health journals are devoting much space to its consideration. Why is this so? Is the situation any different than it was one or two decades ago? Yes—in many ways it is. We are living in a progressive age; we are learning by past experience; we are appreciating more than ever before that efficiency depends largely upon sound mind and body.

One of the most important reasons which have drawn our attention to this subject is the experience we are having under operation of the workmen's compensation acts. Such laws have been enacted in different states in all sections of the country. A few years ago in certain states a street railway company could elect whether or not it would operate under the terms of the act, but if it elected against such operation, then its right to defend itself against damage suits for negligence, for injuries to its employees arising out of and in the course of their employment was limited by the act to the defense of no negligence alone. That is, the defenses known under common law procedure as the doctrine of (a) assumed risk, (b) fellow servant, and (c) contributory negligence were taken away from employers who rejected the act. But now and for the past few years, in many of our states, this privilege of election has been withheld and the business of operating street railways is designated as "extrahazardous." Under these acts it is no bar to recovery by the employee if his own negligence—no matter how gross—contributed to the occurrence of the accident, nor if the accident grew out of the carelessness or negligence of a fellow employee, or was due to a risk incidental to the work. The only question to be considered is: "Did the accidental injury sustained by the employee arise out of and in the course of his employment?" If so the employer is liable for compensation.

EMPLOYER SUPPOSED TO KNOW OF PRIOR TENDENCY TO DISABILITY

There is another feature of the compensation acts which accounts for the use of the word "necessary" in the title of this paper, that is, not merely the desirable requirements but the absolutely necessary physical and mental requirements for street car employees. Many men of suitable age, size and weight apply for service who are apparently sound but are found upon careful physical examination to be suffering from certain latent defects, certain tendencies or predispositions to disease which in themselves may not, at the time of the application, be positively disqualifying for the service but which, under the stress of a slight accident, "arising out of and in course of his employment," may be roused

up and result in a long period of disability—for all of which period of disability, both total and partial, the employer is liable for compensation under these new laws.

These compensation acts while varying somewhat in unimportant details were originally created with the intention of "promoting the general welfare of the employee," and it was recognized as a fundamental principle that compensation should be provided for injuries without regard to the fault or negligence of the employer or of the injured employee. Hence as a matter of self-protection the employer is virtually compelled to make certain that the employee is 100 per cent sound. This will work an increasing hardship on applicants who may have latent defects, perhaps unknown to them. Yet in my opinion such defects are of sufficient importance to cause the applicant's immediate rejection. Labor organizations and others have offered criticism of the strict enforcement of this rule, but such criticisms are well answered by a consideration of the statement of an arbitrator in a recent compensation case when he said in substance in awarding full compensation: "This man's prior trouble was no doubt aggravated by the accident in question and his prolonged disability may have been due to such aggravation. The employer either knew of the pre-existing condition when the man was hired or it was his business to have discovered it."

Out of the many cases coming under my observation of apparently healthy individuals who were suffering from latent defects or constitutional taints which have proved very expensive to the employer I will cite one as an example of what lack of adequate examination means.

Mr. ———, age thirty years, married, conductor. He sustained a very slight injury in trying to close the sliding door of his car, which for some unknown reason resisted his effort. His right hand slipped from the door handle and the back of the hand struck against the door jamb, slightly bruising it. The skin was not broken but some little swelling occurred, and after his day's run a doctor painted the hand with iodine and advised rest for a day or two until the swelling subsided. At the end of two weeks this conductor applied for compensation, claiming total disability, and presented a certificate of disability from a second doctor and friend and this doctor stated that the hand was greatly swollen, the tendons being involved, and that the outlook for permanent recovery was very remote. Request was made for examination by the company's doctor, which was granted, and six weeks after the occurrence of the accident, it was made. The hand was found to be very much swollen and entirely useless; the tendons controlling the movement of the fingers were imbedded in a gelatinous exudate which suggested either a tubercular or syphilitic constitution. A Wasserman test was made of the man's blood, which revealed the fact

that the subject was suffering from syphilis. A course of intensive treatment was instituted at the company's expense which covered a period of four months, at the end of which time the full function of the hand was completely restored.

If the bruise sustained in this case had occurred in a healthy man the disability would not have lasted more than a week at the maximum, but as he was employed with this undetected syphilitic taint, the insignificant accident localized the constitutional disease at the site of the bruise and the employer's oversight in employing a syphilitic was rectified at the expense of several hundred dollars in compensation and medical services.

In addition to syphilis and other chronic constitutional affections, I have encountered serious and costly effects from trivial injury in cases of heart trouble, lessening the power of recuperation after injury; high blood pressure, with apoplexy and paralysis resulting in permanent disability; hernia, made worse and even strangulated by an accidental lift or strain; localized focal infections in the teeth or tonsils, which favor the spread of the poison to slightly injured joints and muscles; varicose veins, which, because of a simple bump or abrasion acting as the exciting cause may bring on a varicose ulcer, practically incurable without operation; functional nervousness, when the shock and excitement attending an injury have proved to be very expensive in so-called traumatic neurasthenia and traumatic hysteria. From costly experience in such cases and many others that could be enumerated, it is shown to be entirely insufficient to reject only applicants for service who present positively disqualifying defects such as color blindness, impaired hearing, structural heart disease, pulmonary or bone tuberculosis, palpable deformity and organic diseases of the nervous system.

SOUND BODY BEGETS EFFICIENCY AND COURTEOUSNESS

Are there other reasons why physical and mental soundness are necessary in transportation service employees? Without question there are many. Our journals and the daily press are constantly pointing out the importance of efficiency, safety and courtesy. How can these qualities be expected in men who are not sound in mind and body? How can a man be expected to concentrate upon his daily work and be civil to patrons under trying circumstances if he is not in good health? The general public is vitally interested in this important matter. It has a right to assume that the operators of our cars are fully competent safely to discharge their duties, and when we accept their fares as passengers we enter into a contract with them to "exercise the highest degree of care reasonably consistent with the practical operation of the road."

The important and practical question arises: How carefully should men be selected and how thoroughly should they be examined? The recommendations of last year's A.E.R.A. committee on personnel and training of transportation employees answered these questions in part; but this year's committee has been asked to pursue still further the same work and also to study the question of psychological and intelligence tests. Last year's committee submitted a minimum requirement which included examination of the sight, hearing, lungs, heart and blood pressure and urinalysis. (See recommendation 4 of committee report).

It is my judgment, based upon experience as indicated above, that this minimum requirement is entirely inade-

quate. It is good as far as it goes but it does not go far enough. It does not take into consideration the question of family history, previous history of applicant as to injury and disease, nature of recovery from prior illness or injury, and a careful study of a possible tendency to recurrence. The same exhaustive inquiry should be made into all possible focal infections in the teeth, tonsils, nasal and accessory sinuses, appendix and gall bladder. A full investigation should be made on the subject of past venereal diseases and their possible after effects, and if the clinical findings remotely suggest a prior syphilis, a Wasserman test should be made. The nervous, circulatory and glandular systems should be minutely investigated for the purpose of detecting any constitutional taint which might lower the applicant's resistance to injury or interfere with normal recuperation and convalescence. In other words, a full, thorough and complete examination should be made—just as thorough as that required by the best old line life insurance companies.

APPLICANT MUST HAVE AVERAGE INTELLIGENCE

The committee on personnel last year gave to the important subject of intelligence examination the following brief reference: "In connection with the physical examination there should be sufficient general questioning by the physician to assure him that the applicant possesses average intelligence and mental ability." Having been honored by being chosen a member of that committee, it goes without saying that I have no desire or intention of offering any criticism of its work, but I do desire to point out that the subject is of such importance that it calls for more careful consideration and further investigation. In justification of this statement I would call attention to the fact that in the examination of men for army service our government used "intelligence tests" in nearly two million cases and the result of these tests furnished valuable information. It is a matter of statistics that out of two million men only 12 per cent of the men so examined were found to be of "superior intelligence"; approximately 66 per cent of the number were found to possess "average intelligence" and over 20 per cent were designated as of "inferior intelligence."

These results compel us to recognize the somewhat unpleasant fact that one in every five of our able-bodied men of suitable age for train service is of inferior mental endowment and is therefore not suitable for the work of handling our passengers and acting in the capacity of our representatives on the cars. The practical consideration which therefore presents itself is at least this: How can this one man in five be eliminated?

In approaching this subject it becomes necessary to inquire, as a preliminary step, what mental and temperamental qualities a competent and efficient motorman or conductor must have.

A conductor should have a good memory, be a close and careful observer, be able to make a correct statement of any unusual occurrence, be accurate in making change, be alert in giving signals and be able to grasp situations quickly.

A motorman should possess intelligence in regard to speed; a keen perception of measurement of distances, a ready response to signals and unusual situations suddenly presented; he should have good mental poise, not becoming easily rattled or excited, able to anticipate danger and act quickly in emergencies.

It is self-evident that we should have a standard,

that having a standard we should maintain it, not taking into our train service a single man who falls below it, and that this standard should be a high one and not any lower than the following:

A good trainman must be a man in the upper half of the 66 per cent class having average intelligence. He must have an alert and well balanced mind, capable of concentration and of forming prompt and sound judgments.

Men of such a standard and possessing these mental qualities are the type of men who are most likely to be courteous and civil, honest and prudent, steady and industrious, even tempered and amenable to discipline. These of course are essential qualities in the men we are seeking to employ.

MECHANICAL DEVICES FOR MENTAL TEST UNNECESSARY

Many mechanical devices have been contrived with the object of enabling the examiner to ascertain the intelligence status of an applicant, and they no doubt have their value. But they are cumbersome and too expensive for the majority of railway companies. When it is remembered that our purpose is to eliminate the one man in five who presents "inferior intelligence," and the lower one-half of the class of men having "average intelligence," it would seem that elaborate mechanical apparatus, electrical contrivances and stop watch accuracy would be unnecessary for a trained and skillful medical man. No criticism whatever is offered, however, if a large company finds value in installing complicated machinery such as that illustrated in the excellent article which appeared in the Jan. 28, 1921, issue of *ELECTRIC RAILWAY JOURNAL*. My only contention is that it is not necessary to have mechanical devices in order to be able to eliminate applicants of less than the standard degree of intelligence.

It should be borne in mind that before the applicant is sent to the medical department, he has been interviewed and passed upon favorably by the employment officer, his photograph taken, his references examined and the questions of his age, height, weight, general appearance and manner fully considered and that by this preliminary interview approximately 70 per cent of the applicants in Chicago are eliminated from further consideration. Following this weeding out process, the remaining 30 per cent are questioned closely by either the superintendent of transportation or the general manager, when another 15 per cent are rejected, leaving only 15 per cent to undergo the physical and mental examination by the medical man. During the past year on the Chicago Surface Lines, approximately 85 per cent of the original applicants for employment in the train service have been refused.

While the examining doctor is spending 30 minutes in making a physical examination, he will have considerable opportunity to size up his man; observe his powers of perception and concentration in replying to questions; consider the accuracy and readiness of his responses in making various movements as requested and of determining his general intelligence and power of judgment. In addition to these observations made by the examiner, it may be desirable to use some well devised intelligence tests. To this end, a list of such tests is now being prepared by the committee on personnel, which will be presented in the report of the committee next fall.

A sample question that will indicate the trend of thought which is being pursued is the following to be

stated to an applicant who applies for work as a motor-man: "If you were operating a car, and while it was standing, you saw a man on the track ahead of you, how would you start?" There are many possible answers to such a question, some of which might give evidence of an utter lack of comprehension, never considering the intervening distance in replying, while others might show good appreciation and understanding of the question, giving answers for different distances, evidencing thereby an intelligent response. A large number of questions or so-called intelligence tests of this character are being prepared for both motormen and conductors.

I believe the subject under consideration is one of great importance and should call for careful study and thought by all employers of labor. If the ideas suggested could be crystallized into a practical and workable plan that would be suitable for general adoption, there is no doubt that it would materially improve the personnel of our train service and result in the employment of a better class of men, both physically and mentally.

It is impossible to foretell the good which might result from such an achievement. Beneficial results would surely be reflected in the increased revenues of the operating companies because the trainmen with "sound minds in sound bodies" would be more courteous and more capable and thus win the good will of patrons. Also by their alertness and vigilance, accidents would be decreased, thus reducing a costly item of expense. And again because of this physical fitness they would be less liable to illness and much less apt to have long drawn out disability because of trivial accidents.

In the present labor market the supply of workmen exceeds the demand, and railway operators have an excellent opportunity to exercise careful discrimination in their choice of employees. Will they use the modern method for making such selections? Good judgment should dictate the answer.

Los Angeles Starts Train Operation



LOS ANGELES ADOPTS TWO-CAR TRAIN OPERATION

ALL-DAY operation of two-car trains on one of the local lines of the Los Angeles (Cal.) Railway was begun on Jan. 30. Ten trains are run on the line together with single cars, giving a ninety-second headway in the rush hours and four-minute mid-day service.

The cars used in train service are of steel construction with an inclosed center section and open sections at the rear and front. They seat fifty-four passengers and have cross seats throughout. They are equipped for multiple-unit operation with Westinghouse air brakes and two 526 L Westinghouse motors. Twenty-five of these cars have been purchased. They were designed by the engineering department of the Los Angeles Railway.

Letters to the Editors

Valueless Valuations

NEW YORK, March 6, 1922.

To the Editors:

The recent valuations of the street railway systems in New York City, as published by the Transit Commission, recall the statement made by the late Charles A. Prouty, who was, until his untimely death, director of valuations in charge of valuating the steam railroads under the valuation act. After four years of work, he testified before the Interstate Commerce Commission: "I would rather undertake to recite the Chinese alphabet backward than read the valuation act, because it does not mean anything after you have read it."

It may safely be stated, as the *New York Times* said some time ago, that valuations do not mean anything either. If the rates of return suit the companies they care little about valuations; if the rates of return are inadequate both the rates and valuations are subjected to litigation. In the present instance the Transit Commission is apparently seeking legislative assistance to bolster up its valuations by making them mandatory and forcing their acceptance before any consideration is to be given to future rate questions. This looks like a confession of weakness and lack of faith in the valuations, while the seeking of legislative assistance leads to another saying of Mr. Prouty's: "We can regulate the railways but we cannot by legislation force one single dollar of private capital into railway investment against its will."

The futility of physical valuations has been demonstrated in one way or another on almost every street railway system in the country. No better illustration of their worthless character is needed than that of which the writer has knowledge wherein a firm of engineers of the highest standing prescribed values for certain pieces of property which, according to their report, should have become worthless and vanished three years ago; but the property is still in operating condition and giving satisfactory service. Such occurrences in valuations, however made, are the rule rather than the exception.

That street railways have a value to the community far beyond any physical valuation that may be placed upon them is clearly indicated by the many instances where cities and towns have bought defunct systems in order to preserve the very life and sinew of their civic existence. The strong protests from the public against the abandonment proposals of the Transit Commission covering various lines in Brooklyn are further evidence of the existence of what may be called the uncapitalized civic value of the street railway. This clearly has no direct relation to the physical value of the railway but it does represent a form of intangible value or good will which may not now be capitalized by the railways, although every form of so-called private business is permitted to and does place a value on itself as a going concern. All municipalities base their valuations of real estate for assessment purposes upon the values created by the street railways. The debt limit of New York City would be vastly reduced if it were not for the increased valuations which are based on transit facilities of all kinds.

The Transit Commission was apparently created, and has announced its intention, to conserve and preserve the street railway systems of the city, in the realization of the fact that they are a vital factor in the conduct of the business and social life of the community. Its present course in creating a means for long-drawn litigation through the medium of the valuation scheme which it has sponsored, combined with the poorly devised scheme of abandonment of lines, will not lead to an early settlement of the momentous questions at issue.

"ENGINEER."

Comment on the Standard Safety Car

UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE
BALTIMORE, MD., March 6, 1922.

To the Editors:

I do not like to bring up what is apparently a dead subject but I want to take this means of calling the industry's attention to Order No. 462 of the Public Utility Commission, District of Columbia, dated Feb. 27, on the subject of one-man car designs.

The commission has recently approved the operation of one-man cars in the district but, in its order, has taken exception to the narrow, combined entrance and exit feature of the so-called safety car and has stated as follows:

Experience has shown that the particular type of equipment so far used has not been entirely satisfactory, owing mainly to the limitation of the entrance and exit facilities. These were originally provided in accordance with standard one-man safety car practice, but it has been found that peculiar local conditions demanded more commodious means of ingress and egress. In the latest type of one-man car placed in operation separate entrance and exit doors have been provided together with additional facilities to add to the comfort, convenience and safety of passengers.

I am merely bringing this up in order that no more mistakes will be made in the purchase of a car that cannot help but be unsatisfactory, and I am referring to the so-called standard safety car, with the narrow entrance. The more we run the correctly designed car in Baltimore, the more we realize the shortcomings of the so-called standard safety car.

H. B. FLOWERS,
Second Vice-President and General Manager.

Changes in the Cost of Living in Latter Part of 1921

CHANGES in the cost of living in five cities were given out recently by the United States Department of Labor through the Bureau of Labor Statistics.

City	Per Cent of Decrease from	
	June, 1920, to December, 1921	September, 1921, to December, 1921
Chicago.....	19.7	1.7
Detroit.....	22.7	3.0
New York.....	18.7	0.9
Philadelphia.....	18.4	1.0
Washington.....	19.0	1.9

The above table shows the decrease in the total cost of living in each city from June, 1920, and September, 1921, to December, 1921.

According to the *Electric Railway and Tramway Journal*, whereas twenty years ago the Leeds (England) Tramways Committee passed a resolution limiting the loading of a car to eight more than the seating capacity, it has, by a recent resolution, increased the number to twelve.

Electric Railway Publicity

Devoted to How to Tell the Story

"Verily I Say Unto Thee"

A Protest by a Minister at Little Rock Against Reducing the Cost of "the Cheapest Thing We Have," the Street Car Ride

"**V**ERILY I say unto thee, thou shalt not by any means go out thence, until thou hast paid the utmost farthing." With this quotation as his text Dr. J. W. Coontz, pastor of the First Methodist Episcopal Church at Little Rock, Ark., delivered a homily on Sunday evening, Feb. 19, to his parishioners on the subject "Why Reduce the Cheapest Thing We Have?" The announcement by the minister of the subject of his sermon was made through the public press. It was prompted by the passage by the Council a few days previously of an ordinance giving the Little Rock Railway & Electric Company thirty days in which to reduce its fare from 6 cents to 5 cents under its franchise.

YOU MUST PAY FULL VALUE

In explaining the text Dr. Coontz said Christ meant that no one should expect anything without paying full value for it. He started his talk by saying that he did not know any men who worked on the cars, nor was he acquainted with any officials of the railway company. He was too poor to own an automobile and had to ride the street cars every day, so no one could accuse him of being biased or not affected by any increase. He stated that he wanted the privilege of expressing his honest views on the subject. He continued his prefacing remarks by stating that he loved the Mayor of the city and the members of the City Council, but, in this particular case, he did not think their judgment was correct. They were making a mistake. He stated that the company could not possibly exist with a 5-cent fare without lowering the wages of the employees or greatly curtailing the service. He, for one, did not care to ride on the street car, at a reduced fare, knowing that the employees on the car were helping to pay for his ride from their own earnings, nor did he want to see the service curtailed.

He stated there was still a further argument why he did not want to see a 5-cent fare, and that is that he would not want business interests to say, "We can make money with a street car system at Hot Springs, Fort Smith, Pine Bluff and other places, but we cannot in Little Rock," and he would have to admit that the Little Rock Mayor and City Council would bring about such a condition.

He also said that the city was growing and that patrons wanted the railway extended into the suburbs. How could the public expect the company to do this, he asked, if the railway did not know positively that it was going to be permitted to make a profit. He did not know the amount of the investment made by the company, locally, but assuming that it was \$250,000, he felt that it was very nice to be able to borrow the use of \$250,000 at any time of the day for the price of a fare. Dr. Coontz

also called the attention of his parishioners to the fact that when he boarded a car he felt very gratified to know that he had 200 men working for his convenience for the price of a single fare.

Dr. Coontz said that in all the cities with which he was familiar the railway companies had been receiving a fare of more than 5 cents. Surely, he said, "all these other Mayors and City Councils cannot be wrong while our men are the only ones that are right." This particular case reminded him of the story of the old lady who had a boy in the army—they were all marching in parade and she stood watching them, and when her boy came along in the procession she remarked: "They are all out of step but John."

The local banks got 8 per cent interest plus brokerage on loans, and Dr. Coontz said it would be foolhardy arbitrarily to tell the banks from now on they must charge only 7 per cent interest and no brokerage. He also used as an example the matter of fire insurance rates. If the City Council were now arbitrarily to name a fire insurance rate that existed, say, twenty years ago, when the losses were not near so heavy as they are at present, the companies would soon be broke. He also asked what success might attend an attempt by the Council arbitrarily to demand that real estate be sold at a price no greater than property brought twenty years ago. Even assuming that a profit had been earned from the sale of light and power it was not right to make up the loss from the operation of the railway from the revenues of the lighting department.

COMPANY DOESN'T MISREPRESENT ITS PRODUCT

Members of the Council handed merchants the privilege of getting out and making as much money as their ingenuity made possible and never so much as looked at the merchants' book. Merchants were permitted to represent goods as they pleased, telling the purchaser that he was getting an all-wool suit when the suit was mostly cotton. Here Dr. Coontz cited specific instances and then concluded: "And do you ever hear of the electric railway trying to sell you a ride and giving you a walk?"

He said that the night before he delivered his sermon he received a special delivery letter from a woman in Little Rock who stated that she had no affiliation with the railway, but was very glad to learn that he was taking a stand in defense of the company. This lady said that all through the war the company operated without an increase in fare under heavy expenses and hardships and had been unable to get relief until just recently and she did not think the company was being treated right. The company should be made to live up to its contract, but it could not be expected to do so and not to make money. In short, his motto was: "Be fair to the company and make the company be fair to you." These illustrations used by Dr. Coontz in closing his remarks were all drawn along the line that "You cannot expect happiness, success or wealth or a future in Heaven without paying full fare for any of them."

Go Right and You Will Be Safe!

Rule of the Road Changed in Vancouver Without Confusion— Publicity Played Prominent Part in Educa- tional Campaign

SAFETY, safety, safety, but the greatest of these is safety! This is the message with a thousand variations which the British Columbia Electric Railway, Vancouver, B. C., spread broadcast throughout the province for many months in order to prepare the public for the new year's change in the rule of the road. The work the company did in familiarizing automobilists, pedestrians and railway passengers won the praise of the Vancouver Sun in an editorial, which said:

The B. C. Electric from the first assumed responsibility for making the streets safe during and after the change. The B. C. Electric went to a great deal of trouble and expense to inform and advise the public how to conduct themselves to obviate accident. Officers of the B. C. Electric have performed a real public service in their attitude on the change in the rule of the road.

Persistent articles

To change from the left to the right is a matter of memory and clear thinking, according to the trolley company. The Roth memory system undoubtedly gained many new students as a result of the company's advertising. The rabbit wearing the silk hat, famed to all students of the system, is an excellent guide post to the roadway. One ear—the right, of course—stands up outside the equally famous silk hat, and that ear the pedestrian, the automobilist, the car passenger, follows. Simple, once you know how!

In one issue of the *Buzzer* was quoted a letter from the East, where life has always run on the right track. The letter said:

Why not picture the change to yourself at every opportunity between now and then? Just see yourself boarding the car at your usual spot, at the other corner. See yourself standing 45 ft. from the corner waiting. See yourself boarding that car carefully, after going straight from curb to car. See yourself looking both ways before crossing street. See yourself look before passing behind a street car.

THE VANCOUVER DAILY WORLD, SATURDAY, DECEMBER 30, 1921

How You Can Help the Rule of the Road Change

WE urge the co-operation of everyone—pedestrian, automobile driver, vehicle owner and public generally—so that a minimum of inconvenience and disturbance to business will be suffered, and so that not a life may be lost in the traffic change.

1. Street Car Passengers

In order to prevent delay and loss of time to your service, please accustom yourself to the new conditions as quickly as possible—

- (a) Have your exact fare ready.
- (b) Buy strike tickets.
- (c) Hand conductor transfer unfolded.
- (d) Avoid the rush hour when you can.
- (e) Let each passenger handle own fare.
- (f) Passengers should board just behind lady.
- (g) Take the second car after a delay.
- (h) Stand where car platform will stop.

Understand that it takes several places to board. Our transfer conductors can bring the



2. Automobile Drivers

Be safe and you will be happy

Be safe and you will be happy. The rule of the road change is a matter of memory and clear thinking. The rabbit wearing the silk hat, famed to all students of the system, is an excellent guide post to the roadway. One ear—the right, of course—stands up outside the equally famous silk hat, and that ear the pedestrian, the automobilist, the car passenger, follows. Simple, once you know how!

3. Pedestrians

Be safe and you will be happy. The rule of the road change is a matter of memory and clear thinking. The rabbit wearing the silk hat, famed to all students of the system, is an excellent guide post to the roadway. One ear—the right, of course—stands up outside the equally famous silk hat, and that ear the pedestrian, the automobilist, the car passenger, follows. Simple, once you know how!

4. Public

Be safe and you will be happy. The rule of the road change is a matter of memory and clear thinking. The rabbit wearing the silk hat, famed to all students of the system, is an excellent guide post to the roadway. One ear—the right, of course—stands up outside the equally famous silk hat, and that ear the pedestrian, the automobilist, the car passenger, follows. Simple, once you know how!

DRIVE SAFELY and you will KEEP RIGHT

Some suggestions to automobile owners and drivers for avoiding accidents when the Rule of the Road changes

1. In approaching curves, keep on the right wheel track and the right edge of the road.
2. Look on for pedestrians stepping out from behind parked automobiles.
3. When approaching street car, stop and look.
4. Look on for pedestrian stepping out from behind parked automobiles.
5. Give right-of-way to trolley when approaching from the right upon crossing street.
6. Watch for person stepping out from behind parked car.
7. Avoid being stopped behind street car and look.
8. Don't "cut off" ahead of street car.

Business Depends Upon the Public Being Transported Safely and Quickly. Co-operate With Your Street Railway to Bring Car Service to the Usual Efficiency as Soon as Possible After the Change.

BC Electric POST THIS IN YOUR CAR

in the official publication of the company, the *Buzzer*, forewarned that on Jan. 1:

There will be the risk in crossing the streets. . . . Look both ways and cross only at crossings. There will be the risk to children playing, roller skating and coasting on the streets. They should be taught "Safety First." Risk will lurk in passing behind a street car. The new direction of traffic will make you forget, another car may come the way you never think of.

Getting on and off the car will need attention to safety, because few of the cars will have gates. Don't get on or off when cars are in motion. Use the left hand to grab the handle in getting off, and the right to carry parcels.

The concreteness of the suggestions for avoiding accidents is considered one of the reasons for the success of the campaign. Such advice as: "Signal from the curb for cars; Stand opposite the white marks at corners while waiting for a car; Never hesitate one moment after getting off a car, but go immediately to the corner; Don't cross in the middle of the block," showed simple acts which would save trouble, time and expense.

on the right hand. . . . the following points:
(a) Leave by opposite platform from the one you have been used to.
(b) If you make a mistake, do not run in front of train.
(c) At terminals do not alight until train stops.

5. General Information

Cars for passengers at Robson and Granville will make the turn onto Robson before stopping. Presently all cars will be without gates for some time. Be watchful of approaching automobiles.
Passengers are requested not to stand on the rear platform, as this suggests traffic. It is suggested that they do not use entrance opening for loading as they will delay on to new Westminster also. Buses all now will be "Front Entrance Cars." Passengers will be made to get on and off by the front end. This will cause all cars to make one-side stops, even on unpaired streets.
New "Automatic" passengers will stand in the "Move up to the Rear."
The B. C. Electric Railway Company hopes and trusts that the great change, as long as present and on early in history, will be accomplished without the loss of a single life and that on an accident will see the operation on which the nation is now looking.

SAFETY FIRST -- SAFETY ALWAYS

B.C. ELECTRIC RAILWAY CO., LTD.

THE STORY AS TOLD BY THE BRITISH COLUMBIA ELECTRIC RAILWAY

For Safety's Sake

Do not board an alight until the car has stopped.
Automobile drivers should say out their horns when coming to an intersection. Don't take chances. It is to be done, play safe. Drive like a mule, then a dog.
Keep the children from playing on the streets. Make shouting or running dangerous.
Keep your eyes about you at all times. Don't look quickly to the rear steps.
Look both ways.
Don't "take off" or become reckless. The rule of a "right-of-way" is easily a matter.

Vancouver residents heeded the warnings and did think, for since Jan. 1, when the street cars trundled out of the car-houses on the right instead of the left side of the street, and as the *Buzzer* said, horses long used to greeting their passing brothers with the right eye began to

use the left, there have been no serious accidents. Collisions have occurred between automobiles and trolleys, but no serious damage has been done.

One of the greatest problems connected with the change was in teaching children to be careful. The British Columbia Electric issued an eight-page booklet on "Safeguarding the Children," which contained ideas for essay topics, verses with lilted meter, impressing the necessity for watchfulness, and catchy safety slogans, such as "If your ball rolls into traffic let it go until traffic passes. You can get a new ball at any store, but you cannot get a new leg any place," and this one, "Methuselah was a careful man. He lived 969 years."

The children were also won to an animated interest in the change through an essay contest on Safety First. The sum of \$30 in prizes was awarded to the three best contestants.

To automobile drivers the company paid particular attention and issued a pamphlet which the government distributed. The diagrammatic illustrations of the manner in which accidents might happen and also might be avoided did much to force drivers to go slowly, to drive on streets minus trolley lines, to keep to the side of the road and avoid car tracks, and to park machines well away from car loading points.

Car cards played an important part in the informative propaganda, and these reiterated forcefully the rules the company was sending out in bulletins and pamphlets. The company was concerned with providing the same service during and after the change that prevailed under the left-hand rules. One card asked that, "as far as consistent with safety, help maintain the speed of the service by picking out your new corner, standing where car will stop, having exact fare ready, boarding at entrance and alighting at exit, passing right inside car when the Rule of the Road Changes." This warning was heeded.

A courteous request on one of the cars won the wished-for support during upset service. The card said simply, "If your car is delayed please remember that extraordinary conditions, more tie-ups, slower loading, heavier traffic, operate against our usual quality of service. We ask you to co-operate after a delay by taking the second car."

A final display advertisement was placed in the daily papers with simple rules, easy to bear in mind, for the trolley passenger, the pedestrian and the automobile driver. It informed the riding public at what points car service would be changed, and where and how to get the right car.

The plan of the company was to leave nothing to chance, and new interurban stations were clearly indicated, exits and entrances were definitely marked on city cars, with the result that the traveling public quickly adapted itself to the new rule, and now very generally "keeps to the right."

Directory Shows How to Get Where You Want to Go

"AN OLD-FASHIONED street car ride" to the interesting places in Toledo, Ohio, is the attraction which the Community Traction Company offers to the public in a compact directory of the railway's lines. The trolley company urges less speed on the way and more observation of the points along the route.

Safety Work Strictly Organized in Memphis

THE Memphis Street Railway, in a symposium, "Truth," published in the daily papers of Memphis elaborates to interested patrons how its safety committee does its work.

There is a central committee of twelve men which plans the work to be done. These plans are transmitted through captains and lieutenants of divisions to the workers covering the system. The active committee is composed of forty workers and five executives. Their work is to encourage the practice of safety rules and cultivate friendly good will with the public, to the end that accidents may be reduced and car miles per hour increased. Meetings of the active committee are held once a month, when reports are heard. A spirit of friendly competition exists among them in the efforts to show the most favorable report. A prize is awarded to the captain of the division having the best record for the previous month.

Don't Ride Your Auto to Work

Automobilists Have Futility of Using Their Own Machines Brought Forcibly to Their Attention by Railway at Tacoma

BY C. V. ALLEN

Publicity Manager Tacoma Railway & Power Company, Tacoma, Wash.

RAILWAY owners, managers and operators point to the high cost of labor and materials, the inadequacy of fares and obnoxious or burdensome franchise obligations in seeking to explain the present financial condition of the electric railways. All of these are unquestionably drawbacks to the ability of companies to prosper, but there is another very serious contributory cause. This is the ever increasing competition of the privately owned automobile. In the industry the drain made upon gross earnings in this way is pretty well known, but practically no plan has been made to offset it, no effort made to sell the railway as against the automobile.

Today the business man who formerly used the trolley to go to his office and back now drives his machine, the woman who shopped by street car now drives her car to market, the picnic party that went by trolley now goes on rubber, the young people who were satisfied to go to a dancing party by street car now feel they must go by auto, the plumber who took the street car now drives to the job in a machine, the laborer very often drives to the factory in his own car.

In fact, the public is afflicted with "automobilitis" in a virulent form, but the majority have only a hazy idea of the high cost of such service as compared to electric railway fares.

Early in 1921 the company with which I am connected decided to work out an advertising campaign with the purpose in mind of selling electric railway service as against the automobile. All of the previous advertising of the company had been of the "display" type. The average individual considers the use of large display advertising expensive propaganda. He more or less resents it. But he knows the small "reader ad" is inexpensive. This is the kind of advertising the baker, the small grocer or the small merchant can afford, and it gets "under the consumer's skin" better.

Mainly for these reasons the company decided in favor of the "reader," the ad to be placed among the news items in such a way that the average newspaper reader would read half way through it before he would realize it was advertising. This of course necessitated enough human interest or human touch in each one to compel and hold attention.

The campaign was begun in February, 1921, with two small readers each day. The situation has been attacked from nearly all angles, but principally the advantage of the street car in economy, safety and convenience. The principal points played up have been the saving in mileage by the use of the trolley, the actual cost of running the car, the advantage of a bank account over the liability of a machine, the likelihood of theft of the car, the probable parking troubles, and the danger attendant upon driving on wet or slippery pavements. An idea of the variety of ways the question was handled is shown by the following quotations:

You can't operate that auto of yours as cheaply as the price of carfare. Take the street car.

How much time do you waste parking your auto down town? Use the street car.

Your car costs you 50 cents to \$1 to go to your office

and back. The street car costs you 16 cents. Save that difference.

Add a couple of years life to your machine by riding to work or business on the street car.

The cost of one \$50 tire will pay your carfare to the office and return for one year. Take the street car.

There is more honest satisfaction in a good bank account than in owning an automobile. Take the street car and save money.

Read your morning paper on the way to your office. Save just that much of your office time. You can do it by taking the street car.

Here's a hunch—put your auto away for a few months and use the street car. With the money you will be able to save you can take a good automobile trip for your summer vacation.

* * * * *

Mr. Automobile Owner: Have you ever stopped to figure that picking up your friend on the way to your office adds materially to your operating expense? Take the street car.

Your car has just so many miles of life. Are you grinding its life out riding to work or office every day? Take the street car and save your machine for your pleasure trips.

Your wife would like the car to drive around in during the day. It would be mighty fine of you to go to your business on the street car and leave the machine at home for her.

The street car is the surest, safest and most economical form of conveyance. Take the street car and save money.

We know a fellow who mortgaged his home for \$1,800 to buy an automobile. That little mortgage is going to take out most of the joy in his having that car. Use the street car and save money.

False pride has bought many an automobile. Be honest with yourself. Use the street car and save your money.

You ought to carry liability, fire and theft insurance on your machine. The premium on that insurance would pay carfare for a family of five for six months. Take the street car and save money.

After the novelty of driving to your business in an automobile has worn off, why not take the street car to work and back and save that daily wear and tear on your machine?

Spend and the world spends with you. Save and your li'l old bank account stands by you when the goin' is tough. Don't spend all your spare income on that machine; take the street car to your business and cut down your automobile expense.

You young fellows between the ages of twenty-five and sixty who live in the close-in residence district and drive to your office—you'll be money in pocket and in better health if you'd walk down to the office and take the street car home at night.

The whole outdoors of this wonderful Northwest is yours if you own a motor car. Keep the machine for those pleasure trips, but use the street car for business.

* * * * *

"Keeping up with the Jones'" has pushed many a man into buying a machine. Be sensible—use the street car.

You lose most of the "kick" in driving on pleasure trips if you pound that car of yours down to the office or shop every day. Use the street car for business.

Good salmon fishing is reported at the Narrows. Take a Point Defiance car to the park, rent a boat at the pavilion and get some real sport.

Street car service is always "on tap" for your use. Why not take advantage of it, and keep your machine to go where the street railway cannot reach. It will save you money.

Wet, skiddy pavements are accident breeders. Leave the machine at home and use the street car.

Not including direct operating cost or interest on investment, the cheapest make of car costs you nearly \$1 a day just to own it. We'll try to show you: Depreciation at 20 per cent a year, \$180; insurance, \$60; taxes, \$25; license, \$10.25; new driver's license, \$1; garage rent, \$60; total, \$336.25, or nearly \$1 a day, and you haven't turned a wheel. Take the street car and save money.

Mrs. Shopper: Do you know that your purchases cost you 50 cents to \$1 extra when you use your machine to make them? Shop by street car in the morning and early afternoon and you can shop very comfortably and at much less cost.

If you had to drop 50 cents to \$1 in a fare box every time you drove your machine downtown and to work, we'd say you'd think twice before you did it. Save money by taking the street car.

* * * * *

You wouldn't wear evening clothes and a silk hat to spade your garden in. Save the wear and tear on that expensive

investment, your automobile, by using the electric railway.

We know a fellow who won't go to the corner grocery to buy a yeast cake without his machine. It's the unnecessary use of your automobile that makes it expensive. Save mileage and you save operating costs.

We admit that the automobile is superior in some ways to the street car, but for every day, safe, dependable and economical service between home and business, the street car has no peer.

Depreciation, that sinister and unseen expense, is eating into the value of your machine every minute. Your dollars invested in it slip noiselessly away day in and day out. Take the street car and put your money into some income-bearing investment.

We know a man fifty-four years old whose son and daughter persuaded him to put his \$800 savings into a machine. That was four years ago. They sold the machine this spring, paid up their repair bills and had \$185 left. That's all that remains of that man's \$800. Take the street car and save your money.

Smith and Jones both drive to their office every day. Smith thinks Jones can afford to do it and Jones thinks Smith can. Neither really can. Be honest with your pocket-book and use the street car.

Are you like the ostrich, sticking your head in the sand when it comes to figuring up what the machine is costing you every day you operate it? Take the street car. The wise man is using it to go to his office and back.

It costs you at least \$1 a day to run that car to the office and back. Is the difference in the service between the street car and your machine worth that surcharge?

* * * * *

The little touch of humor which it was attempted to inject in the advertising has resulted in the paragraphs being quite generally read and without question has materially aided in holding business for the railway and should help substantially in attracting new patrons.

While it is difficult to compute exactly what effect the campaign has had on the riding, the total business of the company has held up to the record of a year ago, although sales in practically every other line of business have fallen off very heavily. Additional proof is the direct evidence of people who have made statements to officers of the company that they had followed the suggestions made in the advertising. Taking into consideration the lower cost of the advertising and its effective appeal to the common sense of the public, the company considers this particular advertising the most effective it has ever done and regards the results as more apparent than those obtained from any other advertising which it has ever attempted.

Ohio Road Starts Advertising Campaign

TO COUNTERACT propaganda calling for a reduced fare which is being circulated in Springfield, Ohio, the Springfield Railway has started a newspaper advertising campaign in an effort to show that the present fare of seven cents is very reasonable. An advertisement believed to have had the greatest effect in this respect is one in which a comparison is made of the transportation facilities of thirty years ago with those of the present day. The advertisement showed the picture of one of the old horse cars and beneath it appeared a picture of the modern electric street car. The "ad" is three columns wide and one page in depth.

"Thirty years ago folks rode in mule-drawn street cars traveling at a speed of four miles an hour and cheerfully paid the 5-cent fare. Today they ride in commodious, sanitary, comfortably heated and lighted cars at a speed of from 15 to 20 miles an hour at an increase in fare of only 2 cents," says the advertisement. The "ad" is convincing with respect to the improved service now offered.

Power Plant Economics Discussed by Engineers in New York

At Largely Attended Joint Meeting of Local Sections of A.I.E.E. and A.S.M.E. Turbine Tests, Boiler-Room Practice, Power-Plant Auxiliaries and Related Topics Were Covered in Papers by Operating Engineers

THE power-plant operating men ran the joint meeting of the American Institute of Electrical Engineers, New York Section, and American Society of Mechanical Engineers, Metropolitan Section, held in the auditorium of the United Engineering Societies' Building in New York City, on Feb. 24. Part of the formal and informal discussion is of interest to electric railway engineers concerned with the power plant. This refers particularly to the report upon efficiency tests of a 60,000-kw. cross-compound triple-cylinder steam turbine, by H. B. Reynolds and W. F. Hovey of the Interborough Rapid Transit Company; the paper on boiler-room economics by I. E. Moulthrop and R. E. Dillon of the Edison Electric Illuminating Company of Boston, and the summary of methods of energy supply for station auxiliaries and their relative merits by H. C. Albrecht of the Philadelphia Electric Company.

ELECTRIC RAILWAY ENERGY PRODUCED ON 11 LB. OF STEAM PER KILOWATT-HOUR

The tests reported by Messrs. Reynolds and Hovey were completed recently upon the 60,000-kw. turbo-generator unit described in an article by W. S. Finlay, Jr., printed in the issue of the *ELECTRIC RAILWAY JOURNAL* for May 10, 1919, page 906. The unit consists of one high-pressure element and two low-pressure elements, each driving a separate generator.

The normal steam pressure at the throttle is 220 lb. absolute, with a superheat of 150 deg. Fahr., exhausting into a vacuum of 29 in. of mercury, referred to a 30-in. barometer at 51.1 deg. F. The speed of all three elements is 1,500 r.p.m.

The unit is provided with a number of automatic features which make it possible for any one of the three elements to go out of service and allow the remaining elements to remain on the line to take care of the load. It has not been possible to make full use of these automatic features up to the present time, due to the absence of a relief valve on the exhaust of the high pressure turbine.

Most of the tests covered in the present report were of three hours' duration. With the exception of a few special tests, the turbine was operated under normal conditions, in so far as the type of load was concerned. The load was controlled from the switchboard through the remote governor-control system provided for that purpose. This method of controlling the load subjected the turbine to the full swings of the railway load. Two series of tests were run, one with the com-

plete unit in service and the other with the high-pressure and one low-pressure turbine in service.

The accompanying sets of curves give the general results of the tests, with particular reference to the total steam consumption and water rates of the units, and the thermal and Rankine-cycle efficiencies.*

From the curves it will be seen that the lowest water rate obtained while the complete unit was operating under normal conditions, was 11 lb. per kilowatt-hour, while the highest Rankine and thermal efficiencies obtained were 76 per cent and 25.1 per cent respectively. With the high-pressure and one low-pressure turbine in service, the lowest water rate was 11.25 lb. per kilowatt-hour. It will be noted that the water rate of the unit when the high-pressure and one low-pressure turbines are in service is better than that for the complete unit at loads below 25,000 kw.

In the discussion of this report Francis Hodgkinson, mechanical engineer Westinghouse Electric & Manufacturing Company, a leading steam-turbine designer, said that these tests had been made with scrupulous care and the results obtained were undoubtedly correct. While the manufacturers would have liked to see a still lower water rate indicated by these tests, they had no reason to be dissatisfied.

PRESENT-DAY BOILER ROOM OPERATION

The subject of power-plant operation was continued by Messrs. Moulthrop and Dillon, who said that there is no part of a steam generating power plant where scientific methods can be better employed than in the boiler room.

As to the power plant in general, a modern station is operated with one oiler and one fireman for each unit of 30,000 kw. or larger. The output per man is twenty times as great as in early stations. Furthermore 2.55 lb of coal, or 37,000 B.t.u., was required in the old engine-driven plants to produce 1 kw.-hr.; now this is accomplished with 1.25 lb. of coal or 18,100 B.t.u.

Large-capacity boilers equipped with modern fuel-burning furnaces, such as are going into many plants today, have an efficiency of 80 to 85 per cent at the operating point of loading, a gain of 15 to 20 per cent over types installed ten years ago.

*The Rankine efficiency is that which would be secured if all of the energy represented by the difference in heat energy of the steam entering the turbine and that leaving the turbine were converted into useful work, the thermal efficiency being the ratio of the work done to the energy in the entering steam.

The Willans line shown with the water-rate curves is plotted between total steam consumption and load. It was actually the basis for calculating the water-rate curves. The original shows breaks corresponding to the opening of the by-pass valves.

Another factor is the improvement in maximum load that can be supplied by a given number of boilers. In a plant built in 1905, the ratio of maximum load to capacity of boilers was 1 kw. per 10 sq.ft. of boiler heating surface installed; today it is 8 kw.

The character of the daily load curve has an important bearing on operation. If the curve is flat and without peaks, it will pay to operate the boilers at as near the point of maximum efficiency as is consistent with good operation and labor conditions, and as the capacity of the plant will permit. If there are peaks in the load curve, however, the degree of forcing over these peaks and the amount of banking to provide for them will depend on various considerations.

For example, the question arises whether boilers should be forced over the peak or additional boilers should be banked for it. The duration of the peak enters into this question, and the type of equipment determines how long a given high rate of forcing can be maintained without difficulty in keeping the fires in condition. Much higher rates can be employed for short periods than for longer ones. Furthermore, the extent of high forcing and the periods used affect the maintenance costs, which mount rapidly with high rates and with the length of time these rates are used.

There is a point at which the loss due to the burning of extra fuel by forcing at a high rate over a peak is equivalent to the loss due to the alternate case of carrying additional boilers for this peak.

The boiler-room foreman is responsible for having a sufficient number of boilers lighted to take care of the daily peak and the proper number steaming to give best efficiency at all times. He authorizes the number of boilers to be brought into steaming or to be taken out to provide for the load.

Here the fireman's duty begins. With the knowledge of the load to be carried and the number of boilers to have steaming to carry this load, he determines by his instruments and his instructions how much coal he must burn in each furnace to produce the necessary steam. He adjusts his equipment and studies his measuring instruments to insure proper operation.

In the effort to secure high efficiency in the boiler room, due consideration must be given to co-ordination with other parts of the plant. It is the efficiency of the boiler room and turbine room in conjunction which tells the final story. Too often it is thought that the measure of efficiency is the loss to the ashpit and up the stack. This will not prove to be the case until this loss is weighed against the loss of heat to the circulating water in the condenser. Feed water can be heated throughout the greater part of the temperature range from either of these two sources of heat. However, by utilizing some of the heat that would otherwise go to

waste in the circulating water, the turbine room gets the credit rather than the boiler room, and provided this credit outbalances the loss in the boiler room, the transfer is justified.

The story of present-day boiler room operation would not be complete without a word about conditions under which the men have to work in the boiler room. In modern plants it is the established practice to spare no expense in making conditions safe and eliminating accident hazards, providing plenty of light everywhere around machinery and plenty of space, and keeping the stations clean. The additional

3. High maintenance cost of speed-reduction gearing generally used with steam-driven equipment.

4. High condensation losses and complications of auxiliary steam piping.

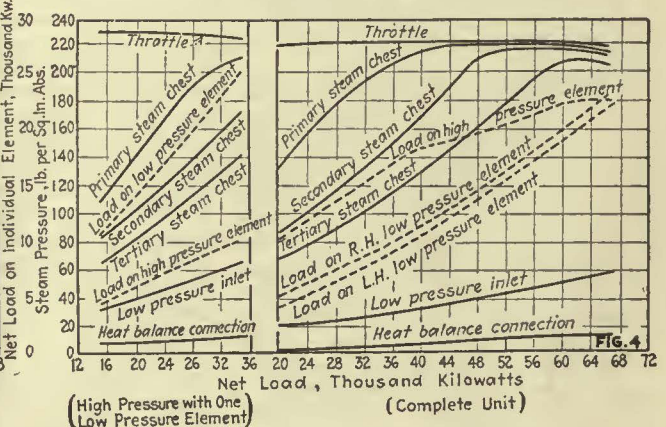
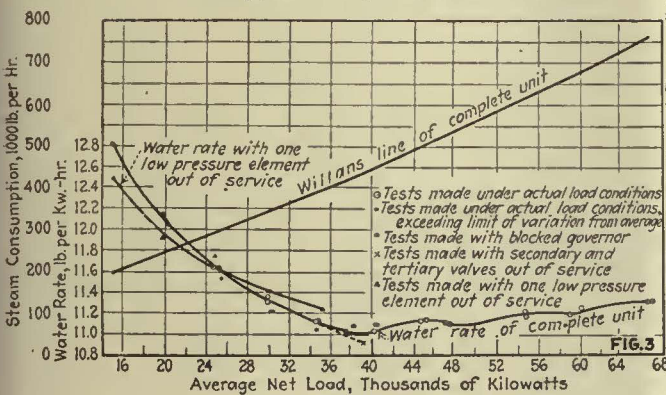
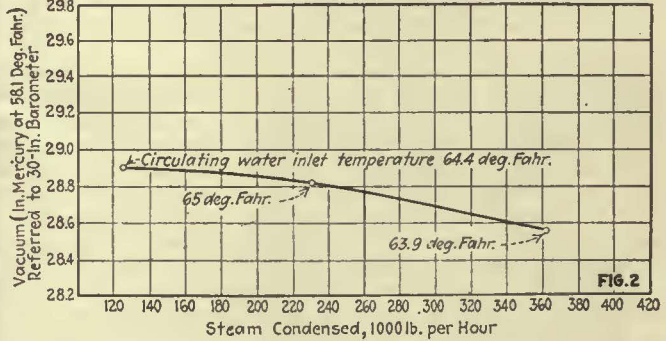
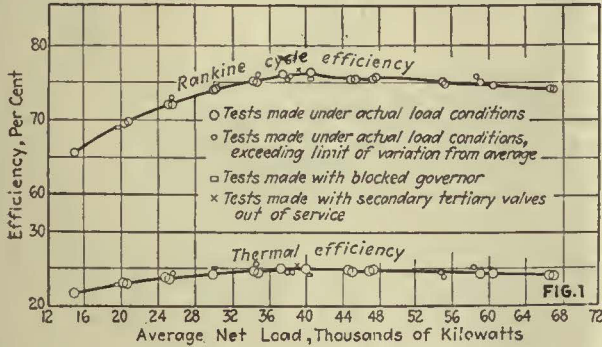
5. Further application of alternating current to auxiliary drive.

Energy for electric drive for auxiliaries may in general be supplied from: (a) The main generating unit or main bus, (b) a house turbo-generator, or (c) a combination of supply from main unit or main bus and house turbo-generator.

Any of the methods of supply mentioned may be arranged so that the supply will be from: (a) a common sys-

In the application of the alternating-current motor to auxiliary drive, one of the chief problems has been the development of satisfactory equipment for variable-speed service. The direct-current motor until recent years has been used to a great extent for this service, principally because of its very satisfactory inherent characteristics for such application.

In considering the extensive use of electric drive, it is necessary that the selection and layout of the equipment should be such as to give a high degree of reliability, because of the importance of the service. In case of trouble, de-



RESULTS OF TESTS ON 60,000-KW. TURBINE OF INTERBOROUGH RAPID TRANSIT COMPANY

Fig. 1. Efficiency of turbine expressed as ratio of mechanical output to thermal input, and as ratio of actual output to theoretical output.

Fig. 3. Water-rate curves.

Fig. 2. Relation of vacuum obtained in condenser to rate of steam condensation.

Fig. 4. Distribution of steam pressure throughout the turbine plotted against load.

expense that has been put into stations to improve conditions has given a high return on investment, and this factor alone has contributed in a great degree toward efficiency.

ELECTRIC DRIVE FOR STEAM GENERATING STATION AUXILIARY

In his paper on auxiliaries, Mr. Albrecht began by saying that in the past few years the use of electric drive for generating station auxiliaries in preference to steam drive has increased tremendously, particularly in modern plants. This change in practice has been brought about largely by the following factors:

1. Increased auxiliary power demands per kilowatt of generating capacity.
2. Wider latitude in selection of methods for obtaining heat balance under all conditions of varying load and seasons.

tem for all of the station auxiliaries, or (b) a segregated system arranged for operation of several selected groups of auxiliaries which may be so chosen as either to include a portion of the boiler auxiliaries and either all of the auxiliaries of an individual main turbine or pair of turbines, or only certain auxiliaries from two or more turbines. The former arrangement has the disadvantage that an interruption in the service may affect all of the auxiliaries supplied from the common bus, and the latter practice is of particular advantage when important motor driven auxiliaries are provided in duplicate.

Special precautions should be taken to include electrical equipment used in the supply and control of motors driving auxiliaries in boiler and turbine rooms, inasmuch as the operating personnel is probably not familiar with such equipment.

fective equipment must be immediately isolated with a minimum effect on other apparatus. It is of interest to record the use for the first time in large generating stations of truck-type switch-board equipment in connection with the 2,300-volt supply to station auxiliary motors in both the Hell Gate Station in New York and the South Meadow Station in Hartford. This type of auxiliary drive has such an important bearing upon the method of securing heat balance and consequently upon station economy and upon simplicity and ease of operation that there should be complete co-operation between mechanical and electrical design and operating engineers in its selection.

OTHER IDEAS AS TO AUXILIARIES

An interesting discussion followed the presentation of Mr. Albrecht's paper. R. H. Tabscott of the New York Edison

Company, pointed out that in large plants the auxiliary service substation may be as large as, or larger than, any substation on the system, and hence must be made just as reliable, if not more so. Mr. Hodgkinson expressed the belief that selection of auxiliary drive offers the greatest opportunity for economy. Reliability is no longer an advantage peculiar to steam-operated equipment, he declared, and necessity

for exhaust steam for feed-water heating is not so important with economizers. Even if feed water must be heated, that is no reason why uneconomical drive should be employed for auxiliaries.

He expressed a preference for house turbo-generator supply to auxiliaries, citing the advantages of the methods used by the Duquesne Light Company for obtaining a heat balance.

Conference on Crossing Specifications

Representatives of Railway, Railroad, Lighting, Power and Other Interests Met in New York and Agreed to a Program Which Will Bring About a Desired Harmony Among Conflicting Requirements

A LARGE and representative conference met in New York City on March 2 to consider the question of uniform specifications for crossing of overhead wires and to dispose, if possible, of certain differences of opinion in regard to Part 2 of the National Electrical Safety Code which deals with overhead lines. The conference was called by the American Engineering Standards Committee at the request of the American Electric Railway Association. The call for this meeting was explained in the issue of this paper for Feb. 25.

As a result of this conference the following resolution was adopted: Resolved, that it is the opinion of this conference that: (1) The remaining differences of opinion on Part 2 of the N.E.S. Code are small, and the different interests are approaching agreement, and that it is therefore advisable: (2) That the N.E.S. Code should be approved by the A.E.S.C. with the understanding that (3) there should immediately be organized a thoroughly representative sectional committee under the procedure of the A.E.S.C. to consider any revisions of Part 2 of the code which may be deemed necessary by any of the interested parties, and that (4) there should be a set of national specifications for crossings between overhead electric wire lines, because there is disagreement among existing specifications, and that (5) such specifications should be prepared by thoroughly representative sub-committees so as to make them in agreement with the code, with such revisions as may be made under the provisions of item 3 above.

In order to carry out the essentials of this resolution a conference committee representative of the groups, with Sidney Withington as chairman, was appointed to confer with Dr. P. G. Agnew of the American Engineering Standards Committee, to organize and decide on the various make-up of the sectional committee.

DISCUSSION WHICH LED UP TO THE RESOLUTIONS

In opening the discussion, M. B. Rosevear, superintendent of distribution Public Service Railway, Newark, N. J., presented, for the American Electric

Railway Association, a statement outlining the considerations which had led the association to request the conference and stating in general terms its position on the various items of the proposed agenda. This was followed by a brief statement by W. A. Durgin in regard to the general work of the Department of Commerce in promoting simplification in industry and industrial standardization along national lines. Dr. M. G. Lloyd, on behalf of the Bureau of Standards, then briefly outlined the development of the National Electrical Safety Code and its present position before regulatory bodies and utility companies and associations.

John Murphy, electrical engineer Board of Railway Commissioners, Ottawa, Canada, representing his commission and the Canadian Engineering Standards Association, outlined the status of crossing specifications in Canada. There the Board of Railway Commissioners has general jurisdiction over wire lines crossing or passing near railway right of way, and also over other wire crossings in case either one of the companies concerned is operating under a Dominion charter. The rules which have been followed by the board are simple. They work out so satisfactorily from the viewpoint of the railways, telephone, telegraph and electric light companies, that the Board of Railway Commissioners does not hear from one per cent of the cases which arise. The great feature is that the parties concerned must of necessity get together and co-operate before the work is done.

Discussing crossings generally, A. E. Davison, of the Hydro Electric Power Commission of Ontario, said that the commission has some 1,500 crossing and allied agreements, the majority of which come under the jurisdiction of the Board of Railway Commissioners. These crossings, wherever carried out in accordance with the sense and intent of the regulations, have operated without failure. Inasmuch as some of these crossings are twelve years old or more, special attention must shortly be given to inspection for maintenance. Since there is developing in Canada a tendency to criticize the above rules with the idea of strengthening the structures and wires crossing over supply conductors, the commission was pleased to

have the opportunity of co-operating the work of the present conference.

More than fifty delegates were present at the conference, all the principal interests being strongly represented.

Those present were: For the American Institute of Electrical Engineers, Percy H. Thomas; for the American Electric Railway Association, M. B. Rosevear, Charles R. Harte, R. W. Eaton and E. H. Scofield; for the American Railway Association, G. H. Dryden, Sidney Withington, J. H. Davis, E. B. Katté, J. C. Davidson, G. Eisenhauer, F. D. Hall, M. A. Baird, H. A. Shepard, L. C. Wells, I. C. Forshey and I. T. Seaver; for the American Telephone & Telegraph Company, K. L. Wilkinson and J. W. Hines; for the Bureau of Standards, Dr. M. G. Lloyd and H. H. Buell; for the Canadian Engineering Standards Committee, John Murphy; for the Electrical Manufacturers Council, Frederick Nicholas; for the Federal Power Commission, Charles E. Oakes; for the National Electric Light Association, Thomas Sproule, Paul Spencer, W. J. Canada, A. E. Silver, W. T. Morrison, J. C. Martin, and W. T. Oviatt; for the Postal Telegraph Cable Company, D. H. Gage; for the United States Independent Telephone Association, J. W. Morrison; for the Western Association of Electrical Inspectors, R. L. Daniel, F. A. Cambridge, J. T. Greene and W. S. Boyd; for the Western Union Telegraph Company, P. J. Howe, Douglas P. Dickie and C. P. Siedler; for the American Engineering Standards Committee, S. G. Rhodes; for the National Safety Council, F. W. Mitchell; for the Department of Commerce, W. A. Durgin and R. M. Hudson; for the United States Department of Labor, P. C. Menges; for various state commissions—Connecticut, A. E. Knowlton; Iowa, A. B. Campbell; Minnesota, D. F. Jurgensen; New York, C. R. Vanamen, W. C. Whiston and F. G. Daniell; Rhode Island, W. C. Bliss; Virginia, W. F. Rhea; Indiana, E. M. Blessing, and Hydro-Electric Power Commission of Ontario, A. E. Davison.

Executive and Subjects Committees to Meet

THE next meeting of the executive committee of the American Electric Railway Association will be held at association headquarters in New York on Friday, March 24, 10 a.m.

Chairman C. D. Emmons of the subject and meetings committee of the American Association has called a meeting of that committee for Friday afternoon, March 24, at association headquarters. The particular problem ahead of the subject and meetings committee now is the annual convention to be held in Chicago in October and the committee plans to get an early start on this work.

The committee will undoubtedly be most glad to receive suggestions from the membership as to subjects for the Chicago convention program.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Fare Reduction Unlikely

Head of Road at Springfield, Mass., Sees No Immediate Hope Ahead for Car Rider

In a statement following the announcement of the arbitration decision reducing wages and revising working conditions on the system, Clark V. Wood, president of the Springfield Street Railway, said that he could see no prospect that the 7-cent fare would be reduced before 1923. A reduction of the fare would be possible, he explained, only in the event of a pronounced increase of traffic or a further reduction of wages.

At present he can see no prospect of any marked traffic gain, and a further reduction of wages this year is barred by the agreement. He said that the wage as reduced by 10 cents an hour is still higher than the wage necessitating an increase of the fare from 5 to 7 cents in 1919. However, he said, in the event of a general industrial revival in the territory served by the company it is hoped that it may be enabled to take up the matter of a fare reduction earlier than can now be foreseen.

The statement called attention to the expenditure, estimated at more than \$350,000, which the company faces in connection with the new Connecticut River bridge, and the maturity April 1 next of \$1,700,000 of 4 per cent bonds. This would have to be met, it is stated, by either refunding or extension, entailing in either case a probable increase of the interest rate. In summing up, the statement says:

Under these circumstances the management feels that its first obligation to the public is to maintain and, so far as circumstances will permit, to improve its service to the public; that its second obligation is to place its securities on a basis where the investing public will purchase them, thus assuring a continuance of its ability to furnish adequate service, and that its third obligation is to furnish that service at the lowest possible rates consistent with the performance of its other two obligations.

Following the award of the arbitration board in its case, the Springfield (Mass.) Street Railway rearranged its schedules and placed 49 runs on the spare list. Extension of the spread of hours for spare men from 11 to 14 enabled the company to arrange the runs to better advantage with the result that about 75 men have been laid off. At the same time, all runs manned by regular crews were rebid. There is no curtailment of service. The reduction of regular crews involving the placing of 180 men on the spare list was carried out against the protest of the leaders of Springfield branch of the Amalgamated Association of Street & Electric Railway Employees. Complaint was made to the union's counsel, James H. Vahey, and it is stated that

he will take up the question with James J. Storrow, neutral arbitrator in the recent proceedings, alleging that the new arrangement is in violation of the terms of the award, in that the runs placed on the spare list should have been posted for rebidding. Under the recent award the spare men have a guarantee of seven hours work in fourteen, in place of nine in eleven, as before.

Chicago Matters Before Commission and Council

Seeking to show the reduced cost of living and of railway materials, the attorneys for the city of Chicago had several business men as witnesses before the Illinois Commerce Commission during the week ended March 4. There was also some discussion of wages in various industries, but none bearing on rates of pay for electric railway men. E. H. Morgan, superintendent of schedules for the surface lines, was also called as a witness by the city and admitted that the non-revenue hours paid for in the companies' time tables amount to about 19 per cent of the total. He stated, however, that most of this had been imposed by boards of arbitration following strikes.

Plans for consolidation of the surface and elevated lines have been discussed before the local transportation committee of the City Council and apparently will not be consummated in the near future. However, a number of engineers are drawing plans for a subway system. One plan was submitted by Alderman Cermak which calls for a six-track subway for freight as well as passengers, serving the whole city and costing about \$750,000,000. It is likely that a plan calling for the expenditure of the \$30,000,000 in the traction fund will be presented.

Puget Sound Company's Appeal Denied

The United States Supreme Court on March 6 denied the application of the Puget Sound Power & Light Company, Seattle, Wash., for review of a decision rendered against it by the United States District Court for Western Washington in proceedings brought against S. B. Asia, Daniel W. Bass and others. The power and light company, as the owner of \$15,000,000 municipal street railway bonds of Seattle, sought to set aside a decision obtained by Asia and his associates in a suit brought by them against the city to restrain, among other things, the application of the gross revenues of the municipal railway system to the payment of principal and interest on the bonds in preference to charges for maintenance and operation.

Sir Adam Raps Radial Report

Head of Power Commission Differs Violently With Sutherland Recommendations on Radials

Sir Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, has launched an attack upon the findings of the Sutherland Hydro Radial Commission. He calls into question not only the soundness of the judgment shown by the majority of that commission in its condemnation of radials, but directly reflects upon the fairness and motives of the commissioners themselves. While the Hydro-Electric Commission chairman issues a foreword with the statement, the document itself is essentially an engineers' report, which takes up, item by item, the findings of the Sutherland Commission.

In his foreword Sir Adam says:

I, for one, regard it (the majority report) as permeated by misunderstanding or by the misinterpretation of evidence, and by the omission of essential data, to an extent which nullifies its usefulness as a judicial document, and as a criterion by which either to approve or condemn the Hydro radial project.

The experts of the Hydro-Electric Power Commission still believe that the proposed Hydro radial system may successfully be carried forward along the lines originally recommended, and there has been nothing disclosed, either by the Sutherland Commission or through any other source, which has in any degree lessened their confidence in the radial project recommended—a project which can scarcely fail to be of very great social, commercial and financial benefit, not only to the municipalities directly concerned, but also to the Province, and, indeed, to the Dominion as a whole.

Sir Adam deals only with the Sutherland majority report. His criticism is prefaced by a brief review of the situation arising out of the adverse finding of the commission. The Sutherland report had unsettled the public mind as to whether radials could be constructed and operated as to be made self-sustaining and without producing a duplication of lines, and it was to clear up the situation that the reply had, at the request of the Hydro radial municipalities, been prepared.

Sir Adam trains his guns upon the qualifications of the experts upon whose advice the commission relied in preference to that of Bion J. Arnold, the expert engaged to make a report for the municipalities, and whose endorsement of the radial scheme was derided. Mr. Arnold, it is pointed out, was himself the owner and operator of an inter-urban electric railway, and recognized as one of the most eminent experts in his field. On the other side, the Sutherland Commission relied upon, first, three men who were steam railroad experts, W. F. Tye, George C. Martin and F. P. Gutelius, whose experience was not applicable to electric lines.

Sir Adam claims that C. E. Bailey and L. A. Herdt, two other "experts,"

whose judgment was accepted by the commission, and R. B. Rifemberick, who was retained as chief consulting expert, could not be classed as operating experts, and goes on to say that apart from some Canadian officials called to testify respecting conditions on certain local steam and electric lines, the only men called who might really be regarded as electric railway operators were F. W. Coen, R. M. Feustel and Robert I. Todd.

Of these Sir Adam's engineers claim that while their testimony would be of value if they were speaking of matters of which they had first-hand knowledge, their testimony upon the Hydro radial project was entitled to practically no weight "because of the almost total ignorance of these men with regard to the specific Hydro radials under discussion."

This "almost total ignorance" is shown by extracts from the evidence of the three experts.

The Hydro chairman closes his statement with a reiteration of the confidence in the whole radial scheme and an assertion of his belief that if the data presented had been rightly applied by the Sutherland Commission there would have resulted a clear and outstanding demonstration of the soundness of the estimates of the Hydro Commission's experts.

The report of the commission appointed to inquire into hydro-railway railways—known as the Sutherland commission—was issued in brief in August, 1921. It was not until last December that the report was printed in full and made available to the public. Just at that time Sir Adam says he was busy with the work incident to opening the Chippawa plant and with other matters so that detailed consideration of the Sutherland report was not possible. Moreover, it would not have been advisable to reply until the report was in the public's hands.

The real battle over the hydro-electrics seems only just about to begin. Speeches by Premier Drury indicate that the Government has under consideration the repealing of the existing Hydro-electric Radial Railway legislation, and the passing of legislation, in lieu thereof, which will authorize the construction and operation by the municipalities, or groups of municipalities, of such Radial Railways as the municipalities may approve under a commission, or commissions, appointed by the municipalities against this the municipalities are up in arms. They have adopted resolutions roundly scoring any such proposal and have forwarded them to the Premier and to each member of his cabinet. Among other things the point is made that, as the Hydro-electric Power Commission already manages the Windsor, Sandwich & Amherstburg Railway and the Guelph and Peterboro' street railways, and prospectively the York Radial and other lines for which rights-of-way are already purchased, "it would be suicidal to provide any other management for other and connecting electric railways."

Preparing for Detroit Election

On April 17 Voters There Will Decide Purchase of Detroit United Lines for \$19,850,000

At the special election to be held on April 17, at which the voters of Detroit, Mich., will decide as to the immediate taking over of the Detroit United Railway lines, a bond issue of \$3,500,000 will also be voted on to finance the down payment of \$2,770,000 agreed upon and to purchase certain material from the company as well as furnish working capital to start with.

UNPAID BALANCE A LIEN AGAINST RAILWAY

The terms of the proposed agreement provide that the city pay \$500,000 every six months until Dec. 31, 1931, when the balance remaining unpaid would come due, interest to be paid quarterly at the rate of 6 per cent a year. It was announced that with estimates based upon a 5-cent fare, the city expects to pay its annual payments and interest charges and own the system free and clear by 1931, paying for it out of earnings.

The City Council has adopted a resolution authorizing the City Clerk and City Election Commission to prepare for the special election on April 17, and directed the appropriation of \$87,525 to cover the costs of the special election and the registration required by law to be held prior to the election. The special election in the spring was favored by Mayor Couzens believing that if the fall election were waited for, the company would let its lines depreciate in the meantime and that the earnings during the summer would be lost.

The unpaid balance would not at any time be considered as a lien against the city, but would become a lien against the railway property.

It remains for the city to obtain a 60 per cent majority at the coming election in favor of the adoption of the purchase plan. If the plan is approved the two systems now in operation in the city will be consolidated under city ownership and operation.

NO INTERURBAN LINES INCLUDED

Louis A. Goslin, a Montreal director of the Detroit United, read to the stockholders the resolution providing that they approve the action of the board of directors in accepting the offer of the city of Detroit for the company's so-called city system of railway, including tracks, overhead equipment, cars, real estate, shops etc., with certain reservations agreed upon for the price of \$19,850,000. The resolution was seconded by J. C. Butterworth, another Montreal stockholder, who was a member of the committee appointed by the Detroit United Railway to confer with the city on terms of the sale. Mr. Butterworth was active in the controversy among Detroit United Railway stockholders at the annual stockholders'

meeting when control was won by the Canadian stockholders.

A resolution read by Avila Gingras, Montreal, was adopted providing for the adjournment of the stockholders' meeting, to meet again on March 10, for the purpose of considering the formal agreement to be entered into between the company and the city for the sale of the system. The resolution further instructed the secretary to send to each stockholder of the company a notice which shall contain the general terms of the proposed sale, and advising them that a formal agreement covering the terms of sale will be submitted to the stockholders at the adjourned meeting for ratification by them.

The city's payment plan, it is understood, was received with favor by the Canadian stockholders since the company will be enabled to meet its interest charges and make a considerable saving on the difference in interest rates between what the company pays on its bonds and mortgages, and the higher rate to be paid by the city.

It has been pointed out that if the city buys the Detroit United Railway's city system the private company will still have its interurban system, which is considered one of the finest and most strategically situated in the country and the city will have a total mileage of more than 350 miles of tracks, probably the largest municipally owned system in the world.

Central New England Road to Try Gasoline Coach

Plans are under way for a tryout of the new gasoline passenger coaches of the Central New England Railroad, Poughkeepsie, N. Y., to take place in Dutchess County some time this spring.

Announcement of this possibility was made by J. W. Cuineen of Danbury, general superintendent of the Central New England, in a talk before the Dutchess County Get-Together Association recently. Mr. Cuineen said:

"We are up against a proposition the railroads never met before. We have the competition of motor buses, jitneys and motor trucks. We have no quarrel with the motor truck. There is room for it, and for the railroads, but we feel that the commercialization of the highways should be paid for. The railroads pay taxes. The railroads feel that they are not used right in allowing this competition right alongside of them.

"So in order to reduce our costs we are experimenting with what they call the gasoline passenger coach. The New Haven road was the first to use it.

"I have one in my territory operating from Litchfield to Danbury, a distance of 40 miles. There is also one from Danbury to Waterbury, a 15-mile run. The coaches carry thirty-five people and have an average speed of 40 m.p.h. Probably future cars will have larger seating capacity. We want them to carry from sixty to seventy-five passengers."

Commission Wants Friendly Suits to Determine Rights of Bodies

The California State Railroad Commission in a letter, dated March 2, to the Los Angeles Board of Public Utilities expressed its willingness to terminate on March 7 the working agreement between the two boards entered into during the year 1916 for the joint and co-operative regulation of public utilities service in Los Angeles. The letter came as a result of the determination of J. P. Kennedy, the newly-appointed public utilities commissioner of Los Angeles, to test the jurisdictional matter between the two boards in the courts.

The letter outlines that the commission recognizes that the city of Los Angeles has jurisdiction in some cases, but declares that the commission's jurisdiction includes the regulation of all service matters that "are directly connected with or related to the fixing of rates," and also in cases where the public utility under consideration renders service extending to the public both within and outside of the city. The commission suggests friendly suits that "all questions of jurisdiction may be definitely and authoritatively determined by the courts."

The commission calls the attention to the fact that the working agreement between the city of Los Angeles and the State entered into in 1916 was based upon the belief by both State and city officials at that time that "it was more important that the commission and the city both devote their energies to securing the best possible service conditions than to quarrel about whose duty it was to do the job."

The letter states further the members have no apology to make for the existence of the working agreement between the city and the state boards, which the rail commissioners say, "has promoted the best interests of the citizens of Los Angeles, who are dependent for service." The state commissioners firmly point out in their letter that "in the future we shall exercise to the fullest extent such jurisdiction as we possess under the law to secure the most efficient service for the people of Los Angeles."

City of Montevideo Seizes Tramway Undertaking

An extraordinary situation affecting not merely British interests in Montevideo but also Uruguayan credit in the markets of the world is disclosed by Mr. Betterton's question in the House of Commons on Feb. 20 respecting the forcible seizure and disbursement of the funds of a British-owned tramway system by the Municipality of Montevideo.

It appears that at the beginning of the year the employees of the two Montevideo tramway systems struck for a large increase of wages. When the strike had lasted three weeks the municipality ordered the company to resume service and the men to return to work,

promising to give the latter their terms. The service was resumed at the end of January and since the company in question was unable to pay the wages demanded the municipality forcibly seized its funds and itself paid the men.

This arbitrary action is the climax of a somewhat critical situation dating back to 1918. Tram fares have not been increased all through the war, but in 1918, with a view partly to improving the welfare of the men and partly to meeting increasing costs, the company applied for permission to raise the fares. This was refused. In 1920 the application was renewed and under a promise that it would be granted a small increase of wages was given on account. The promise, however, never materialized. The company was thus involved in heavy losses, which were further increased by the passing of some extraordinary social laws which require the company to make payments and incur expenses not provided for in its concession.

Although the welfare of the workers is ostensibly the pretext for these high-handed proceedings, an attempt to establish municipal control is suspected.

Abundance of Railway Matter Before Legislature

Massachusetts has a long legislative programme this year affecting the electric railways. All the matters are still before the street railway committee of the Legislature, no action having been taken yet on any of them. However, a few hearings have been held.

One proposition before the 1922 Legislature is for the State to buy the bonds of the Boston Elevated Railway. Another plan calls for the removal of the surface structures which the Boston Elevated Railway maintains in Harvard Square, Cambridge, in connection with its subway service there. One bill seeks to change the existing law so that the Boston Elevated may be required to reduce fares before it has paid back to the communities any of the money which it advanced in the form of taxes to pay the deficit from operation. This company owes money to all the communities in which it operates and under the present law must pay it back before it can reduce its 10-cent fare.

Another proposition affecting the conduct of the Boston Elevated gives authority to this property to extend its service into the town of Revere, taking sections of the Eastern Massachusetts Street Railway by right of eminent domain if it cannot acquire such sections by agreement.

Other proposals include jitney regulatory measures, rules for the operation of one-man cars, establishment of transportation areas, and the establishment of an eight-hour day for all street railway employees. There are bills also which call for the abolition of the corporate franchise tax for the railways and a provision that they shall be taxed on their net income instead, and for

exempting street railways from assessment to pay for the public improvements in street and bridges when ordered by the authorities and not required as improvements to the railways.

Looking to Big Things—Mitten's Idea of Success

Service Talks, published by the Philadelphia (Pa.) Rapid Transit Company, has reprinted in its March 4 issue the high spots of President Mitten's address of Feb. 28 to the members of the General Committees. "The Will to Bigger Things" should have a stimulating effect upon all the employees of the company who have been told from time to time the value of co-operating with the management.

In expressing his appreciation to the men for standing by him in this period of stress Mr. Mitten told the history of his coming to Philadelphia. He carried his story down to the recent controversy "which has given to the public a much better idea of what we are doing, and has strengthened us in many ways. It has established direct contact between the management and the stockholders, through the agency of the men in their appeal for proxies. We now feel that we are working for men and women whom we know and who know us; people who have a genuine interest in our efforts to serve them, who appreciate what we have done in the past and our aims for the future."

In urging the support of the P. R. T. stockholders, Mr. Mitten said:

Think what it will mean to have these thousands of stockholders all actively pulling for P. R. T., constructively criticising when we fall short, and encouraging us when we do well! The influence of the brain and energy thus brought to our aid defies calculation.

This entire situation is quite without precedent. I know of no other organization where the community interest between employee, management and owner promises so much. In this respect as in others, we are breaking into ground entirely new.

We are going to do wonderful things, from now on, in showing what Men and Management, when unhampered, can do in getting results. Every man will do his utmost, not merely to help earn the co-operative wage dividend, but also to prove that co-operative labor, here in America, can beat the world.

Railway Business Improves When Competition Is Eliminated

Since the removal of bus competition in Muskegon, Mich., traffic on the lines of the Muskegon Traction & Lighting Company has increased and operating expenses are being met. This conclusion is arrived at after the submission of the January report on the first full month's operation since the elimination of competing bus lines.

In January 80,352 more passengers were carried than in December. Besides, the company paid its operating expenses realizing a net of \$2,863. The report states that its earnings were not sufficient to meet interest charges, etc. The first report submitted seems to be in accord with the predictions of company officials at the time the question of bus competition was before the commission.

All Positions Filled in Richmond

Strike There Is Over—Franchise and Other Matters Up for Consideration

The strike on the lines of the Virginia Railway & Power Company, Richmond, Va., is only technically on, the company having filled all positions and restored service on all lines. Advertisements for men have been withdrawn, and President Wheelwright states that the company now has a sufficient force and will not again return to domination by the Amalgamated Association.

Under government pressure the company at Richmond consented to the formation of the union during the war and the company regards the going back to a non-union basis as a distinct gain. On the other hand, the men in large numbers are running jitneys, several hundred autos in Richmond paralleling car lines and reaching to sections of the city not heretofore served with jitneys. This has caused a large falling off in the passenger receipts.

The city authorities in Richmond have done nothing to check the jitney, and will probably take no steps in regard to jitney regulation, the new general franchise, or the special franchise for trackless trolley lines until after the primary election for members of the City Council in April. Efforts of the company to secure from the Virginia Legislature a statute placing both jitneys and street cars under the State Corporation Commission as common carriers failed, under pressure of the localities seeking to retain home rule. A local bill passed allowing the city of Portsmouth to acquire and operate public utilities.

The strike never was serious in Petersburg and was settled amicably in Norfolk. There has been much feeling generated in Richmond and Portsmouth and in labor circles generally there is much opposition to any concessions being made to the company. At the same time that the City Council of Richmond was holding meetings to protest the wage cut of car men the new city budget was reported cutting the pay of city laborers to 38 cents an hour. This has met with little protest.

The power company has notified the city that it is not financially able to undertake its part of the paving program for this year in Richmond. The franchise requires the company to pave between its tracks and for 2 ft. on either side. The streets listed for paving this year would cost the company \$250,000 including track renewals and paving. The company asserts it is unable to borrow this sum under present conditions.

Schenectady Wage Dispute Resurrected

Officials of the union of railway employees of the Schenectady (N. Y.) Railway have asked members of the arbitration board on the wage question which considered the dispute between

the union and the railway last September to reconvene. They wish the board to decide if the previous award made by it was to have affected station masters, receivers and inspectors, and if the remainder of the award should not be paid.

Ouster Ordinance on Interurban Service Likely

Notice of the introduction of an ouster ordinance was given the City Council of Saginaw, Mich., on Feb. 28. If enacted the measure will call upon the Saginaw-Bay City Railway, now in the bankruptcy courts, and the receiver to remove all tracks and overhead construction from the streets of Saginaw. The action is in the nature of a showdown between the city on one side and the Saginaw-Bay City Railway and the Michigan Railroad, operating an interurban service between Saginaw and Flint, on the other, over the question of co-operating with the city in paving work, which members of the Council assert has been delayed several years because of the local company's poor financial condition. The dispute over this interurban service was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 18.

North Shore Goes After Milwaukee-New York Traffic

Starting on Feb. 15 the Chicago, North Shore & Milwaukee Railroad put on two more fast daily trains between Milwaukee and Chicago to make connections with the "Twentieth Century" and "Broadway Limited," the two famous twenty-hour trains between New York and Chicago. This new train is called the "Eastern Limited." It leaves Milwaukee and Chicago at 9:55 a.m. and arrives at the opposite terminal at 12:10 p.m., stopping only at Racine and Kenosha, Wis. Twentieth Century passengers are received or unloaded at the La Salle Street station of the elevated, from which there is a direct entrance into the La Salle Street station of the New York Central Railroad. Baggage is carried on the same train and transferred at the same place. Broadway Limited passengers are received and unloaded at the Quincy Street station of the elevated and taxis are provided for carrying the passengers the few blocks intervening between the Pennsylvania Railroad Station and the Quincy Street elevated station. In this case baggage has to be forwarded one train ahead of the Eastern Limited in order to be put on the Broadway Limited. The North Shore Line makes reservations for Milwaukee people on the New York trains, which are held for them until the North Shore train arrives in Chicago. These trains already give promise of paying well.

As a preliminary to the starting of the connecting service Twentieth Century trainmen and porters and La Salle Street Station "Red Caps" were taken over the North Shore Line on a special train and entertained, so that they can answer any questions about this service.

Chamber of Commerce Rebukes Commission's Critics

Rebuking certain critics of the State Railroad Commission in a number of recent decisions which, it is charged, those affected have endeavored to have reversed through methods of "popular clamor and political pressure," directors of the Los Angeles Chamber of Commerce on Feb. 28 went on record to the effect that litigants "should be prepared to abide by the decision of authority, or employ the method of review and appeal provided by law." A resolution was adopted denouncing the alleged effort to change the commission's decisions through unlawful means and a copy was mailed to Governor Stephens at Sacramento.

10 Per Cent Wage Cut Proposed in Cleveland

Notice of a 10 per cent reduction in pay for all motormen and conductors, effective May 1, has just been posted by the Cleveland (Ohio) Railway.

Under the new scale of wages the Cleveland platform men will receive 50 cents an hour instead of 55 cents an hour for men in service of the company less than three months; 53 cents an hour instead of 55 cents an hour for men in the service of the company less than one year, and 55 cents an hour instead of 60 cents an hour for men in the service of the company more than one year.

Officials of the men's union announce that they will oppose the effort of the company to reduce the pay.

According to Paul E. Wilson, secretary of the Cleveland Railway, the proposed reduction will mean a saving to the company of about \$40,000 a month and insure a restoration of the 5-cent fare in Cleveland by midsummer.

Negotiations between the union and the company over the proposed reduction in wages will probably be begun about April 1.

Increased Pay Sought on Jersey Line

The employees of the Trenton & Mercer County Traction Corporation, Trenton, N. J., sent a petition to the company asking for an increase in wages after April 1, when the new agreement goes into effect, but the company replied with the announcement that the men would be expected to accept a reduction in pay of 5 and 6 cents an hour. The present maximum scale is 50 cents an hour, with 5 cents an hour extra for the one-man car operators.

The men also want some of the working conditions changed and complain about the three-shift system. They want pay for the men who have to report for work in the early morning, but who fail to obtain runs for the day. The employees claim that the company promised them higher wages when it secured the 8-cent fare, but failed to live up to this promise.

Franchise Negotiations Renewed in Akron

In answer to a request made by the city for adequate service and extensions to the present lines, officials of the Northern Ohio Traction & Light Company, Akron, Ohio, at another conference expect to submit to the city a proposed fare for incorporation in the proposed flat rate franchise grant. The alternative in case the suggested fare is too high will then be to open negotiations looking to the service-at-cost franchise.

A. C. Blinn, vice-president of the company, announced that the fare in the flat fare grant would have to be sufficient to pay the operating expenses on the city system, provide for depreciation and taxes, and give the company a fair return on its investment. He asserted that the company, in a flat fare franchise, would have to make the fare high enough so that it would not suffer losses regardless of business conditions. The traction company, he said, can not speculate whether it is going to make or lose on the franchise, but must be sure that the rate allowed will pay expenses and earn a fair return on its investment.

Figures have been submitted recently by officials of the company showing that the cost of making seven rail extensions would amount to \$1,892,024. The cost of making six bus extensions, and rail extensions on Rider Avenue together with the double tracking of East Exchange Street would approximate \$500,000, according to the figures.

The company contemplates placing in service twenty-four motor buses on the extension lines specified by Council if a flat rate franchise is adopted. Three or four would be operated on all lines with the exception of the cross-town line by the way of Johnston Street it was said, on which line five buses would be operated.

New York State Men Prepare to Negotiate New Contract

Members of the local division of the Amalgamated at Rochester, N. Y., have voted to rescind their action in separating from the Utica and Syracuse divisions in the negotiations of an agreement to take the place of the existing contract with the New York State Railways. The agreement now in force expires on May 1. As a consequence of the action taken by the men, the Schenectady division will be included in the negotiations.

For several years the divisions in Rochester, Syracuse and Utica have conducted negotiations with the New York State Railways through a joint conference board, of which P. T. Noonan, Utica, is chairman. At the annual meeting of the Rochester division last December it was decided to conduct negotiations independently.

Syracuse and Utica invited the Schenectady division to join with them in the formation of a conference board and this invitation was accepted.

Through the offices of the international union the Rochester division was asked to reconsider its action. This it did.

A committee made up of the presidents and business agents of each of the four locals has been appointed to conduct negotiations. Either side must notify the other of changes it wishes to make on or before April 1. William McGinn is president of the Syracuse division and Owen Lynch is business agent.

Self-Propelled Car Replaces Trolley

Manhattan, Kan., a town of approximately 10,000 inhabitants, is now enjoying transportation service furnished by self-propelled vehicles operated over rails. Manhattan had electric railway service for many years, but when the local power company rated its "juice" too high to please

competes successfully with another transportation system. It connects with the Manhattan cars.

"Will they go through snow?" This was a question in the minds of Manhattan citizens when the new buses were installed. Snow didn't hinder them, as they successfully plowed through a 2-ft. layer of "traffic hinderer" without hesitation. In the new cars the load is equally distributed over the four wheels, which are all driving wheels.

The cars each have a seating capacity of thirty-two persons. They have high speed reverse gears which give as much speed in reverse as forward, locomotive type cow catchers and electric starting and lighting equipment. They are heated from the motor exhaust. The entrance and exit is near the front of the car with the door operated by the driver. The chassis



SELF-PROPELLED VEHICLE OPERATED ON RAILS

the interurban company, the railway decided to dispose of the electric cars and install a "fleet" of motor buses. The interurban company purchased six buses. In addition to serving the citizens of Manhattan, it has a track leading to Fort Riley and Junction City, and offers a service which is appreciated by patrons.

Manhattan is the home of the Kansas State Agricultural College, which means that first class service is required to please the large number of students who must make their classes on schedule. The accompanying illustration shows one of the buses on Poyntz Avenue, the town's principal thoroughfare.

The Manhattan City & Interurban Railway and its patrons are apparently well satisfied with the new service. The interurban cars are registering 300 miles a day, while the city cars average 190 miles a day. The new cars are said to be handling traffic at a cost of less than 15 cents per car mile.

Five gasoline railway cars have been purchased by the Interurban company. Four of these are used on the company's steel rails, while the other car has been equipped with 40 in. x 8 in. tires for use on the pavement between Manhattan and Fort Riley. This bus

of each bus weighs 7,200 lb. The attitude of the public toward the change has been expressed by a resident as follows:

The worn out electric equipment has been sold and junked. The new cars give first-class service. This is the secret of their popularity. The town looks better since the trolley wires and poles were removed. Only half as many men are required to operate the new buses as was the case with the old cars. Cost of maintaining the right-of-way has been reduced to small proportions because the new buses are light in weight.

Mining Papers Merged

The McGraw-Hill Company has purchased the *Mining and Scientific Press* of San Francisco and on April 1 will consolidate it with the *Engineering and Mining Journal* under the name of *Engineering and Mining Journal-Press*. These two publications are the leading magazines of the metal mining industry, the *Journal* having been established in 1866 and the *Press* in 1860.

J. E. Spurr, editor of the *Journal*, will be editor of the combined weekly, while T. A. Rickard, editor of the *Press*, will be contributing editor, keeping his residence in San Francisco and representing, in particular, the Coast and Western viewpoints.

The combined publication will be issued in New York.

Attack on Pennsylvania Commission Fails

Cases brought by the Borough of Edgewood, near Pittsburgh, to test the control of the Public Service Commission of Pennsylvania over electric railway companies, were in effect thrown out by the United States Supreme Court on March 6.

The suit was that of the Borough of Edgewood, vs. the Wilkesburg & East Pittsburgh Street Railway and the Public Service Commission. The Borough of Edgewood contended that boroughs and municipalities can regulate electric railway fares in Pennsylvania under contracts made by them with the companies. The Scranton Street Railway was allowed to file a brief in this case, but was denied the right to participate in the oral argument.

Interurban Wages to Be Arbitrated

S. D. Hutchins, Columbus, Ohio, and C. S. Rich, Springfield, Ohio, arbiters in the wage dispute between the Indianapolis, Columbus & Eastern Traction Company and its trainmen, will meet in Springfield soon to attempt to draw up a satisfactory wage scale. The arbiters met in Springfield on March 2 for a preliminary conference at which time they went over the matters at issue but without coming to any conclusion. They met again on March 8 and as a result a third member will be chosen.

The wage contract under which the trainmen had been working expired on Feb. 15. It provided a rate of 49 cents an hour. When the contract expired the company proposed that the rate be cut to 45 cents. This proposal, however, was rejected by the men who insisted on retention of the 49-cent rate. After several conferences had failed to bring about an agreement both sides decided to leave the matter to a board of arbitration, one member to be selected by the company and the other by the traction employees.

St. Petersburg Wants Municipal Power Plant

The city of St. Petersburg (Fla.), has rejected the proffered contract for electrical power to run the municipal railway submitted by the St. Petersburg Lighting Company to replace the contract expiring Jan. 1, 1923. The city is planning to build its own electrical plant to supply power for city purposes. Later it may be extended for public service, but according to Public Utilities Director R. E. Ludwig, the present plans are for a plant to furnish the city's power only.

Mr. Ludwig says that the proffered prices are too high and that the conditions of the proposed contract are "too cnerous." He recommended that the contract offer be rejected and after a committee of the City Commission had investigated and returned its report,

Director Ludwig and the committee were authorized to tour the State and investigate all municipal plants as to initial cost, operating cost and other details. They are expected back and a decision will be made early in April. A petition containing the names of 2,000 citizens has been presented to the commission asking that a municipal plant be built if possible.

News Notes

Wants Electric Locomotives to Be Used.—Andrew P. Roman, assistant corporation counsel for the city of Buffalo has proposed a bill to be introduced at Albany, N. Y., compelling all railroads entering the city to use electric locomotives within the city.

Employees Notified of Probable Cut.—Wage reductions amounting to 20 per cent have been intimated in a bulletin issued to all employees of the Ottawa (Ont.) Electric Railway. It is said that the announcement will be made in April and that lower wages will become effective in May.

Denies Receivership Story.—According to a recent statement of L. M. Hobgood, president of the Fairburn & Atlanta Railway & Electric Company, Fairburn, Ga., his company is not in the hands of a receiver. In fact in his opinion the railway is one of the most prosperous in the State of Georgia. Press messages of late have announced the appointment of a receiver for the property.

Seeks Relief From Paving Expenses.—Assemblyman Everett of St. Lawrence County recently introduced a bill in the New York Legislature advocated by street railway companies which will save electric railways several millions of dollars annually. The proposition seeks to relieve the electric railway lines from paying the cost of maintaining the streets between the tracks and for 2 ft. on either side. The cost would be met by the taxpayers according to the Everett measure.

Veterans Receive Annuities.—Annuities were granted to twelve veteran employees of the Georgia Railway & Power Company, Atlanta, Ga., as a result of the first meeting of the annuities board. The most conspicuous veteran in point of length of service was Roland G. Thomas who had a service record of forty years. The plan of the railway in caring for its disabled employees was reviewed in the ELECTRIC RAILWAY JOURNAL issue of Jan. 28.

Boston "L" Takes Men Back.—According to an announcement of the Boston Street Carmen's Union many blue uniform men of the Boston (Mass.) Elevated Railway have been placed back at their former positions during the past two weeks. At a previous meet-

ing of the union it was announced that more than 300 discharged employees had been taken back by the company. These men were among hundreds of employees laid off by the Boston Elevated in carrying out its economy plan.

Columbia Men Strike.—Service on the lines of the Columbia Railway, Gas & Electric Company, Columbia, S. C., has been suspended since Feb. 15 when the men went on strike following, it is said, the discharge of several employees. The president of the union of motormen and conductors has announced that the men will operate the cars pending settlement of the differences by a board of arbitration. F. H. Knox, president of the railway stated on Feb. 25 that no such offer of arbitration had been submitted to railway officials.

Can't Oust Railway.—According to a recent decision of the State Supreme Court the Northern Ohio Traction & Light Company, Akron, Ohio, is not denied its franchise rights to operate between Canton and Massillon. Ousting the railway was demanded by District Attorney Ruff of Stark County because the company had failed to start the work of double-tracking this line and had failed to pay any instalments which had been agreed upon. An agreement was made in 1919 when the company sought a franchise for a double track agreeing to pay \$75,000 in three instalments.

Franchise Draft Waits on Information.—The matter of formulating a new franchise under which the Menominee Light & Traction Company, Menominee, Mich., will operate is being retarded. So reports the franchise committee appointed by the Mayor. The committee alleges that the traction company has not submitted the necessary information regarding expenses, earnings, investments, etc. The committee asks for further time to act and then to prepare a franchise draft from other available sources which if accepted by the traction company will be submitted to the voters at the spring election.

Wants Railway Service.—Following threats of the Indianapolis, Columbus and Eastern traction service to withdraw service on the branch line to London, Ohio, because the branch was being operated at a loss, petitions are being circulated in the town proposing a referendum on the question of granting the company an increase in rates sufficient to make up the deficit. When the matter was brought before the London Council some weeks ago, the company's request for an increase in rates was met with a flat refusal. An ultimatum was then issued by the company that unless the increase was granted in the near future, service on the line would be stopped and the tracks junked. Evidently the action of the council was not approved by the citizens generally for the referendum petitions are meeting with favor and it is anticipated that the increase will be granted.

Financial and Corporate

New York Valuation Hearings March 20

The session of the New York Transit Commission several weeks ago at which the report of the bureau of valuations was received was adjourned until March 6 so as to permit the local railroads to examine the report and its recommendations and to present their views on the matter. On March 6 the companies sought an adjournment and the hearing was put over until March 20. The valuation figures were summarized in the *ELECTRIC RAILWAY JOURNAL* for Feb. 25, page 333.

Counsel for the commission said on March 6 that considering the magnitude of the matter and the great detail in the valuation report four weeks was not an unreasonable time for the companies to have to study the report. In this the members of the commission acquiesced. Chairman McAneny said, however, that the necessity did exist of putting the commission as soon as possible in a position where it could proceed with the finalities of its plan. Judge Shearn for the commission then explained that it was his idea that all the companies ought to be ready to proceed on March 20 in the matter of any objections that go to principles that have been applied in the valuations, and that as soon as these objections—if there are any—have been disposed of the commission should proceed as it directed at the outset to take up the detailed objections of the Brooklyn Rapid Transit System and then follow down through the others in the order in which they appear in the appraisal.

After the matter had been settled of putting over further consideration of the valuation matter the commission proceeded to consider the general question of the character of service rendered by the different roads. Some of the questions thus considered are reviewed elsewhere in this issue of the *ELECTRIC RAILWAY JOURNAL*.

Consolidation Prospects Bright in Spokane

The controversy between the city of Spokane, Wash., and the electric railroads there has reached a point where the consolidation of the two companies has been agreed to and negotiations started with the city looking to an arrangement that will eliminate jitney competition. The controversy dates back to last June. At that time the railroads secured authorization from the Public Service Commission to increase fares from 6 cents to 8 cents. The city retaliated by throwing the streets open to the jitanies.

With the high mark of daily traffic in the last several years running about 75,000 passengers, the jitanies, sixty-two of which operated last month, have taken nearly 30,000, leaving the street railroads perhaps 40,000 to 45,000 passengers daily.

A plan of consolidation between the Washington Water Power lines and those of the Spokane & Eastern Railway & Power Company has been agreed upon between President D. L. Huntington of the Washington Water Power Company and M. H. McLean, Chicago, representing the bondholders of the latter company. The plan is to have a third company, the Spokane City Transportation Company, take over both city railway properties and do away with all parallel lines in the city.

It has been proposed to the city that a new franchise be issued to this company on the basis of a 7-cent fare and a universal transfer. The proposed new franchise would permit the company to withdraw from the business at the end of ten years and also to use motor buses, trolley buses or any other modern method of transportation in lieu of electric street cars.

The matter has just been presented to the City Council and there is no intimation as to the outcome. One thing is agreed even by city officials, namely, that the jitanies and street cars cannot both exist.

Income Bond Interest Declared Payable

The directors of the Third Avenue Railway, New York, N. Y., have authorized payment on April 1, 1922, of 1½ per cent interest upon the 5 per cent adjustment bonds of the company. Interest on these bonds, which is payable semi-annually, has not been paid since June 30, 1917. President Huff said:

With the reduction in cost of labor and material, surplus above paying interest on the underlying bonds has increased until, for the six months ended Dec. 31, 1921, full interest was earned upon the 5 per cent adjustment bonds. This was the first time for several years, however, that full interest had been earned for a six months' period and during the following month, January, 1922, full interest was not earned. Under these circumstances and in line with the conservatism that has always characterized the management of this property, the directors have deemed it inadvisable to pay more than 1½ per cent interest for the period ended Dec. 31, 1921.

First Dividend in Forty Years!

The dividend announcements of the London underground electric railways for 1921 were made early in February. In many cases they show marked improvement over those for 1920. The most remarkable point is that there is a dividend of 1 per cent on Metropolitan District Railway ordinary stock. That stock has received no dividend since the year 1882, and then the rate was only ⅓ per cent. Presumably the increased fares are the cause of returning prosperity. The City & South London Railway and the London Electric Railway ordinary stocks get 3¼ per cent, or about double the dividends of a year ago. Central London Railway deferred gets 4 per cent, against nothing last year.

Profit Realized in Des Moines

For the first time in several years the Des Moines (Iowa) City Railway was able to show a profit during the month of January. According to the company's report filed with the city car supervisor traffic during the month resulted in a profit of \$18,616. The total of revenue passengers carried during the month was 2,716,045, an average of 87,613 a day. Total revenues from all sources were \$215,927. Against these receipts operating and depreciation charges amounted to \$148,574. Tax charges were \$15,000 and fixed charges amounted to \$33,737. This makes a total for expenses of \$197,311.

F. C. Chambers, general manager of the company, estimates that the Valley Junction bus competition cost the company \$2,400 in profits during the month. January is the first month since the adoption of the new franchise where street cars had an entire month without competition in Des Moines from the buses. During the month service was restored to the pre-war basis.

Mr. Chambers has made study of the January fare figures which produces some interesting results as to the various charges which eat up the fare paid by the passenger. On account of the number of city policemen, firemen and charity workers who ride the cars without paying it has been figured that the average passenger revenue is 7.6 cents. Of this amount labor charges take by far the greatest proportion, namely 3.15 cents. Other charges are interest 1.16 cents, material 0.88 cent, depreciation, 0.64 cent, surplus, 0.65 cent, fuel, 0.58 cent, taxes, 0.54 cent. The item figured as surplus is the "cushion fund" provided in the recently adopted franchise to enable a reduction in fare when \$150,000 has been created.

Indianapolis Dividend Deferred

The Indianapolis (Ind.) Street Railway has announced the passing of the regular quarterly dividend on the \$5,000,000 preferred stock, which forms the underlying security of the system as it was reorganized when the Indianapolis Traction & Terminal Company ceased to operate it.

The notice to the preferred stockholders was as follows:

After a careful examination of the company's present financial resources, the board of directors deem it advisable to defer the payment of the quarterly dividend due March 1, 1922.

The urgent necessity of an increase in revenue in order that the company may meet its obligations, including the dividends on the preferred stock, and make necessary improvements is again being presented to the public officials and it is hoped that the justice of the company's claim will be recognized so that the payment of dividends may be resumed as speedily as possible.

This notice to preferred stockholders discloses that in the presentation to city officials of data concerning the company recently the company officials emphasized the need for the city so to modify the terms under which the company operates that it may give service at a profit in the future.

Deferred Payment Plan Suggested in San Francisco

An amendment to the city charter will have to be voted by the people before the city of San Francisco, Cal., can purchase the entire rights and properties of the Market Street Railway. This is the opinion of City Attorney George Lull. Conferences are now being held looking toward the purchase. Mr. Lull is reported to have said:

The charter permits us to purchase outside the city for water rights, but not for street car rights. The line running from San Francisco to San Mateo city is a big money earner for the company and is included in all the estimates of the \$40,000,000 valuation made by City Engineer M. M. O'Shaughnessy. If the voters want to purchase the system, in my opinion, they will not wish to leave out the line that makes the most money.

Mr. Lull said the Market Street Rail-

should be bought by as many people as possible.

Since the rehabilitation of the property the line is going well though not in the way of an investment. The present owner of the line has spent considerable money in putting tracks, wires and equipment in good condition so it was pointed out to the directors that it could be considered a sound business proposition.

E. W. Clark Reports Summarized

Reports of the corporations under the E. W. Clark management, Philadelphia, Pa., for the year ended Dec. 31, 1921, have been submitted. Among the companies reporting are the Commonwealth Power, Railway & Light Company System, Bangor Railway & Electric Company, Nashville Railway & Light Company,

Outlook in Findlay Brighter

Edward Goepper, president of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, told the stockholders at the annual meeting that "the outlook is now much better for a gradual return to more normal conditions within a reasonable time."

He said that the company had held its own during the last year of depression without increasing its floating debt. He said further that an adverse factor that has seriously affected receipts of all interurban lines was the constantly increasing use of the automobile as a means of conveyance for both passengers and freight. Enactment of legislation placing such motor vehicles operating for profit under state regulations as are all the railways, was urged.

	Commonwealth Power, Railway & Light Company			Bangor Railway & Electric Company			Nashville Railway & Light Company		
	1921	1920	Increase Per Cent	1921	1920	Increase Per Cent	1921	1920	Increase Per Cent
Gross earnings.....	\$31,309,259	\$31,285,981	0.1	\$1,420,471	\$1,262,779	12.5	\$3,857,852	\$3,675,209	5.0
Operating expenses and taxes...	20,865,452	22,390,298	6.8*	1,877,213	800,777	9.5	12,976,632	2,979,332	0.1*
Net earnings.....	\$10,443,807	\$8,895,683	17.4	\$543,258	\$462,002	17.6	\$881,220	\$695,877	26.6
Interest, etc.....	7,527,859	7,020,765	7.2	282,286	263,707	7.0	471,082	479,326	1.7*
Balance.....	\$2,915,948	\$1,874,918	55.5	\$260,972	\$198,295	31.6	\$410,138	\$216,551	89.4
Pfd. stock div.....	1,077,180	1,077,180	.....	108,174	105,000	3.0	125,000	125,000	.....
Balance.....	\$1,838,768	\$797,738	130.5	\$152,798	\$93,295	63.8	\$285,138	\$91,551	211.5
	(Available for renewals, depreciation, financial requirements of companies and dividends on common stock.)			(Available for financial requirements of company and dividends on common stock.)			(Available for renewals, depreciation, financial requirements of company and dividends on common stock.)		
	*Decrease. Note: Dividends on preferred stock accumulated, but unpaid since Feb. 1, 1921.			†In December, 1921, \$29,291; December, 1920, \$8,905; twelve months, 1921, \$100,647; twelve months, 1920, \$66,742 included for depreciation.			*Decrease. †In December, 1921, \$20,754; December, 1920, \$3,000; twelve months, 1921, \$186,228; twelve months, 1920, \$36,000 included for depreciation.		
	East St. Louis & Suburban Company System			Portland (Ore.) Railway, Light & Power Company			Cumberland County (Me.) Power & Light Company		
	1921	1920	Increase Per Cent	1921	1920	Increase Per Cent	1921	1920	Increase Per Cent
Gross earnings.....	\$3,818,302	\$4,368,922	12.6*	\$9,922,242	\$9,564,615	3.7	\$3,305,110	\$3,114,008	6.1
Operating expenses and taxes...	2,977,429	3,322,699	10.4*	16,992,326	6,676,157	4.7	12,242,835	2,142,835	4.7
Net earnings.....	\$840,873	\$1,046,223	19.6*	\$2,929,916	\$2,888,458	1.4	\$1,062,275	\$971,173	9.4
Interest, etc.....	654,385	647,272	1.1	2,107,733	2,101,615	.3	697,876	667,483	4.6
Surplus.....	\$186,488	\$398,951	53.3*	\$822,183	\$786,843	4.5	\$364,399	\$303,690	20.0
	(Available for financial requirements of companies and dividends.)			(Available for financial requirements of company and dividends.)			(Available for financial requirements of company and dividends.)		
	*Decrease. †Included for depreciation, December, 1921, \$26,170; December, 1920, \$17,369; twelve months, 1921, \$330,919; twelve months, 1920, \$359,417.			†In December, 1921 and 1920, \$59,782; twelve months, 1921, \$717,386; twelve months, 1920, \$642,002 included for depreciation.			†In December, 1921 and 1920, \$17,568; twelve months, 1921, \$215,220; twelve months, 1920, \$210,820 included for depreciation. Note: One year's back dividends on the preferred stock were paid in February, 1921. In May, 1921, regular quarterly dividends were resumed. There remain unpaid back dividends amounting to \$241,500.		

way offered a method of purchase at a conference on Feb. 27 on a split basis—that is, the city vote \$14,000,000 in municipal bonds and make the rest of the payments for the system out of the revenue of the line on the installment plan. The city bonds would be negotiated to take care of the \$14,000,000 bond issue made by the company, which becomes due in 1924.

Purchase of Railway Proposed

The directors of the Chamber of Commerce of Valdosta, Ga., have endorsed a plan whereby the residents and business interests of the city will buy the Valdosta Street Railway and operate it. It was suggested that a committee should be formed looking toward the organization of a holding company for the property and that stock

Light Company, East St. Louis & Suburban Company System, Portland Railway, Light & Power and the Cumberland County Power & Light Company.

The Commonwealth Power, Railway & Light Company, controlling properties in the central west, shows a balance of \$1,838,768 against \$797,738 a year ago. It is noted that in its report for 1920 this company showed a 40 per cent decrease in balance whereas in 1921 the increase amounted to more than 130 per cent.

The most appreciable increase in balance available for depreciation, renewals, etc., was shown in the report of the Nashville Railway & Light Company, where an increase of 200 per cent is seen in the balance. The statements of operations for the above mentioned properties are reproduced herewith.

In discussing the service-at-cost franchise put in effect on the city lines here last March, President Goepper said that despite deficits that had been experienced the company sees a possibility of the system finally proving a success.

Seeks to Equalize Revenues.—To equalize the revenues of the street railways in the District of Columbia, due to the fact that the present rate of fare yields a greater return to the Capital Traction Company than to the Washington Railway and Electric Company, the Senate committee on District of Columbia is considering a proposal of the Local Public Utilities Commission to tax revenues between 6 and 7 per cent at the rate of 50 per cent and in excess of 7 per cent at the rate of 75 per cent.

\$13,400,000 New Financing at Atlanta

Plans matured by the officers of the Georgia Railway & Power Company, Atlanta, Ga., over a period of a year past provide for the raising of \$13,400,000 to be applied as follows:

To pay the floating indebtedness mainly due to losses of the past four years, about.....	\$5,000,000
To complete (now about 50 per cent finished) the 80,000-hp. Tugaloo hydro-electric development, about	2,000,000
To increase to 22,500-hp. (50 per cent increase) the capacity of Morgan Falls water power development, about	400,000
To provide increased service and facilities for customers in the electric and gas departments and street car service, about..	2,000,000
In addition to the above it is estimated that during the next five years the demand for power will require additional high-tension transmission lines, costing about	2,000,000
These plans provide also for the construction of Mathis-Tallulah, Seed and Burton developments on the Tallulah River, all between the present development and Burton storage reservoir, using stored water successively, costing approximately	2,000,000
Total new cash capital needed to complete the plan	\$13,400,000

Harry M. Atkinson, chairman of the board, explains as follows:

To carry out these plans, this \$13,400,000 will have to be borrowed in the money market and expended in making these developments in Georgia and for the use of the public.

One great benefit under this plan will be that the waters of the Tallulah River will be used successively five times, where they are now used only once.

These developments will put the company in position to continue furnishing Atlanta and north Georgia continuous, efficient, dependable water power service at reasonable rates and will contribute more to the development and upbuilding of this city and section than any other one thing that could possibly come to it.

These plans are not merely on paper, but the financing has actually been done, subject only to the earning power of the company proving sufficient under the established rules of the money market to enable the company to borrow this sum. As a first step the mortgage has been prepared and has been submitted to and approved by the Railroad Commission, and the money has been secured subject alone to the security proving satisfactory.

The established rule of the money market requires earning power of a company like this of twice the amount of its fixed charges and interest and under the present rates allowed to be charged by the company only \$4,000,000 of this needed total sum can be secured at this time.

\$11,513 Net Income in London, Canada

In its annual statement for 1921 the London (Ont.) Street Railway reports an increase in its gross earnings over 1920 of \$43,138 but with an increase in operating expenses of \$32,787. Wages which were included in operating expenses amounted to \$351,476, an increase of more than \$22,000 over the previous year. Net earnings from operation amounted to \$80,522. After deductions of fixed charges and depreciation the net income realized was \$11,513.

President Currie's report makes mention of the difficulty experienced in operating the railway "at the extremely

low rate of fare of seven regular tickets for a quarter, and nine limited tickets for a quarter, during certain hours of the day." He further admits the company's inability to finance the purchase of necessary new equipment.

Lafayette Road Sold for \$201,300

The street railway system at Lafayette, Ind., was offered for sale on March 1, by Charles Martindale, Indianapolis, master in chancery. The track and the carhouse were purchased by Julius Berlovitz for \$75,000. Mr. Berlovitz stated after the sale that if the proper co-operation is extended by the city and West Lafayette authorities the system in Lafayette will be continued and the property rehabilitated.

The South Street power station, owned by the Lafayette Service Corporation, was sold to the Northern Indiana Gas & Electric Company. Emmett Mulholland, representing that company, was the only bidder. The sale price was \$120,000.

The street railway, it is announced, will continue to operate for the next thirty days under the present receivership.

Mrs. John S. Morrison, secretary of the board of trustees of the Indiana State Soldiers' Home, purchased the Tecumseh Trail property for a state park in connection with the Soldiers' Home grounds. Her bid was \$6,310.

There were no bids on the company's property as a whole.

All sales were made by Mr. Martindale subject to the approval of Judge A. B. Anderson in the United States district court at Indianapolis. The sale was ordered on petition of the bondholders of the Lafayette Service Corporation, who applied in the federal court for a receiver and foreclosure of their mortgage.

Mr. Berlovitz stated that he hoped to form a company of Lafayette citizens to take over and operate the railway. The tentative plan is to eliminate a few short stretches of unproductive track, if it is deemed advisable. The city and West Lafayette authorities will be asked to give the company proper protection by elimination of competition from jitneys. If this is done, it was stated, the company will proceed at once to rehabilitate the lines with new cars, the tracks will be put in proper repair and the line up Main Street hill will be relaid and cars put in operation.

Judge Anderson did not order the property appraised, but fixed an order that the railway and the carhouse which were purchased by Mr. Berlovitz, could not be sold for less than \$65,000; the power plant purchased by the Northern Indiana Gas & Electric Company for \$120,000, to be sold for not less than \$95,000, and the Trail property, purchased by the trustees of the Soldiers' Home for \$6,310, to be sold for not less than \$6,000. The total amount realized from the property was \$201,300, while the total indebtedness against the property is \$225,000.

Pittsburgh Railways Nets \$162,989

The Pittsburgh (Pa.) Railways finished the year 1921 with a surplus of \$162,989, whereas in 1920 it showed a deficit of \$910,057. The year's operating figures are contained in the report of the receivers, filed with the United States Court.

Though the total of 311,863,881 passengers for 1921 is 11,255,479 below the number for 1920, the increased fare allowed the company to enlarge its operating revenue by \$218,709. Daily

	1921	1920
Operating revenue.....	\$21,541,312	\$21,322,503
Operating expenses and taxes.....	17,661,992	18,754,795
Operating income.....	\$3,879,319	\$2,567,707
Non-operating income....	190,631	172,292
Gross income.....	\$4,069,951	\$2,739,999
Fixed charges.....	3,720,463	3,424,498
Receivers' net income, Surplus.....	\$349,488	.....
Deficit.....	.....	\$684,498
Less verdicts, settlements, pre-receivership damage claims.....	186,498	225,588
Net income, surplus.....	\$162,989	.....
Deficit.....	.....	\$910,057

receipts, which in January were \$61,666, were only \$56,839 in December. This is a decrease of \$4,827 a day.

The company increased its car mileage from 37,586,235 miles in 1920 to 37,974,664, though passenger travel decreased.

Chief items in the expenditures, including \$90,000 receivership fees, were semi-monthly wages motormen and conductors and others, \$10,203,220.28; monthly salaries, \$694,389.82, and repairs to tracks and equipment \$313,131.92. The financial showing for 1921, compared with 1920, as disclosed in the report of the receivers, is shown in table above.

Application Made for Permission to Abandon Line

Application was filed on March 6 with the Ohio Public Utilities Commission by the Springfield & Washington Railway, operating between Springfield and South Charleston, Ohio, for authority to abandon service on the line. The application was set for hearing by the commission for April 14.

Notice that such application would be filed was given some time ago by Floyd Baker, one of the owners, who said that since the Springfield manufacturing and wholesale concerns had been using their own motor trucks for delivery to South Charleston, the line had been operating at a loss. A committee of citizens from South Charleston and Springfield are now attempting to form a company to take over the line.

The line was originally intended to extend from Springfield to Washington Courthouse, Ohio, but when the right-of-way had been extended to South Charleston, the company ran out of funds and the line was never extended any farther.

Receiver Appointed for Pennsylvania Property

On application of the First National Bank, Bangor, Pa., which alleges that the Slate Belt Transit Company, Pen Argyl, Pa., has an indebtedness of \$23,000, the Northampton County Court has appointed Oscar J. Mutchler receiver for the company. The transit company did not oppose the receivership. The court has also appointed George Rasely, Mount Bethel, and Henry A. Male, Pen Argyl, appraisers.

The Slate Belt Transit Company has been operating in the slate regions since 1900 and maintains lines between Bangor, Pen Argyl, Wind Gap and Belfast. Joseph Hambleton, for many years president of the company, has been appointed manager by Receiver Mutchler. The latter has been authorized to carry on the business of the company and operate the line.

Cambridge Subway Deal Will Pay for Repair Shop

Proceeds of the sale of the Cambridge Subway will finance the big repair shop at Everett which is being planned by the Boston (Mass.) Elevated Railway. The Boston property received \$7,868,000 for the tube between Boston and Cambridge. Some \$4,500,000 of this sum has already been used to pay off maturing bonds, which it was not deemed expedient to attempt to refund under then prevailing bond market conditions. The road's treasury is, however, entitled to be reimbursed for this \$4,500,000 and when it is decided that a good time has arrived the railway will arrange this postponed refunding operation and in that way secure funds for this construction.

Financial News Notes

Reorganized Company Pays Dividend.

—The directors of the Market Street Railway, San Francisco, Cal., have declared a dividend of \$1.50 a share on the prior preference stock applicable to the quarter ending March 31, payable April 1, to stock of record March 15.

Bankers Offer Public Service Stock.

Bonbright & Company, New York, N. Y., are offering \$3,700,000 of 8 per cent cumulative preferred stock of the Public Service Corporation of New Jersey. The price per share is \$100 and accrued dividends. This is the same issue of which more than \$1,000,000 has been subscribed by the company's patrons.

More Collateral to Be Sold.

—A notice has been issued to holders of securities pledged under collateral trust agreement of the Memphis (Tenn.) Street Railway dated Nov. 1, 1917, securing two-year 6 per cent collateral gold notes that the trustee will offer for sale

at public auction at New York on March 15 all securities pledged under the collateral trust agreement.

Earnings Better at Pine Bluff.—The Pine Bluff (Ark.) Company reports for the twelve months ended Jan. 31, last, gross earnings of \$788,812, contrasted with \$773,363 the preceding year and a surplus after preferred dividends of \$127,312, against \$93,498. In January the company's gross was \$66,957, compared with \$68,185 in the same month of 1921 and a surplus after preferred dividends of \$12,469, compared with \$11,768 last year.

\$865,000 Bonds Offered.—Harvey Fisk & Sons, Inc., New York, N. Y., and Cassatt & Company, Philadelphia, Pa., are offering \$865,000 of the Darby, Media & Chester Street Railway's first mortgage 4½ per cent Gold Bonds. This property is part of the Philadelphia Rapid Transit System, which has guaranteed the bonds as to principal and interest. The bonds are offered at 81½ and accrued interest to yield more than 6½ per cent. They are dated July 1, 1906 and are due July 1, 1936. The offering was quickly oversubscribed.

Presentation of Valuation Case Concluded by Company.—Coleman J. Joyce, counsel for the Philadelphia (Pa.) Rapid Transit Company, announced on March 1 at a valuation hearing before Public Service Commissioner Clement that his side in the valuation proceedings has finished the giving of direct testimony. Mr. Joyce said he had no more testimony to bring before the commission, but would submit some financial data having a bearing on the matter. Assistant City Solicitor Samuel Rosenbaum, representing the city in the proceedings, informed Commissioner Clement that his side desired a month's time in which to prepare a report to be submitted to the commission.

Reclassification of Stock Proposed.

A special meeting of the stockholders of the United Gas & Electric Company, New York, N. Y., a subsidiary of the United Gas & Electric Corporation, was called for March 6, to ratify action of the board of directors in reclassifying the present common stock. At present the company has 26,210 shares of common, par \$100, outstanding. It is proposed to change this into an equal number of shares having no par value. The 3,790 shares of common remaining unissued after the exchange the company will reserve for issuance at such prices as the directors may determine, subject to approval of at least two-thirds of the common stockholders.

Fewer Passengers in Richmond.—In response to a request from the street committee of the Council of Richmond, Va., President Thomas S. Wheelwright recently forwarded to that body a statement of the number of passengers transported over the lines of the Virginia Railway & Power Company in Richmond during the years 1920 and 1921, in which it was shown that there was a decrease in 1921 over the previous year of 3,774,831 passengers hauled in the city of Richmond alone. The figures

were: 1920, 46,611,097; 1921, 42,836,265. So far this year, the figures are far below those of the previous periods. This statement was filed for reference when the committee begins its work of framing a franchise.

Plea Made to Discontinue Local Service.—Informing the City Council of Bellefontaine, Ohio, that the city service maintained over the traction line in that city was a continually losing proposition, F. A. Healy, general manager of the Indianapolis, Columbus & Eastern Traction Company, has applied to the Council for permission to discontinue the service. The franchise under which the company operates, has eleven years to run. The company offered to stop all limited as well as local inter-urban cars at each street intersection permitted to remove the local car. No definite action has yet been taken by the Council, but a canvass of the members indicates that the request will be opposed by a majority if it is brought up for a vote, the Councilman contending that the land along the right-of-way has been built up because the home owners expected continued city service.

Bonds Authorized to Provide for Improvements.—A bond issue of \$195,000 authorized by the Railroad & Public Utilities Commission for the Knoxville Railway & Light Company, Knoxville, Tenn., will be sold to create funds with which to finance the building of the new substation now in progress of erection at the power house on Sixth Avenue. This was announced by Col. C. H. Harvey, president of the company. The new substation will cost approximately \$220,000, although no exact figures can be arrived at until the work is complete. Col. Harvey explained that the charter of the company allows it to issue and sell bonds to the extent of 80 per cent of expenditures for improvements. The \$195,000 to be issued and sold will be 80 per cent of the amount that will have been expended when the present improvements are completed.

Authority Sought to Issue Refunding Bonds.—The Northern Ohio Traction & Light Company, Akron, Ohio, has asked the Ohio Public Utilities Commission for authority to issue and sell \$1,225,000 first lien and refunding mortgage 7 per cent gold bonds, proceeds to be used in payment of \$1,145,000 Canton-Akron Railway bonds due March 1, 1922. In requesting the 7 per cent rate, the company held that prevailing market conditions necessitated the paying of higher interest at this time on traction securities. An issue on \$1,145,000 of first and refunding mortgage 5 per cent gold bonds originally was authorized by the commission July 21, 1916, to pay for the acquisition and redemption of first mortgage bonds of the Canton-Akron Railway, which is part of Northern Ohio Traction & Light Company's system, and on May 6, 1919, the commission authorized an issue of \$80,000 in bonds, dated Aug. 1, 1916, to reimburse the company's treasury for capital expenditures.

Traffic and Transportation

Fares in Springfield

Bus Competition Removed in Ohio City, but Revenue Still a Problem—Pass Being Talked

Although agitation has been started for a reduction in fares by the Springfield (Ohio) Railway, it is more than likely that the 7-cent rate will be continued for some time to come at least.

This is indicated by the monthly reports filed with the city manager, which continue to show a deficit with no relief in sight. The reports are filed with the city under the terms of an ordinance passed some months ago granting an increase in the fare from 5 to 7 cents with free transfers.

BUSES INCREASE COMPANY'S FINANCIAL EMBARRASSMENT

According to the report for the month of January, filed March 1 with the city, the company sustained a loss of \$5,704. This sum does not include accrued dividends due on the company's preferred stock, amounting to \$2,500.

The report shows that 766,351 passengers were carried during the month. Gross income for the month was placed at \$49,837. Expenditures charged against this included: Operating expense, \$40,034; taxes, \$3,667; interest on funded debt and other fixed charges, \$1,639; monthly installment of street improvement assessments for 1922, \$199.

The critical financial situation faced by the company was rendered more acute last fall when bus lines were established along routes followed by the company's cars. As the buses began operating practically overnight, there was no regulatory ordinance to govern them. Complaint was voiced by the railway when the bus operators began running their machines just ahead of the street cars and picking up persons along the way who otherwise would have ridden on the cars. These were attracted to ride in the buses, first, because the bus arrived before the car, and, second, because the buses charged a 5-cent fare whereas the railway fare was 7 cents. The railway charged that this was manifestly unfair competition.

ORDINANCE PROVISIONS MADE AGAINST BUSES

Continued demand for some action resulted in the adoption on Jan. 9, 1922, of a bus regulatory ordinance, passed as an emergency measure. Because the terms of the ordinance were so drastic, however, the buses were allowed a period of thirty days to comply with its provisions.

The most drastic provision in the ordinance was the one barring the buses from the routes followed by street cars. Another provision considered onerous by the bus operators was the one re-

quiring indemnity bonds to be furnished by the operators to cover legal damages assessed for possible accidents occurring to passengers or others as the result of the bus drivers' alleged negligence. It was specifically stated, however, that the amount of the bond was not to represent the limit of the operator's liability should the courts allow a larger award than the amount of the bond. These bonds ranged from \$1,000 for machines having a carrying capacity of not more than six persons to \$20,000 for machines whose seating capacity exceeded sixteen persons.

Annual license fees were also provided. These were \$10 for all machines whose seating capacity was fifteen or less, \$150 for each bus whose seating capacity was sixteen to twenty-five passengers and \$250 for all buses having a seating capacity exceeding twenty-five persons.

Other provisions included in the ordinance required buses to be operated on regular schedules, be subject to inspection without notice by city officials, requiring the display of route signs in a prominent place on the front and sides of the machines, prohibiting the carrying of an excess of more than 25 per cent of the rated seating capacity, forbidding the collection of fares while the bus is in operation, requiring tire chains and fire extinguishers to be carried, requiring them to stop on the far side of streets to take on and discharge passengers, requiring two exits, one to be at the rear of the machine, and specifying lighting systems.

BUS LINES QUIT

Few of the bus lines continued in business after the period of grace for the ordinance had expired. The operators at first decided to carry the battle into court to test the legality of the ordinance, but changed their minds, some of them removing their buses to other cities. In two cases, however, where bus service was continued, the owners made test trips over the prohibited routes. Their arrest followed and every preparation was made to carry the fight to the Supreme Court when it was discovered that there was a flaw in the original warrants which caused the cases to be thrown out of court. Since that time those bus operators which have continued service have made no effort to attack the terms of the ordinance.

This regulation of the buses helped the railway in doing away with unfair competition, but the deficit in the earnings of the railway still continues, with both city officials and company officers attempting to find a satisfactory solution. At the present moment the weekly "pass" system is being considered, but whether this will be adopted remains to be seen.

Decision From State Supreme Court Expected

The State Supreme Court is expected to reach a decision on March 15 in the controversy between the State of Louisiana and the City of New Orleans. In this contest the state disputes the authority of the city, through its Commission Council, to negotiate with the New Orleans Railway & Light Company on rates of fare, gas, electric light and other matters affecting the public utilities of the city. The case was argued at great length before the full court of nine judges, this being the first case in the history of the state to come before the court since its personnel was increased from seven to nine judges.

It is anticipated that the court in its forthcoming opinion will take up all phases of the car tangle and will once and for all, in a comprehensive decision, settle the matter of the 5-cent fare litigation.

The argument in the case was opened by the state's Attorney General Cocco, who contended that the rate-making authority was vested in the Public Service Commission, under the Constitution of 1921, while City Attorney Kittredge and H. G. Dufour, representing the railways, maintained that the Legislative acts of 1912 granted the City of New Orleans the right to fix fares and other rates.

46,608,899 Pay Fares at Times Square Stations

The Times Square stations of the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company handled the most passengers during 1921 of any of the stations of the New York companies. Figures which the Transit Commission has compiled show that 46,608,899 persons paid fares at these two stations. Experts say that fully as many persons leave the trains as board them at these stations, which makes a total of 93,217,798 persons passing through the stations, or an average of 182,788 daily. The Interborough station at Times Square handled 1,413,188 more persons than did the station at Grand Central, while the Times Square station of the Brooklyn Rapid Transit handled 2,157,860 more persons than the Union Square station, its nearest competitor.

At Times Square in 1921, 30,400,905 passengers took Interborough trains, and 16,207,994 boarded cars of the Brooklyn company.

Increased Rates in Effect

The Toledo, Bowling Green & Southern Traction Company recently increased the rates of fare between Bowling Green and Toledo, Ohio. The new fare to Toledo is 50 cents one way and 90 cents round trip. This represents an increase of 10 cents one way and 14 cents round trip. The fare to Maumee has been increased 5 cents one way and 10 cents round trip.

Service Standards to Be Promulgated

New York Commission Developing Plans for Requiring Increased Service Based on the Improved Financial Ability of the Companies to Increase Facilities

The question of the adequacy of service furnished by the railways in New York City is now before the New York Transit Commission for consideration. The commission announced at the session several weeks ago at which the valuation figures were presented that it was prepared to go into the general question of the character of the service rendered. After postponing on March 6 further consideration of the valuation details it did proceed on that day to inquire into the adequacy of service.

CHAIRMAN MCANENY explained that the question of service was taken up for the double purpose of securing the entry and enforcement of orders improving service as rapidly as possible in view of the improved financial condition of the roads and also in order that the railways, at the time the commission is concluding its examination of the valuations, shall appreciate how the service in the future will affect their costs.

HIGH STANDARDS TO BE EXACTED

The chairman emphasized the point that the commission was not introducing this general subject at this time as a threat of any pressure to be brought against the companies while the commission was considering these matters. On the contrary, the improvement of the service of the roads is and has been a prime consideration from the beginning. Conditions were improving with the companies and the commission desired it understood that the highest standards of operating service were going to be exacted. Mr. McAneny said:

"While we are bent upon a reorganization of the system that will improve its physical condition and that will be susceptible of extension at the same time we are bent upon securing the best kinds of train and car service that the lines can give."

With that object in view two or three months ago the several bureaus of the commission were instructed to work in co-operation in perfecting their observations of actual traffic and of preparing a standard set of operating principles toward which the companies would be expected to move as rapidly as their means might permit.

MR. TURNER DESCRIBES OVERCROWDING

Mr. Shearn, counsel for the commission, called as the first witness Fred W. Lindars. He was questioned at considerable length with respect to the recent financial showing of the various companies. Mr. Lindars was followed as a witness by Daniel L. Turner. He said that in connection with the valuation work a large number of observations had been made on the various lines, subway, surface and elevated. While that work was carried on men under him had been co-operating with Mr. Turner in considering proper standards of service that might be put into operation if the city could have the benefit of the economies contemplated in the adjustment plan.

Observations and reports made by Mr. Turner were then introduced into the evidence. He was examined with respect to some of these so as to establish the method of procedure in compiling the report. Mr. Turner testified to an overload of 247 per cent in the subway at the peak of the rush-hour traffic and an overload of 2 per cent at the time of minimum traffic. In other words nearly 250 people were crowded into a car with a seating capacity of fifty. During the rush the variation of headway was from 1 minute and 40 seconds to 4 minutes. Traffic varied in the number of cars from 120 during a twenty-minute period to forty-four cars during a twenty minute period.

Mr. Turner said that there was no operating reason why the local service interval could not be maintained at the most at two minutes and thirty-seven seconds whereas it was maintained on a five-minute interval. The underlying motive at the bottom of the company's policy was to make a profit. On the other hand, the primary consideration of the passengers is to secure adequate and proper service.

A RUNNING FIGHT IN INTEREST OF PASSENGERS

Mr. Turner said it has been one continuous struggle to enforce proper service by the operating companies. Counsel for the commission thought that that body would be warranted in instituting service orders. Chairman McAneny said that the point had been reached where the commission would be justified in taking much stronger measures than have been possible in the immediate past; in the first place, toward getting back to interrupted standards and then in setting up standards for the future.

Mr. Turner stated for the record what in his view and that of his associates should be the principles that ought to control proper standards of service for the various transit lines under the plan that the commission proposes. These are summarized as follows:

1. That on rapid transit lines frequent train service must be the fundamental principle. This may mean that during the middle of the day the headway on the trunk lines must be reduced to two minutes, and possibly to even less under some conditions.
2. That the amount of service on rapid transit lines must be made to respond to the traffic demand by varying the number of cars in the trains, rather than by changing the headway between trains.
3. That the service provided over the trunk lines, or through the line controlling points, must be distributed over the branches

of the rapid transit lines in proportion to the traffic on such branches.

4. That during the rush hours, the express and local service in one or both directions, as the traffic requires, past the maximum load point during every twenty-minute period must be the maximum that the line capacity will permit, the headway between trains must be the shortest possible, and the number of cars in the trains the maximum possible.

5. That, during the non-rush hours, on the express and local trains, in one or both directions, as the traffic requires, seats for all passengers must be provided during every twenty-minute period past the maximum load point, the headway remaining as nearly constant as practicable at the specified minimum headway and the number of cars in the trains varying with the traffic.

6. That during the period immediately preceding the rush hours, as traffic increases, the service must be increased, on a seat per passenger basis, by adding cars to the trains and shortening the headway, until the maximum service is equalled. Similarly, at the end of the rush hour, the service must not be reduced by taking off cars too soon.

7. That, therefore, on the rapid transit lines, the adoption of the preceding principles means generally that on every day, during all hours of the day, rush hours, mid-day and night, either seats or the maximum service that the line capacity will permit must be provided during every twenty-minute period.

8. That on the surface lines, during the rush hours, the headway between cars must not exceed ten minutes and the minimum headway the line capacity will permit, depending upon the traffic and the overloading permitted.

9. That on the surface lines during the rush hours a certain amount of overloading, or excess of passengers over seats may be permitted during each twenty-minute period, past the maximum load point in one or both directions as the traffic may require, the permissible overload will be specified for each line, depending upon the characteristics of the traffic service and equipment on such line, and the limitation of track capacity. Except where track capacity is the limiting factor, such excess of passengers over seats, if the headway between cars is ten minutes a seat per passenger, service must be provided. The permissible overloading may vary between these limits, as determined by the commission, depending upon the type of car and headway being operated.

10. That on the surface lines during the non-rush hours, in no case should the headway be greater than ten minutes in the middle of the day between the morning and night rush hours.

11. That also during the non-rush hours, on the surface lines, a sufficient number of cars should be operated to provide a seat for every passenger during every twenty-minute period in one or both directions, as the traffic may require, past the maximum load point.

12. That during the period immediately preceding the rush hours, as traffic increases, cars must be put into service on a seat per passenger basis, until the number of cars in operation equals that required for the rush hours.

13. That similarly, at the end of the rush hours, the number of cars shall not be reduced until the traffic has fallen to a point providing a seat for each passenger, after which the service may be stepped down in accordance with this standard.

14. That during all hours of the day the car movement must be speeded up to the maximum possible and regular headways must be maintained.

15. That, therefore, on the surface lines, the foregoing principles mean generally that during all hours of the day, rush hours, mid-day and night, either seats during every twenty-minute period, or a specified maximum service must be provided.

16. That short line and turnback service must be scheduled on the basis that the service beyond the point considered must be such that on any three consecutive cars there must be provided an average of a seat per passenger.

The standards thus developed are not, it was explained, to be based on the ability of the companies to meet them with their present equipment and facilities, but rather with the capacity that can be developed by the companies with the necessary betterments in construction, equipment and operating agencies worked out with the co-operation of the commission.

Fare Hearing Shows Boise Company Borrowed to Pay Interest

The Boise Valley Traction Company, Boise, Idaho, has paid interest on its outstanding bonds with money borrowed from the Idaho Power Company. This was disclosed at the hearing before the Public Utilities Commission concerning the application of the traction company for a 10-cent fare.

The city protested against a 10-cent fare grant by the Public Utilities Commission, and also requested that the traction company show in detail how it lost the \$54,572 in 1921 claimed in the petition.

The fact that the Idaho Power Company has aided in financing the traction company will have some bearing, it is thought, on its valuation proceeding now before the Public Utilities Commission. If working capital has included funds to finance another company, the commission will have to take this into consideration when it investigates the cost of obtaining the capital.

The Boise Valley Traction Company owns and operates the interurban lines, the South Boise line and the Eighteenth Street and Tenth Street belt lines. It is asking for increased fares on the South Boise line and the two belt lines.

Average revenue on the belt lines in 1921 was 4.91 cents a passenger and the average operating expense was 5.77 cents a passenger, the application states, or a deficit for each passenger of 0.86 cents. The company estimates that the increased rate will give it a revenue of \$50,526. If the increase is allowed the revenue on the South Boise line will be increased from \$16,637 in 1921 to \$20,957.

At the hearing it was brought out that the 1921 power bill for four cars on the loop lines of the company and one on the South Boise line in 1921 was more than \$18,000. City Attorney Lampert compared this statement with the power bill of \$13,000 for six cars operated by the Boise Street Car Company.

The company has done no publicity work for several years toward increasing its business on its lines, according to the commission. No information concerning the advantages in buying strip tickets or commercial tickets in large quantities has been circulated among the passengers for several years.

Arguments are to be heard by the commission before it can render a decision.

Authorizes Five-Cent Fare in Hamilton

The City Council of Hamilton, Ont., by a vote of eleven to nine has authorized the Hamilton Street Railway to charge a straight 5-cent fare. The order states that the higher fare can be put into effect at an early date, remain in force until the end of the year and thereafter at the pleasure of the succeeding councils.

The relationship between the city

and the traction company has been a strained one for some time now over the matter of fares. The electors had shown their disapproval of the 5-cent fare by a large majority on Jan. 2. The Mayor, however, urged the higher rate for the company stating that there was not another city in America, the size of Hamilton, where people could ride at a lower rate than 5 cents. The fare agitation in Hamilton has been referred to previously in the *ELECTRIC RAILWAY JOURNAL*.

First Week of Pass in Fort Wayne Satisfactory

At the close of the first week's sales of the new weekly passes in Fort Wayne, Ind., S. W. Greenland, general manager of the Indiana Service Corporation, reported that the reception given the innovation by the Fort Wayne public was very satisfactory. Nearly 3,100 passes were sold the first week and it is expected that this number will increase. A tendency developed during the first week for the possessors of passes simply to tell the conductor that they had passes and to try to get out of the trouble of exhibiting the passes. But the rule of making every pass owner, who wished to use his pass, show it, was rigidly enforced and it is felt that this little difficulty will be entirely done away with in a short time.

Mr. Greenland declares that it depends on how the public overcomes all little points of friction in connection with the use of the passes whether the system will be maintained. He declared that the plan had been put into effect with the thought of speeding up the service and that it must not be allowed to become a hindrance in operating the cars efficiently. Passes good for a week on all city cars of the Indiana Service Corporation are sold for \$1. They are interchangeable.



Six-Cent Fare Allowed.—The Ohio Electric Railway, Springfield, Ohio, has received permission from the City Council of Newark, Ohio, to charge a 6-cent fare in that city for a period of one year.

May Try Trackless Trolley.—It is reported that the Grays Harbor Railway & Light Company, Aberdeen, Wash., may apply for franchises to outlying districts of the harbor cities in order to test the new trackless trolley system.

City Council Approves Five Cent Fare.—The City Council of Buffalo, N. Y., has indorsed a proposed amendment to the state law to limit electric railway fares in cities of the first and second class to 5 cents with free transfers.

Retrouting in Effect in Chicago.—Retrouting of cars of the Chicago Surface Lines in the downtown district of Chicago, Ill., under a plan proposed by John A. Beeler went into effect recently. For the most part the operation was satisfactory.

Reduced Fares in Effect.—Reduced fares of 16.2 per cent went into effect on all lines of the Connecticut Company on March 1. The tokens, three for 25 cents, have been on sale since Feb. 25 and there has been a liberal demand for them. The casual rides will still pay 10 cents unless they have tokens at the reduced figure. The tokens are obtainable at all central offices of the company and from car conductors. They may be obtained in large or small lots.

Approves of Increased Fares.—At a meeting of business men and prominent citizens of Springfield (Ore.) recently, unanimous approval of the proposed advance in the fares of the Springfield-Eugene electric line was given. T. L. Billingsley, superintendent of the company's electric railway lines, gave figures to show that the company is losing money under the present fare of 10 cents between Eugene and Springfield, and 5 cents on the city lines. It is proposed to advance the fares to 12 and 6 cents, respectively.

Five-Cent Fare Defeated.—During consideration by the Senate of the District of Columbia Appropriation bill, Senator Harrison of Mississippi sought the adoption of an amendment providing for a 5-cent street car fare, or six tickets for a quarter in the National Capital. Senator Jones, of Washington, also favored the amendment. A point of order against the amendment by Senator Phipps, Colorado, in charge of the bill was overruled by the presiding officer and the Senate then by a vote of 27 to 21 defeated the proposal.

Establishes Two Zones.—The Frankford, Tacony & Holmesburg Street Railway, Philadelphia, Pa., has been granted permission by the Public Service Commission to establish two zones and to charge an 8-cent fare in each zone. Tickets, good in either zone, will be sold in groups of eight for 50 cents. Monthly commutation books for \$4.50 will also be sold on all passenger cars, good for fifty-two trips between Linden Avenue and Bridge Street. The first zone extends from the county line to Decatur Street and Frankford Avenue. The second extends from Frankford Avenue and Bridge Street north on Frankford Avenue to Blakiston Street, east on Rhawn Street from Frankford Avenue to the company's carhouse at State Road and Robbins Street and east on Bridge Street from the corner of Franklin Avenue to the company's carhouse. The company has two routes, one of which is leased from the Philadelphia Rapid Transit Company and is the connecting railway line between the Philadelphia Rapid Transit lines on the south of the city and the Trenton & Bristol Street Railway on the north.

Personal Mention

E. J. Murphy Made Statistician

Association Recognizes Service to the Industry of Its Acting Statistician by Promoting Him

E. J. Murphy has been appointed chief statistician of the American Electric Railway Association. Since the changes effected as a result of the reorganization at association headquarters last year, Mr. Murphy has virtually been carrying on the duties as indicated by the above title. He has been in charge of the preparation of the special monthly reports and compilations prepared by the Bureau of Information and Service, the editing of the proceedings and advance reports of committees and the publication of the *Engineering Manual*.

Mr. Murphy was graduated from the



E. J. MURPHY

College of the City of New York in 1915 with the degree of Bachelor of Science. Subsequently he took several courses in statistical methods and the general theory of accounting at Columbia University. After a short experience as a rater in compensation insurance he came to the association in 1916 as an assistant statistician. Except for a period of military service in 1918, he has been with the association ever since.

Since the appointment of Mr. Welsh as executive secretary Mr. Murphy has taken a large part in the handling of the affairs of the Engineering Association and acted as secretary at its meetings during the last convention. His special field, however, has been general statistical work, and he has been a regular contributor to *Aera* on the subject of electric railway conditions as revealed by statistical data received at association headquarters.

With the appointment of G. C. Hecker as special engineer, as reported in these columns last week, it will be possible to expand the work heretofore carried

on at association headquarters and Mr. Murphy will be able to devote his time in a greater degree to financial matters and to the general statistical work of the association, thereby enlarging this branch of the association's service.

F. L. Butler Given New Duties

Frank L. Butler, for the past year manager of the railway department of the Georgia Railway & Power Company, Atlanta, Ga., has been appointed general operating superintendent in charge of the railway, gas, electric and steam heating departments. He will also have charge of all matters pertaining to public service. Mr. Butler is also vice-president and a member of the board of directors of the Atlanta Northern Railway. He succeeds W. H. Glenn, who resigned as operating manager several months ago. He is recognized as an able executive in the gas and electrical industry, and as manager of the railway department for the company he has superintended the extensive improvements that have been carried out the past year. Mr. Butler, before assuming his position as manager of the Atlanta company, was manager of the Winnipeg (Man.) Electric Railway. He has also served with the Chicago & West Towns Railway and the Suburban Railway, Chicago, and the Alton, Jacksonville & Peoria Railroad.

J. R. Marsh Enters Utility Publicity

John R. Marsh, for the past two years on the editorial staff of the *Atlanta Georgian*, has been appointed assistant manager of the public relations department of the Georgia Railway & Power Company, Atlanta. Mr. Marsh has an exceptional record as a newspaper man in Atlanta. He has been connected with the *Lexington Leader* and *Lexington Herald*, and is a graduate of the University of Kentucky. He succeeds Paul Warwick, who is now with the Georgia Committee of Public Utility Information as executive secretary.

W. B. Spencer, who has been in charge of the transportation department of the Rhode Island Company, Providence, was recently appointed assistant to the president. He will be in charge of public relations.

John J. Treacy, president of the New Jersey Board of Public Utility Commissioners, has tendered his resignation for the second time since he was appointed a year ago. He wishes to resume private law practice in Jersey City.

Fielder Sanders, Street Railroad Commissioner of Cleveland from 1916 to 1921, resumed the practice of law in Cleveland on Feb. 15, with offices in the Hanna Building. Mr. Sanders

was judge of the Municipal Court from 1912 to 1915. A review of his work, particularly that in the utility field, was published in the *ELECTRIC RAILWAY JOURNAL* for Jan. 7, page 60.

W. P. Bailey Retires

After Many Years as Traffic Manager He Leaves Olean, Bradford & Salamanca Railway

After thirty-three years of almost continuous service in the railway field, W. P. Bailey, traffic manager of the Olean, Bradford & Salamanca Railway, Olean, N. Y., retired from his work on March 1. He will enter business with Floyd L. Kelly, Olean. Mr. Bailey's health necessitated his giving up his very trying work.

Mr. Bailey's railway experience centered in the middle Western territory from 1903 to 1910. During this time he held various positions with the Indianapolis & Northwestern Traction and the many consolidations which form the Terre Haute, Indianapolis & Eastern Traction Company. He made for himself a prominent name among officials



W. P. BAILEY

in the electric railway industry throughout the central part of the United States, and when in 1910 he transferred his activities to the Eastern coast as general freight and passenger agent for the Western New York & Pennsylvania Traction Company, Olean, N. Y., he extended his reputation in this new district. In a year's time he proved his capacity for excellent and seemingly unlimited work and was made general freight and passenger agent, with management of the parks operated by the company. His greatest single contribution to the company might perhaps be said to be the building up of the freight revenue. This department he recognized was a source of income insufficiently developed. He therefore devoted his attention to realizing from it all its possibilities. After an illness of a year he returned to his work in this department until the reorganization and taking over of the property of the Olean, Bradford & Salamanca Railway. He was then appointed traffic manager of the newly organized company, the position he has since held.

Charles R. Bohannon, for many years district purchasing agent and commercial manager for Southern Indiana of the Interstate Public Service Company, Indianapolis, Ind., is now manager of the lines at Jeffersonville. He succeeds Albert Keller, who now is associated with the American Public Service Company, Chicago, Ill.

J. F. Heyward, formerly general manager of the Cincinnati Traction Company, Cincinnati, Ohio, now retired and a resident of Tampa, Fla., has offered his services to the Quarter Million Club just organized and has been assigned to head the industrial bureau. This bureau has charge of investigating the financial stability of industries applying for the club's assistance and also the ability of such industries to be successful in Tampa. Mr. Heyward was formerly prominent in industrial, financial and engineering circles in the Middle West and East.

R. D. Williams has been appointed traffic manager of the Sacramento (Cal.) Northern Railroad. He will have supervision of both the freight and passenger service. Mr. Williams has a record of twenty-three years with the Erie Railroad traffic department in various parts of the United States. During the war he was furloughed to the government to organize and manage a traffic department for the housing division of the Emergency Fleet Corporation. After the war he acted as traffic manager for the California Fruit Exchange at Sacramento.

Obituary

Edward Hopkinson, M. P., is dead, at the age of sixty-two. He was one of the chief pioneers of electric traction in Great Britain. He belonged to a family which has long been famous in electrical and other sciences. Many years ago he carried out experiments at Portrush, Ireland on the first electric tramway constructed in the United Kingdom, and he designed the electric equipment of the Beesbrook and Newry tramway, also a pioneer line. Having joined the firm of Mather & Platt, he designed the electric plant and equipment for the City & South London Railway. This line, which was opened in 1890, was the first underground electric railway in the world, and represented the largest application of electric power for traction purposes that had been made up to that time. Mr. Hopkinson was also associated with other early electric traction undertakings and held a place of great distinction in his profession. The well-known Hopkinson test for dynamo machines is associated with the name of his family. His position in the scientific world is also indicated by the fact that he was a Doctor of Science of the University of London.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Competition Causes Decrease in Light Rail Prices

Prices of light rails have been gradually sagging in the past week or two and are now \$1 to \$2 a ton lower. A close analysis would probably show that the market for delivery in the general Pittsburgh district is off about a dollar a ton and that an extra dollar has come off for delivery to points removed from Pittsburgh, particularly in the East.

Demand has been fully as heavy as formerly and has probably increased somewhat. In other words, the light rail market has been moving in much the same spirit as finished products generally, an increase in demand tending to stimulate competition, thus bringing out lower prices.

Mills still maintain that the market presents a differential averaging about a dollar a ton in favor of rails made from new steel as against rails rolled from old rails. With concessions on large lots or for delivery at points where freight rates make competition particularly active, rails made from new steel may be quoted at 1.40 cents to 1.45 cents and rerolled rails at 1.35 cents to 1.40 cents, making a general range for the base price, on 25 to 45-lb. sections, 1.35 cents to 1.45 cents, with the usual differentials for lighter sections.

\$400,000 for New Cars

The Pittsburgh (Pa.) Railways will purchase forty new cars at a cost of \$400,000. These cars are to be of the latest double-truck type with low floor and all steel construction and will be equipped with four motors, air brakes, fare boxes, heaters and other modern appliances. They will be built by the Pressed Steel Car Company and the motors will be furnished by the Westinghouse Electric & Manufacturing Company. Delivery is to commence in about 100 days and is to be completed about fifty days thereafter.

City Council Prefers Local Builder for Seattle Cars

As stated in these columns in the Feb. 18 issue, recommendation for the purchase of 200 new cars was made by Peter Witt for operation of the Seattle (Wash.) Municipal Railway. In considering this recommendation the City Council of Seattle feels that the work should be handled locally. The Pacific Car & Foundry Company, a Seattle firm, with shops at Renton, has made a formal proposition to the Council to construct these cars at cost plus 10 per cent. Superintendent Henderson of

the railway is also giving estimates of the cost for construction of the cars in the railway company's shops. The motor equipment will be purchased in the East as there are no local motor manufacturers.

Report Made on Car Surplus

Reports just received by the Car Service Division of the American Railway Association show that on Feb. 15 a total of 449,819 freight cars were idle because of business conditions, compared with 467,997 on Feb. 8. Surplus cars, that is cars in good repair and immediately available for service if necessary to meet traffic conditions, consisted of 278,481 of the total, while the remaining 171,338 represented the number of idle freight cars needing repairs in excess of the number normally regarded as being in bad order.

Steel Founders Meet

Operating representatives of the Electric Steel Founders' Research Group held a meeting in Milwaukee on Feb. 6, 7 and 8. This group was formed about two years ago for co-operative technical work toward improving the manufacture of steel castings.

At the Milwaukee meeting reports were made by the operating heads of plants on foundry problems that had been delegated by the group to the several companies. These included annealing, core practice, facing sands, furnace practice and pouring practice investigations.

Tokyo-Nikko Electric Railway

A company at Utsunomiya, Japan, is making arrangements to construct a high-speed electric railway between Tokyo and Nikko, at an estimated cost of 10,000,000 yen. Construction work is expected to be completed by next summer.

Metal, Coal and Material Prices

Metals—New York		March 7, 1922
Copper, electrolytic, cents per lb.	12.875	
Copper wire base, cents per lb.	14.125	
Lead, cents per lb.	4.70	
Zinc, cents per lb.	5.00	
Tin Straits, cents per lb.	29.00	
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	\$4.675	
Somerset mine run, Boston, net tons.	1.875	
Pittsburgh, mine run, Pittsburgh, net tons	2.15	
Franklin, Ill., screenings, Chicago, net tons	2.00	
Central, Ill., screenings, Chicago, net tons	1.75	
Kansas screenings, Kansas City, net tons	2.50	
Materials		
Rubber-covered wire, N. Y., cents per lb.	5.90	
Weatherproof wire base, N. Y., cents per lb.	15.50	
Cement, Chicago net prices, without bags.	1.94	
Linseed oil, (5-bbl. lots), N. Y., cents per gal.	94.00	
White lead, (100-lb. keg), N. Y., cents per lb.	12.25	
Turpentine (bbl. lots), N. Y., cents per gal.	85.00	

Rolling Stock

Dayton (Ohio) Street Railway has purchased fifteen Economy meters for installation on its new light-weight cars now under construction by the Cincinnati Car Company.

Missoula (Mont.) Street Railway expects to use a 300 hp. electric locomotive for the purpose of pulling freight. It will also be used as a snow plow.

Interstate Public Service Company, Indianapolis, Ind., has placed a contract for five one-man double-truck cars. The cars cost \$11,000 each. They have a seating capacity of forty persons.

United Railways, St. Louis, Mo., through its receiver, has asked the court in charge of its affairs for permission to build fifty cars. They are to be of the "777" type, similar to the last lot of motor cars added to the system.

Track and Roadway

Brantford, Ont.—The City Council has approved the \$80,000 by-law for the extension of the municipal railway.

Hutchinson (Kan.) Interurban Railway is backing a movement to build a belt line connecting the Arkansas Valley with steam railways in Hutchinson.

Alabama Power Company, Gadsden, Ala., is repairing its track on Ninth Street and when this work is finished will rebuild the track from Forest to Cansler Avenue.

Chicago & Joliet Electric Railway, Joliet, Ill., will lay new tracks on Second Avenue and Boulder Avenue in the spring. This work is the result of a twenty-year franchise recently granted the company.

Wisconsin Public Service Company, Green Bay, Wis., will soon begin building its extension on West Walnut Street. An order for 200 tons of rail has been made. This will cost approximately \$12,000.

Tulsa (Okla.) Street Railway has started work on extending its Kendall car line one block east from the present terminus at College Avenue to the university athletic field. The Corporation Commission recently ordered this extension.

Philadelphia, Pa.—Sealed proposals for constructing signal towers and for furnishing and installing underground cables along the Frankford Elevated Railway were received at the Director's office, Department of City Transit, until noon on Feb. 28.

Claremore, Okla.—It is said that an offer has been made by C. Page of Sand Springs to the Non-Partisan Water Commission at Tulsa to build an electric line from Tulsa to Spavinaw via Claremore, connecting with the Missouri Pacific at Claremore. Free right-of-way for the Tulsa-Spavinaw extension is sought.

The New Orleans (La.) Railway & Light Company has placed an order with the Buda Company for a twenty-track carhouse layout. This work is to be built of A. E. R. A. 140-lb. 7-in. T-rail with solid manganese switches and manganese centers, mates and frogs. This company has also purchased two Universal rotary track grinders from the Atlas Railway Supply Company, Chicago. This business was handled in both cases by P. W. Wood, New Orleans, Southern agent for these manufacturers.

Power Houses, Shops and Buildings

New York, N. Y., Commissioner Whalen of Plant and Structures Department has recommended to the Board of Estimate the construction of a 12,000-kw. electric power plant on Staten Island at a cost of \$1,235,000 to furnish power for municipal piers, trolley lines, trackless trolleys and ferries.

Cookeville, Tenn., is now receiving power from its new municipal hydro-electric power plant at Burgess Falls, 12 miles below Cookeville, on Falling Water River. The installation has a power of 600 hp., but a unit of 400 hp. can be added at any time. Cookeville has previously had a steam plant.

Georgia Railway & Power Company, Atlanta, Ga., has completed the interconnecting power system whereby interchangeable high-power electrical service is given throughout the entire South. Work on the Tugalo power station which will increase the company's hydro-electric power 88,000 hp., is being carried on rapidly.

The Nova Scotia Tramways & Power Company, Ltd., Halifax, N. S., has signed a thirty-year contract with the Nova Scotia Power Commission for the purchase of electrical energy and power up to 18,000,000 kw.-hr. per year. The power will be furnished by the hydro development at St. Margaret's Bay near Halifax, a government project. The city of Halifax recently refused to take over the power produced by this development.

Pine Bluff (Ark.) Company is erecting a fully equipped receiving and sending radio station for experimental and demonstration purposes. This will be the first sending station of this radius in the state of Arkansas. It is a half kilowatt machine and will reach any of the Arkansas Light & Power Company plants in Arkansas. The Pine Bluff Company is under the same management. J. L. Longino, manager of the Pine Bluff Company, states that the aerial is to be on two 100-foot poles, placed near the company's main office here. The Arkansas Light & Power Company will equip its offices and plants at other Arkansas cities with receiving sets and instructions can be issued from the general office here to all branch plants. Trouble wagons are also to be equipped with wireless.

Trade Notes

Belden Manufacturing Company, Chicago, Ill., wire and cable manufacturer has announced the appointment of William P. DeVay as purchasing agent.

The Nichols-Lintern Company, Cleveland, Ohio, announces the completion of its new factory building, especially designed to meet its requirements. With the additional facilities now offered the demands for the company's car equipment apparatus will be speedily met.

Cummings C. Chesney, chief engineer and general manager of the Pittsfield Works of the General Electric Company, has been awarded the Edison medal for 1921 for meritorious service in electrical science or electrical engineering or electrical art. The work which won for Mr. Chesney this medal was the development of transmission apparatus, generators, condensers, transformers and converters while associated with the late William Stanley. The award is made by the American Institute of Electrical Engineers.

Reginal M. Campbell, well known in the electric light, power and railway fields, has resigned from the Habirshaw Electric Cable Company, to accept the position of special representative of the American Copper Products Company with headquarters in New York City. In his new connection Mr. Campbell will continue his activities in the fields he has specialized in for eighteen years. Prior to his connection with the Habirshaw company, Mr. Campbell was associated with the Ohio Brass Company. The American Copper Products Company, whose organization he has now joined, is one of the largest producers of copper products in the country. Mr. Campbell is a member of the New England Street Railway Club and the Railroad Club and Engineers' Club of New York.

New Advertising Literature

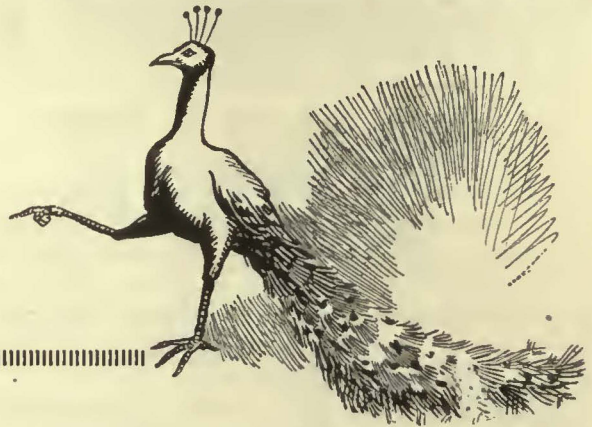
Industrial Works Bay City, Michigan, is distributing upon request catalog No. 113, illustrating and describing the type BC "Industrial" crawling tractor crane of 20,000-lb. capacity. This crane is adapted for use in railroad reclamation work and in storage yards.

The Four Wheel Drive Auto Company, Clintonville, Wis., has just issued a circular picturing and describing in some detail the installation of gasoline-driven cars on the Manhattan City & Interurban Railway, Manhattan, Kan., to replace the old electrical equipment.

Erie Electrical Equipment Company, Johnstown, Pa., has just issued a loose-leaf catalog of Erie fittings and devices. Some of the fittings included are panel-type fittings, wall and floor flanges, side outlet keys, insulator pins, parallel crosses, and various types of insulators for pipe support.

PEACOCK CRIES

Consider Capacity



Do you fully appreciate the capacity factor in hand-brake equipment?

Too often the mechanical man does not realize the need of reserve capacity in brakes. But the man on the road, unacquainted with the technical details, knows that a little extra slack or a kink in the chain may ruin his chances for an emergency stop unless his brake has ample and rapid chain-winding capacity.

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Meet Any Chain-Winding Requirement

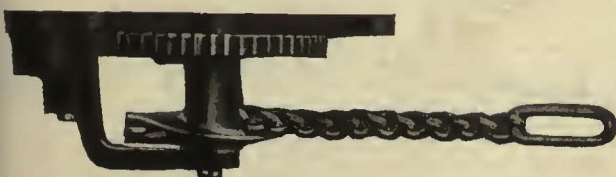


Peacock Staffless Brake

Our brake normally will take care of 30 in. of chain—more than will be required generally by the largest electric cars. But a steam railroad company wanted a brake to handle 48 in. of chain. This requirement eliminated most of the other hand brakes. A slight change in the Peacock Brake was all that was needed to meet this unusual specification—and we got the order.

The Peacock Staffless Brake for safety cars has almost unlimited capacity to take up all the chain that comes, and stock it up in the generous housing space below the drum.

Don't risk the costly accident which may occur through some little oversight in brake adjustment or inspection. Get Peacock Brakes which have the capacity to function in spite of slack or defective adjustment.



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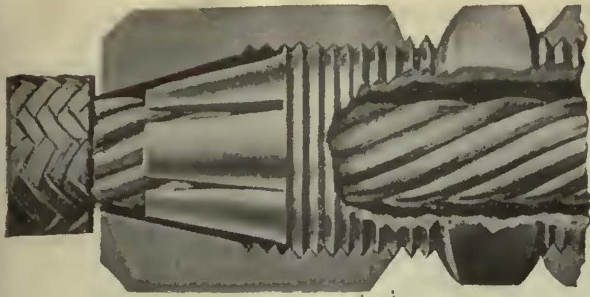
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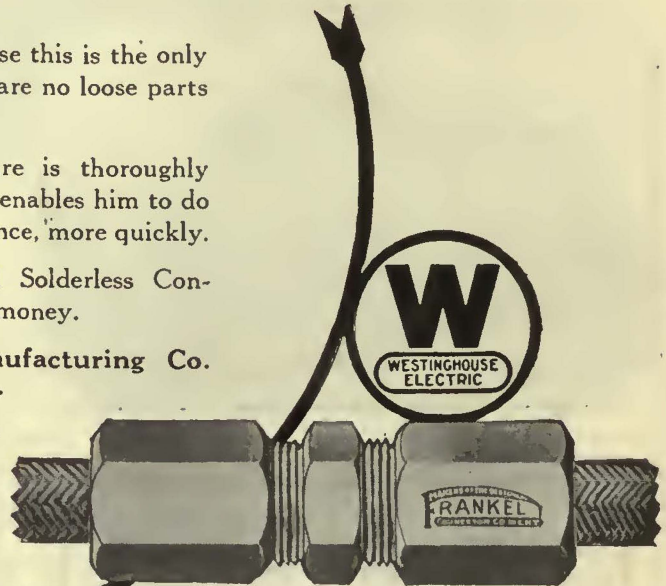
We say distinctively Frankel, because this is the only solderless connector in which there are no loose parts to get lost.

This simple, yet important feature is thoroughly appreciated by the workman, for it enables him to do his work with greater ease—and, hence, more quickly.

The use of Westinghouse-Frankel Solderless Connectors means a saving of time and money.

Westinghouse Electric & Manufacturing Co.
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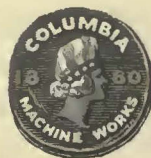
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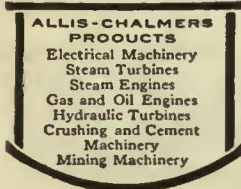
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Quick emergency application with *full open ports* at emergency point.
Graduated release if desired.
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You lift the receiver, put it to your ear and even under the worst conditions only a few seconds will elapse before Central answers and you're *getting service*. Your public has been educated up to expect that kind of attention. Consequently, when your prospective passenger, the impatient American citizen, hops to the corner to flag a car, and nothing meets his gaze but empty tracks, he soon grows restless. And if his wait stretches out into more than four or five minutes, he is ready to hail the jitney pirate as a public benefactor.

More frequent street car service, approaching if not absolutely reaching the ideal of a car always in sight, is the answer.

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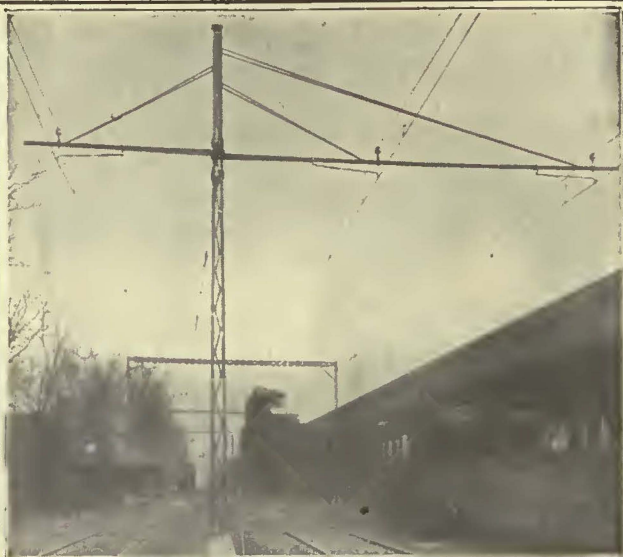
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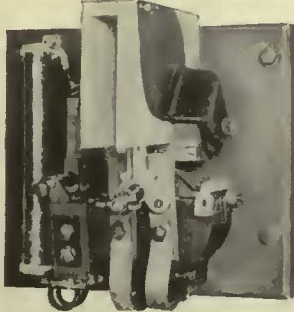
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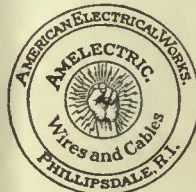


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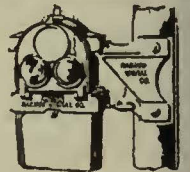
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THE TERRY TURBINE

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for heavy street railway work are
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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Roller-Smith Bond Testers are more than ordinary resistance testing instruments.

An equipment designed for electric railways, where simplicity must be combined with ease and rapidity of manipulation. A moderately paid employee, without engineering training, can use it and cover ground rapidly. The contact teeth bite into the rail, insuring quick accurate readings.

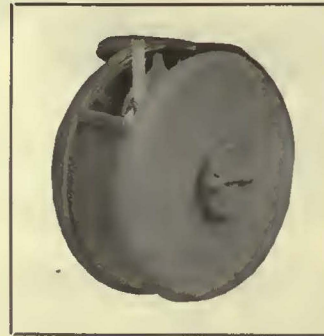
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Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.



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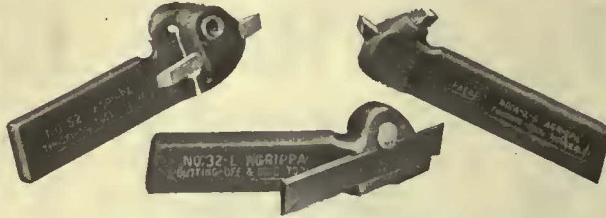
NATIONAL FIBRE & INSULATION CO.
Box 419 Yorklyn, Delaware.

BAKELITE-DILECTO

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

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Pittsburgh Office, 801 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
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Williams' "Agrippa" Tool Holders

for
TURNING THREADING BORING KNURLING PLANING
CUTTING-OFF and SIDE WORK

Literature on request

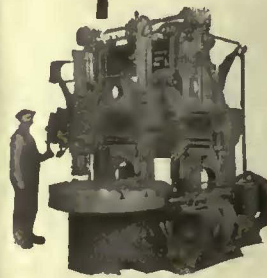
J. H. WILLIAMS & CO., "The Drop-Forging People"
BROOKLYN BUFFALO CHICAGO
143 Richards St. 143 Vulcan St. 1143 W. 120 St.

NILES-BEMENT-POND CO.

111 BROADWAY, NEW YORK

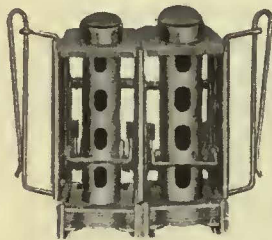
MACHINE TOOLS

FOR ELECTRIC RAILWAYS



- Axle Lathes
- Wheel Presses
- Car Wheel Lathes
- Boring Mills
- Lathes
- Hammers
- Cranes
- General Machine Tools

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

International Registers



Type R-10

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

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



The Cleveland is the practical fare box for the One-Man Car

Let us tell you why.

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

A Single Segment or a Complete Commutator

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

Cameron Electrical Mfg. Co., Ansonia, Connecticut

HACKSAW
HIGH SPEED
GLADIUM
ECONOMY EFFICIENCY
BLADES
GLADIUM CO. Inc. 34 Cliff St. New York

STERLING VARNISH

— do you know

How much actual base per gallon you get in insulating varnish and why this should interest you on an actual cost basis?

See our full page next week

The Sterling Varnish Co., Pittsburgh, Pa.

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3 1/2 to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sta., Philadelphia

N-L

Indicating Signals
Mechanical Sanders
Ventilators, Smokestacks
Pneumatic Sanders
Selector Switches, Lanterns, etc.

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8404 Lorala Ave., Cleveland, Ohio

ELECTRIC HEATER EQUIPMENTS



GOLD CAR HEATING & LIGHTING CO.
NEW YORK CITY
PATENTED

THERMOSTAT CONTROL EQUIPMENTS

Address All Communications to

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(220 36th St.)
Brooklyn, N. Y.

Literature on Request

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

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POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum \$2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:
1 to 3 in., \$4.50 an in. 15 to 29 in., \$3.90 an in.
4 to 7 in., \$4.30 an in. 30 to 49 in., \$3.50 an in.
8 to 14 in., \$4.10 an in. 50 to 99 in., \$3.10 an in.

POSITIONS WANTED

MASTER mechanic with 20 years' experience with large properties in shop, power house and substation repairs. Best of references. PW-399, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

POSITION wanted as roadmaster or track superintendent by a roadmaster. Have proven ability in all kinds construction and repairs, also special work. References O.K. Desire change. PW-395, Elec. Ry. Journal.

PURCHASING agent or assistant, 14 years with one of the largest power and traction companies in the Southeast. Capable and energetic. Best reference. Married. PW-398, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

YOUNG man, experienced as inspector, time table and chief clerk, would like to make change with chances for advancement. References. PW-397, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

WANTED

Concern Wanted

A reliable established concern, manufacturers of trolley cars or trolley car supplies to take an interest in, manufacture, and put on the market the most efficient life guard now known, just the thing to make the safety car safer. W-400, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

PAUL STEWART and COMPANY



POWER PLANT EQUIPMENT

- A1 Units Immediate Delivery**
- TURBO ALTERNATOR UNITS**
- 1—10,000 kw. Allis-Chalmers 80% P. F. Condensing Turbo Unit, 60 cyc., 3 ph., 3,300-4,600-11,000 volts, 200 lb. I. S. P., 150-200 degrees superheat. Complete with surface condenser and auxiliaries.
 - 1—6,500 kva. Allis-Chalmers Condensing Turbo Unit, 60 cyc., 3 ph., 3,200 volt. Complete layout, including jet condenser and all auxiliaries.
 - 1—3,000 kw. Westinghouse (actual capacity approx. 4,000 kw.) Condensing Turbo Unit, 60 cyc., 3 ph., 3,300-4,400 v.
 - 1—1,500 kw. Westinghouse Complete Turbo Alternator Station, 60 cyc., 3 ph., 2,400 volt, 3,600 r.p.m., including Le Blanc jet condenser, boiler plant and building.
 - 1—2,000 kw. Allis-Chalmers Condensing Turbo Unit (actual capacity approximately 3,000 kw.), 60 cyc., 3 ph., 3,300 volt. Complete with jet condenser and auxiliaries.
 - 2—1,350 kw. Westinghouse Condensing or Non-Condensing Turbines (actual capacity 1,500-1,800 kw.), 60 cyc., 3 ph., 480, 3,300 or 11,000 volts, 1,300 r.p.m. Complete with Le Blanc condensers.
 - 2—600 kw. Westinghouse Non-Condensing Turbo Units, 60 cyc., 3 or 3 phase, 320-460 or 2,400 volts. Units newly rewound and relabeled.
 - 1—500 kw. Westinghouse Condensing Turbo Unit, 60 cyc., 3 or 3 phase, 3,200 volt, 3,600 r.p.m. Complete with surface condenser.
 - 1—1,000 kw. General Electric-Curtis VERTICAL Condensing Turbo Unit, 60 cyc., 3 ph., 2,300 volt, 1,200 r.p.m. Complete with jet condenser.
 - 1—1,500 kw. General Electric VERTICAL Condensing Turbo (actual capacity 2,200 kw.), 60 cyc., 3 ph., 3,300 v., 900 r.p.m. Complete with surface condenser, piping and all auxiliaries.
 - 1—3,000 kw. General Electric-Curtis Vertical Turbo Unit, 60 cyc., 3 ph., 2,300-4,500 volt, 730 r.p.m. Complete with surface condenser, piping and all auxiliaries. Complete installation.
 - 1—10,000 kw. General Electric VERTICAL Condensing Turbo Unit, 60 cyc., 3 ph., 6,000-11,000 volt, 730 r.p.m. Complete with surface condenser and auxiliaries.
 - 1—10,000 kw. General Electric VERTICAL CONDENSING Turbo Unit, 25 cycle, 3 phase, 6,000 volt. Complete with surface condenser and all auxiliaries.
 - 1—1,500 kw. General Electric VERTICAL Condensing Turbo Unit, 25 cycle, 3 phase, 11,000 volts.
- DIRECT CURRENT UNITS**
- 1—1,500 kw. Westinghouse Engine Type Generator, 230-250 volt, direct connected to horizontal heavy duty cross compound Corliss engine.
 - 1—1,200 kw. General Electric M. P. Engine Type Generator, 350-600 volts, direct connected to tandem compound heavy duty Corliss engine.
 - 1—300 kw. Same as above.
- BOILERS**
- 3—350 hp. Stirling B. & W. Water Tube Boilers, 300-lb. allowance. Without grates or stokers.
 - 4—500 hp. B. & W. Steel Header Water Tube Boilers, 13 tubes wide, 21 tubes high, 300-lb. allowance. Complete with stokers and all fittings.
 - 1—350 hp. Stirling B. & W. Water Tube Boiler, 160-lb. allowance. Complete with stoker and fittings.
 - 1—350 hp. Heine Steel Header Water Tube Boiler, 150-lb. allowance.

ROTARY CONVERTERS

- 1—500 kw. Westinghouse, 3 phase, 60 cycle, 380 volts A.C.; 600 volts D.C.; 400 r.p.m., with 3—300 kw. Westinghouse 2400/380 volt transformers, also switchboard.
- 2—300 kw. Stanley, 3 phase, 25 cycle, 360 volts A.C.; 600 volt D.C.; speed, 500 r.p.m.; complete, with suitable transformers, also panels.
- 1—300 kw. Westinghouse, 3 phase, 60 cycle, 370 volts A.C.; 675 volts D.C.; 800 r.p.m.

MOTOR GENERATOR SETS

- 2—1000 kw. General Electric Synchronous Motor Generator Sets, each consisting of 1—1000 kw., 600-volt type MPC, 514 r.p.m., D.C. generator, and 1—1400 kva., 3 phase, 60 cycle, 2300/4000 volt, 514 r.p.m. synch. motor.

DIRECT CONNECTED ENGINE UNIT

- 1—650 kw. Gen. Elec. 575-volt Compound Wound 100 r.p.m. Generator, direct connected to 23 and 54 x 48 Greene Wheelock cross compound heavy duty 4-valve engine, complete with surface condensing equipment and panel; price, f.o.b. cars, \$7,500.

ARCHER & BALDWIN, Inc., 114 Liberty St., New York City
Telephone 4337-4338 Rector

FOR SALE

SECOND HAND CARS

trucks and motors
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Phila., Pa.

FOR SALE

MOTORS

22 New G. E. 203 P
TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

WANTED—SECOND-HAND

LOCOMOTIVE TOP

to be used on platform 34 ft. 10 in. long, 9 ft. 1 1/2 in. wide, top of cab not to exceed 7 ft. 9 in.; one Rotary Converter with transformers and switchboard, two to five hundred kilowatt; some first class second-hand Freight Trail Cars with radial draw bars and trucks.

THE ARKANSAS VALLEY INTERURBAN RAILWAY COMPANY

A. V. I. Terminal Bldg., Wichita, Kan.

"The House of Dependable Service"

NEW and RELAYING RAILS

of all Sections

HYMAN-MICHAELS CO.

Peoples Gas Building, Chicago, Ill.

Branch Offices:
1324 Woolworth Bldg., New York
2115 Railway Exchange Bldg., St. Louis
1313 First Nat'l Bank Bldg., Pittsburgh

Write or wire when in the market to BUY or SELL

Please Mention this Publication

S EARCHLIGHT SERVICE SECURES SATISFACTORY SALES

WHAT AND WHERE TO BUY

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

- Advertising, Street Car
Collier, Inc., Barron G.
- Air Circuit Breakers
Roller-Smith Co.
- Air Receivers and After-coolers
Ingersoll-Rand Co.
- Ammeters
Roller-Smith Co.
- Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools
Elec. Service Supplies Co.
- Axles
Bemis Car Truck Co.
Cambria Steel Co.
Midvale Steel & Ordnance Co.
St. Louis Car Co.
- Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
- Axle Straighteners
Columbia M. W. & M. I. Co.
- Babbitt Metal
More-Jones Br. & Metal Co.
- Babbitting Devices
Columbia M. W. & M. I. Co.
- Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
- Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
More-Jones Br. & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Bearings, Center and Roller Slide
Stucki Co., A.
- Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
St. Louis Car Co.
- Benders, Rail
Niles-Bement-Pond Co.
Railway Track-work Co.
- Bending Apparatus
Railway Track-work Co.
- Boilers
Babcock & Wilcox Co.
- Boiler Tubes
Cambria Steel Co.
Midvale Steel & Ordnance Co.
National Tube Co.
- Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.
Roller-Smith Co.
- Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
- Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
- Boring Tools, Car Wheel
Niles-Bement-Pond Co.
- Brackets and Cross Arms
(See also Poles, Ties, Posts, etc.)
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
- Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
- General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Brooms, Track, Steel or Rattan
Amer. Rattan & Reed Mfg. Co.
- Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
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U. S. Graphite Co.
Westinghouse E. & M. Co.
- Brushes Wire Pneumatic
Ingersoll-Rand Co.
- Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
- Buses, Motor
Brill Co., The J. G.
Republic Truck Sales Corp.
- Bushings
Nat'l Fibre & Insulation Co.
- Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
- Cables (See Wires and Cables)
Carbon Brushes (See Brushes, Carbon)
Car Lighting Fixtures
Elec. Service Supplies
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
- Cars, Dump
Differential Car Co.
- Cars, Passenger, Freight, Express, etc.
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Kuhlman Car Co., G. C.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
St. Louis Car Co.
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Electric Equipment Co.
Transit Equipment Co.
- Cars, Self-Propelled
General Electric Co.
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More-Jones Br. & Metal Co.
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St. Louis Car Co.
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St. Louis Car Co.
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Earl, C. J.
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction
Archbold-Brady Co.
- Ceiling Car
Pantasote Co., The
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Automatic Reclosing Circuit Breaker Co.
Cutter Co.
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
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Ohio Brass Co.
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General Electric Co.
- Coal and Ash Handling (See Conveying and Hoisting Machinery)
- Coil Banding and Winding Machines
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Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
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General Electric Co.
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Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
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Westinghouse Tr. Br. Co.
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- Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
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Frankel Connector Co.
Westinghouse E. & M. Co.
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Consolidated Car Heating Co.
Electric Service Sup. Co.
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Westinghouse E. & M. Co.
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- Couplers, Car
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Ohio Brass Co.
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Niles-Bement-Pond Co.
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- Crossing Foundations
International Steel Tile Co.
- Crossing Signals (See Signals, Crossing)
- Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.
- Crossings, Track (See Track, Special Work)
- Crushers Rock
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- Curtains and Curtain Fixtures
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Morton Mfg. Co.
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Brill Co., The J. G.
General Electric Co.
- Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
- Draft Rigging (See Complers)
- Drills, Rock
Ingersoll-Rand Co.
- Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoll-Rand Co.
Niles-Bement-Pond Co.
Ohio Brass Co.
- Dryers, Sand
Electric Service Sup. Co.
- Electrical Wires and Cables
Amer. Electrical Works
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Jackson, Walter
Kelley, Cooke & Co.
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Richey, Albert S.
Sanderson & Porter
Sangster & Mathews
Smith & Co., C. E.
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Witt, Peter
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Midvale Steel & Ordnance Co.
- Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
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Williams & Co., J. H.
- Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
- Gages, Oil and Water
Ohio Brass Co.
- Gaskets
Power Specialty Co.
Westinghouse Tr. Br. Co.
- Gas-Electric Cars
General Electric Co.
- Gas Producers
Westinghouse E. & M. Co.
- Gates, Car
Brill Co., The J. G.
- Gear Blanks
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Carnegie Steel Co.
Midvale Steel & Ordnance Co.
Standard Steel Works Co.
- Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co.
- Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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General Electric Co.
National Ry. Appliance Co.
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- Graphite
Morganite Brush Co., Inc.
- Greases (See Lubricants)
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- Grinding Blocks and Wheels
Railway Track-work Co.
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- Hacksaws
Gladium Co.
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Ingersoll-Rand Co.
- Hurps, Trolley
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Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
- Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
- Headlining
Pantasote Co., The
- Heaters, Car (Electric)
Con. Car Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water
Smith Heater Co., Peter
- Heaters, Car (Stove)
Electric Service Sup. Co.
Smith Heater Co., Peter
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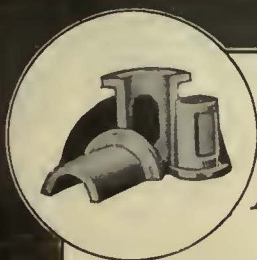
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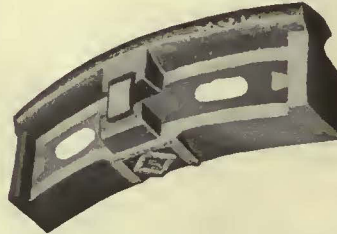


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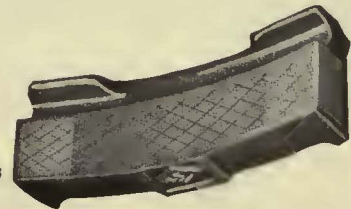
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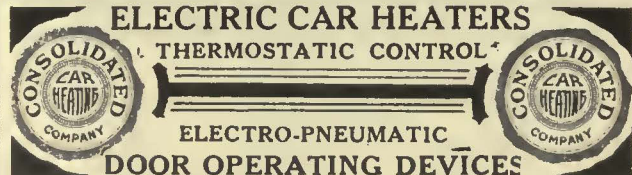
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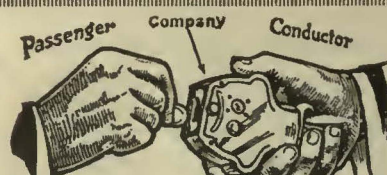
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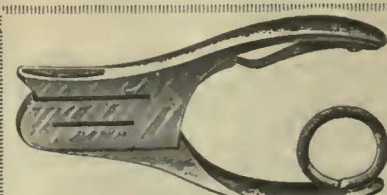
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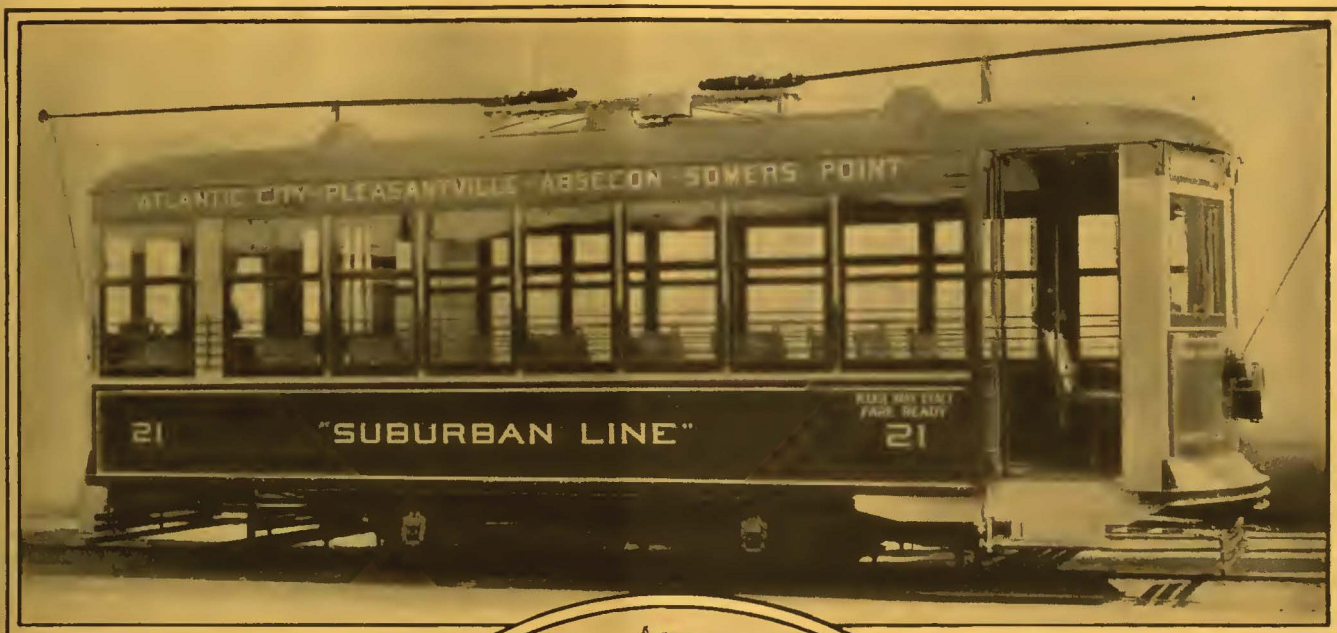


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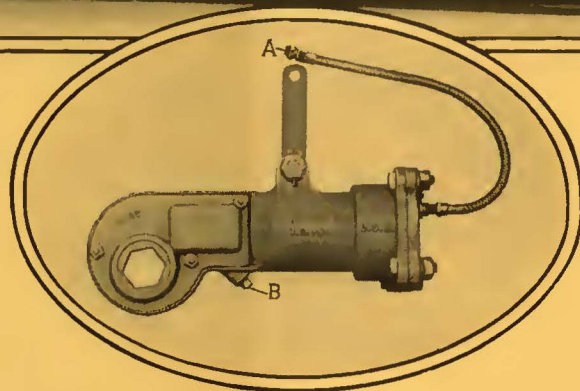
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