Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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The Year 1921, Legally and Financially

THE year 1921 promises to bring with it many problems, particularly from the legal and financing standpoints. Forty of the forty-eight state legislatures will be in session and will doubtless take up a great deal of public utility and tax legislation, while the United States Congress will undoubtedly consider a revision of the excess profits and income taxes and of the tariff, the soldiers' bonus, etc. Hence, it may be expected that the legal departments of the electric railways and the legislative committees of the various associations will have a busy year. Their activities will not only be directed to assisting in the formulation of constructive legislation but to interpreting the tax laws that will be passed, both state and federal. It is needless to say, also, that the pending of all of these tax matters, and the likelihood of other enormous government bond issues to cover a soldiers' bonus, etc., will have a marked effect on the ease with which new issues of electric railway securities may be floated. Yet the improving financial condition of the electric railways, resulting from increased earnings and the tendency toward lowering expenses, will have a very helpful counter-effect.

Experience Keeps a Dear School

SEATTLE is up against it. In fact, the city has been up against it ever since it took over the local railway lines of the Puget Sound Traction, Light & Power Company a year ago. The privately owned road was up against it before that. Denied adequate measures of relief, the owners sold out to the city, then under Ole Hanson as Mayor. Ole Hanson was for municipal ownership then. He has since seen a great light, but that doesn't help Seattle now.

The story is an interesting one and has many angles. In fact, it has too many angles and lessons to be dealt with adequately except at considerable length. One series of facts, however, stands out in bold relief. The city now is $500,000 behind in its operation of the municipal railway; at the end of 1921, if the present fare is continued, there will be an estimated deficit of $1,610,452. Employees are being paid by warrants salable now at a discount or payable at some indefinite future date when the city has sufficient money to meet them. The Seattle ticket fare is now 6⅔ cents. The cash fare is 10 cents. The latest proposal is to make the ticket fare 8⅓ cents. If that is done and traffic remains constant it is estimated—estimated, mind you—that it will take two years to wipe out the present deficit.

Seattle was considerably a war bride. The heavy hand of the post-war period has now descended upon it. The city is slowing up. Estimates based on the future are decidedly dangerous. Therefore, Mayor Caldwell has preached caution. He is not so sure that the panacea for Seattle's poor showing is in advancing the fares. In consequence of this and other happenings the matter of an increase has gone over for a time. In this move Councilmen were outgeneraled who were appalled at the financial outlook and desired to make the advance in fares effective at once. The lesson of Seattle's failure with municipal ownership and operation is plain to other cities. Those disposed to disregard it can hardly expect to escape a similar experience. They tempt fate.

Keeping Up the Load Factor in Operating Machinery

A GREAT DEAL has been heard of late regarding the matter of "load factor." The term is applied in all kinds of connections, always with a view to expressing the idea of continuity of use of something or other. There is one application in which particularly the term needs to be used and the principle of getting high load factor needs to be worked out. This is in connection with outdoor and indoor machinery, large and small, but particularly large.

There are mechanical operations which have to be performed over and over again, for which machinery is ideally adapted. A machine will save labor and time, and if it does not cost too much in proportion to the work to be done it ought to be used. We are in the habit of rating a machine by the time in which it will save its cost, a very rational way of looking at the matter. Thus, "that tie tamper will buy itself in our work in six months," "that concrete mixer will save its cost in a single season," etc. We cannot understand why managements are sometimes so slow in giving their maintenance department what they need in the way of machinery when the savings to be made seem so apparent.

But there's another side to this question, one that possibly looms large in the manager's mind, namely: Can the device whose purchase is recommended be kept at work sufficiently continuous to enable it to produce the savings of which it is undoubtedly capable? In justice to the device itself, to the manufacturer behind it and to the manager who is asked to buy it, this question ought to have careful consideration. What will the machine save per year, and not per hour, is one question. Another is, can it be used in more than one line of work in case it is not needed all of the time in the job for which it is to be primarily purchased? In other words, how adaptable is it? Proper attention to questions like these will result in the more intelligent purchase or construction of machines and in their more efficient use. Ultimately it will cause the use of more machinery, because each piece in use will be an advertisement for machinery in general.

Having purchased a machine, the operator's next job is to utilize it properly; to keep up its operating load factor. This is a matter of dispatching. Manufacturers have worked this out to a science; in an up-to-date fac-

tory very few idle machines are seen. They have to work or get out to make place for more useful tools. There is no reason why the same principle cannot be applied on electric railways even more than it has. All that is needed is a little system. Some time ago we described how the New York State Railways, Rochester Lines, kept track of the movement of their line trucks. This work was done by the telephone operators in the chief engineer's office. It would make an interesting duty for some clerk in each main department to follow the same procedure in connection with all important equipment on the track or the line, and in some cases even in the shops. A graphical record of performance, such as is kept in power plants and substations, would be very instructive in this connection.

Competition and Monopoly

COMPETITION is an industrial stimulus and an antidote for stagnation in development when considered from a certain standpoint and history shows that competition was the cause of developments which led to the monopoly operation of public utilities.

The railway industry is essentially best administered as a monopoly in each transportation district, but competition is never eliminated by theoretical statements. The successful monopoly must advance and develop at such a rate as to ward off and anticipate competition and, in the event of a new invention, must use it in a constructive manner to better its situation as a monopoly furnishing public service.

The Bell system did not give up when the automatic telephone was introduced; it developed the automatic instead of condemning it and adopted the policy of owning it and trying it out. Having been proved practicable, it is being put into operation and will gradually replace the older types as the existing installations depreciate. This organization meets competition and increases its monopoly control by doing its own inventing and developing in telephony and at the same time furnishes service with its existing equipment and protects its capital investment. It maintains itself by being so progressive that competition has no chance to exist.

The street railways were forced to compete with the steam roads and stages in their early history in order to exist. They did not suffer under such a handicap, but developed into our existing systems. Now the street railways are faced with a new competitive situation due to the development of the automobile and the motor bus. The railways cannot solve this situation by using destructive criticism, but they can master the situation, as they have mastered many previous situations, by using constructive methods. They hold the key to the problem in that they know and have experience in transportation.

If the motor bus is a coming transportation agency the street railways should own and develop it; if the street can be redesigned to meet any better the present and growing traffic changes the street railways should do it; if trackless trolleys have a place, the street railways should find it. There never was a time more auspicious for development in transportation through constructive measures, and we look for the street railways to show the same type of progressive management in the handling of competition in transportation as is exhibited by the Bell system in the telephone field.

Power Economy Outside the Power House

AN ELECTRIC railway system is a complex organization at best and departmental heads are apt to grow so that they view their own functions in the organization with a distorted and sometimes narrow perspective. The power department in such an organization is probably the most independent in its operations and furnishes examples to illustrate the complexity of a railway manager's duties. We recall an incident in which a railway power house superintendent had the temerity to request the management to adjust train schedules so as to operate the power units at maximum economy. But this man is no more open to criticism than many railway managers who forget all about the power department after it is once organized.

Economical power production is a managerial rather than a design function. There are no fixed constants in power production, and the purchase and installation of modern equipment under the direction of a competent inside power house operator will not relieve the railway manager of all power responsibilities. The power-house expert can be depended upon to get the most out of the fuel delivered to him when used in connection with the installed equipment, but there is an inherent tendency for him to view his job with the internal operating perspective of the combustion and equipment engineer. Often more money loss occurs before fuel reaches the power house, or after the electrical energy leaves the power house, than all internal economies will save. It is in the broader field of purchase of fuel and use of the power that the touch of the manager should be felt.

A great opportunity for economy and one requiring great attention is that of fuel purchase. We hope to see the day when fuel will be more largely purchased on a B.t.u. basis, and when all purchasing agents will discover that all is not coal that is black. In general, railway power producers pay too much for coal and too little for B.t.u. This subject was discussed more in detail in the issue of Oct. 9, page 701.

Then again the wrong kind or size of coal may be purchased. An equipment in the power house designed for a certain size and type of coal for efficient operation labors under a heavy handicap when any and all kinds and sizes of coal are used. If the coal is too large, air holes and thin spots may occur in the fuel bed; if the coal lumps are too small, the draft apparatus may be too limited; if clinkering or coking coal is used, then other troubles may arise. Power-house equipment and labor both operate inefficiently when variable types and sizes of coal are used to produce power. A close cooperation between the power-house superintendent and the purchasing agent is essential to efficient operation.

There is also room for managerial activity in regard to the use of power after it has been produced. The St. Paul electrification furnishes a startling innovation in this respect—the train dispatcher modifies schedules to control peak demands of power. Of course the inducement for such a policy is the financial clause in the power contract, but it stands to reason that the power company would not offer the inducement unless it saved money. This idea applies in detail only to specific cases, but modern power plants are so numerous that questions of peak load power transfer arrangements, supplementary stations, feeder size and location and schedules offer a fruitful field for economies in power entirely aside from internal economies in the local power plant.

Electric Steel Offers Possibility of Lighter Equipment

ANY improvement in the strength of steel results eventually in a decided gain to the railway industry. The war gave a great impetus in this direction through the development of alloy steels and steels made in the electric furnace. The results of some tests on electric steel which have recently been published indicate that its properties approximate those of crucible steel and that it is superior in tensile strength and torsion to the best open-hearth steel. This is true, even if the steels have the same chemical specifications. It is claimed that the cost is not far in excess of that of open-hearth steel.

The automobile industry has quickly grasped the opportunity to reduce weight by using electric steel, and there would seem to be a considerable field for such a material in the railway industry, particularly in the lightening of rolling stock parts. For axles, electric steel will, according to reported tests, stand twice the torsion of open-hearth steel. It is also reported to suffer less fatigue under shocks.

There will be a time element in such a change. The output of the material is at present somewhat limited, but it is now on the market and the development of additional electric furnace capacity appears to be considerable. The initiative for its use should come from the railway operators, as they are the men to benefit from the reduction of weight of the equipment.

Staten Island Has a Scandal

NEW YORK'S Mayor is horrified. It may not matter that New York is horrified at its Mayor. That is something else again. With it the Mayor has nothing to do. From being interrogated in the building graft scandal, the Mayor has turned to questioner by proxy in a scandal which he has unearthed through Grover Whalen, commissioner of plant and structures. It is a small matter intrinsically, but it involves a big issue. Over on Staten Island, where the city is now operating one-man cars at a 5-cent fare, it was recently discovered that one of the motormen-conductors was a nickel snatcher. This was too much for the auburn-haired denizen of the City Hall, so Mr. Whalen was assigned to bring the offender to book.

Nickel snatchers are not wanted on the city lines. Of course not. How can the city be expected to make a success of its municipal railway undertaking if nickel snatching is not stopped? It needs every nickel it can get. This particular offence was not so grave; it was the cumulative effect of the thing that was to be feared. Since the arrest of the offender it is said that the earnings of the road have increased. How could they very well do anything else? If there is any place in the world where a nickel would be missed it is on this Staten Island road. The miscreant who is charged with pinching nickels there might have known this if he had given the matter more than a moment's careful thought. Anyway there was a technical error in the form of the complaint. Proceedings have been adjourned until Dec. 21. Justice will then probably deal sternly with the offender, if the court does not accept the defendant's plea that he hadn't had time to ring up the fares.

What does it matter if a thousand people are robbed in a day in the great city so long as the fellow on Staten Island who steals a nickel from the city is brought to justice and is held up to his associates as an example of what may befall them if they become careless in their handling of other people's money.

Physical and Mental Examination of Prospective Employees

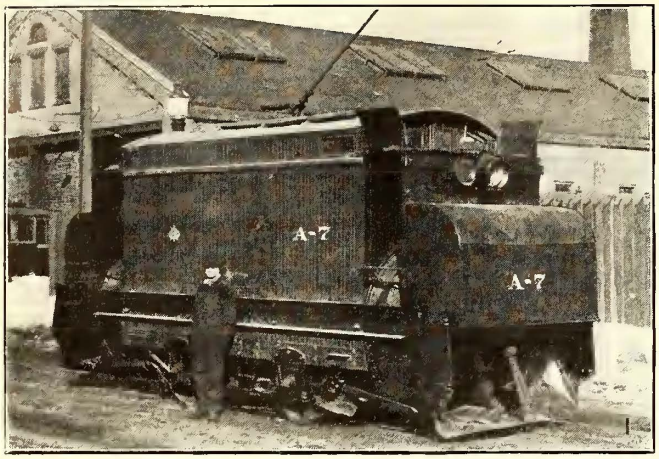
A RECONSTRUCTION period is at hand for electric railways, and it is suggestive of a new sentiment that the American Electric Railway Transportation & Traffic Association should have appointed a committee on personnel which will prepare a report for the next convention on the best methods of hiring and training employees. This subject has been investigated by several committees in past years, but it was dropped during war time when the problem was not so much how to select and train an efficient force as how to secure men of any kind to keep the cars moving. The turn in the tide is now emphasized by the constantly growing number of men applying for positions with electric railway companies, particularly for platform service. These companies are also in a situation where undesirable employees may be weeded out without worry about the possibility of replacements. It is natural, therefore, that the industry through its association should resume its study on the selection and training of employees.

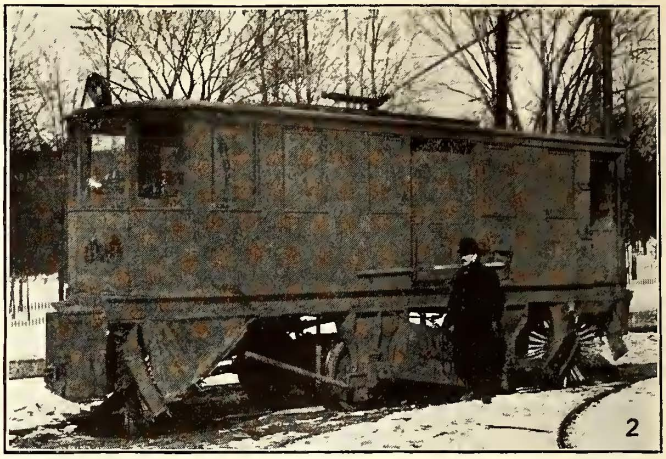
Another factor which is behind the demand for a revival of this particular committee is the growth of employers' liability legislation. Preventive measures in the selection of men physically fit should lessen the burden which companies are facing in the way of compensation for employees injured or killed in hazardous occupations.

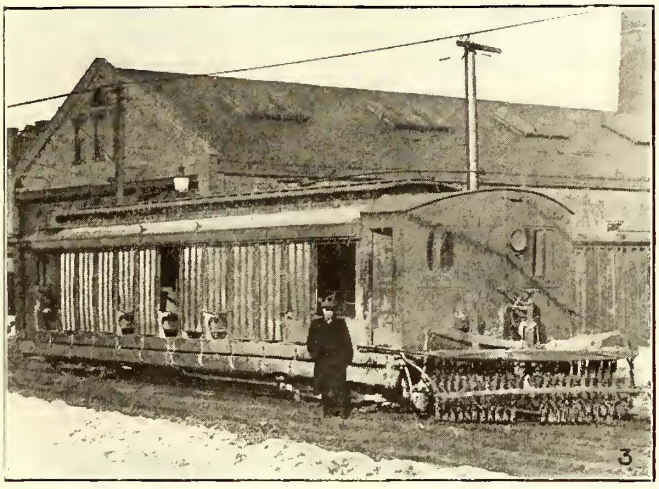
Inquiry among industrial plants has indicated that we have only begun to realize the possibilities of the proper selection of workmen from the physical standpoint and that we have just scratched the surface from the mental standpoint. Too many electric railways have been content with a perfunctory investigation as to the physical condition of applicants for train service, and only those employers who have turned this task over for serious study by a capable doctor have begun to get their reward in the weeding out of poor material from applicants at first sight suitable for the work. A man's mental alertness, soundness of judgment and efficiency or skill in his occupation depend to a large extent upon his physical condition. He cannot respond quickly to an emergency without being sound physically. He may not be actually crippled or afflicted with a serious ailment, but the continual consciousness of discomfort resulting, for instance, from fallen arches may easily be a contributing cause to a serious accident. Experience in the weeding out of recruits for our great national army showed how large a proportion of the youth of the country was not up to a proper physical standard.

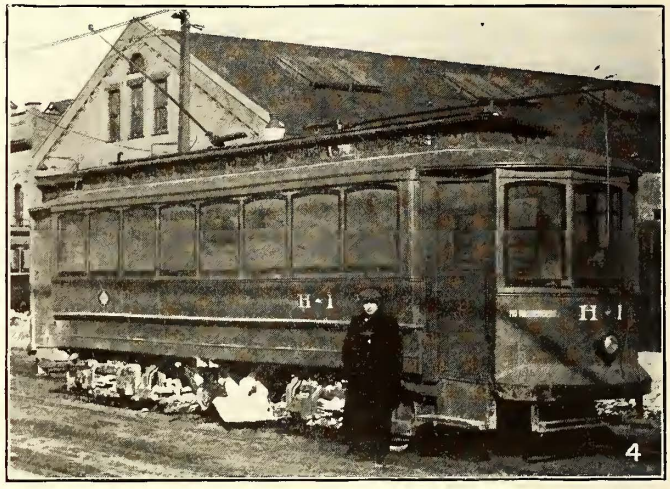
Psychological tests for prospective employees have never been developed to any great extent in the electric railway field, although many industrial establishments have reported good results from experiments of this kind. The committee on personnel might well look into this feature of selective employment methods because sluggish mental habits, not always detected by physical examination, may easily lead to disastrous accidents or unfit an employee for his duties on the cars. We believe there is a fertile field for development in this branch of employment methods.

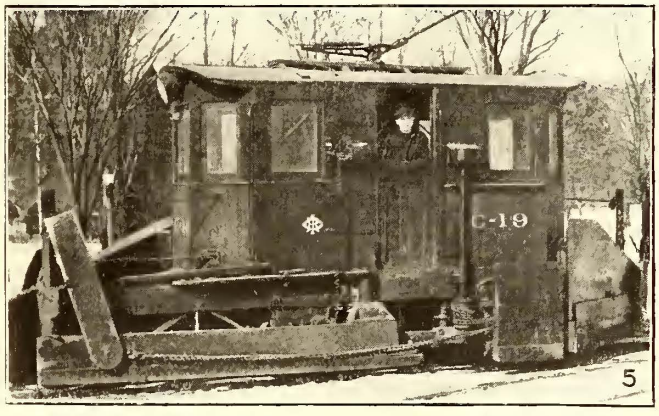
Snow-Fighting Equipment of the International Railway

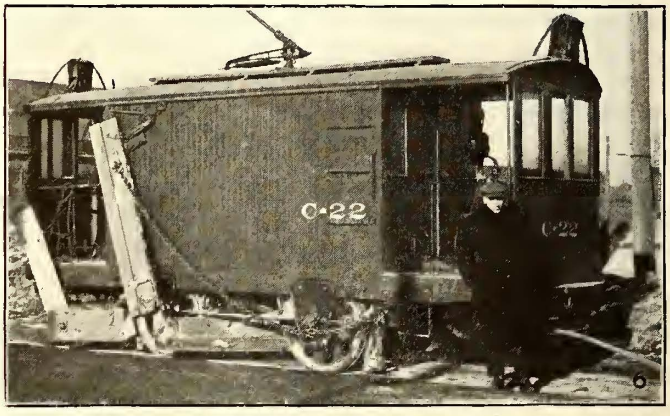


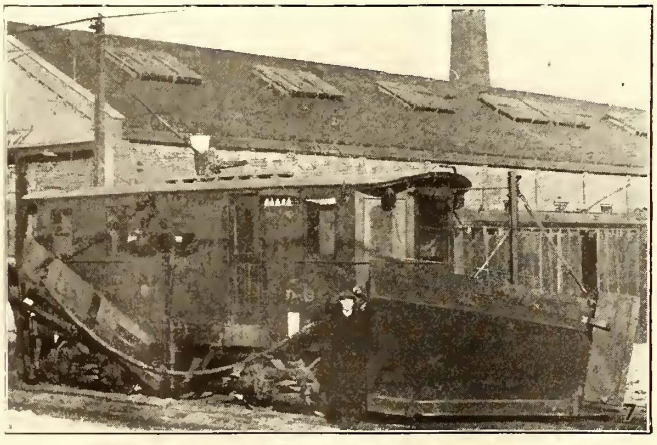












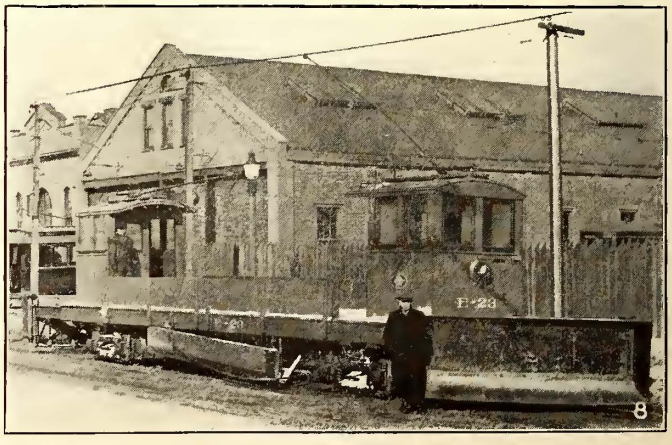


Fig. 1—Rotary snowplow. Fig. 2—Single-truck snow-sweeper. Fig. 3—Combination open car and sweeper. Fig. 4—Ice digger. Fig. 5—Single-truck shave plow. Fig. 6—Scraper plow. Fig. 7—Double-truck shave plow. Fig. 8—Combination flat car and sweeper.

Does It Pay to Prepare for Winter Operation?

Some Facts and Figures Compiled from Records of the International Railway Would Indicate an Affirmative Answer—What Do Your Records Show, Mr. Manager?

BY JOHN S. DEAN
Railway Motor Engineering Department, Westinghouse Electric & Manufacturing Company

THIS question, which is of vital importance, has been the subject of much discussion during the past year and should be given further careful thought and consideration by all operating men on electric railway properties located in the snow belt. To help crystallize this thought into some definite plan of action, the following data have been obtained through the courtesy of J. H. Hulme, superintendent of equipment International Railway, Buffalo, N. Y., and are submitted to show what can be accomplished by systematic preparation and planning to combat the severe operating conditions incident to the winter season.

The city of Buffalo, N. Y., with a population of 500,000 people, is on the 43-deg. latitude parallel and the Weather Bureau reports show that for the past thirty years this region has received an average of 75.9 in. of snow each winter, with a maximum of 126.4 in. (1909-1910) and a minimum of 22.4 in. (1889-1890). The maximum snow for any one month was 46.6 in., which occurred during the month of January, 1891. Operating under these climatic conditions, the local railway company has learned its lessons from past experience.

The International Railway Company, which controls all of the city railways and all but two of the interurban lines entering the city of Buffalo, operates 230 miles of city and 204 miles of suburban and interurban tracks. To handle its traffic requires on the average about 880 cars, the overhauling, maintenance and inspection of which are taken care of at one main shop, located in the section of the city known as Cold Springs, and nine operating barns conveniently placed at strategic points along the system.

PREPAREDNESS THE WATCHWORD

This railway company, realizing the importance of keeping the cars in good operating condition to reduce pull-ins to a minimum and make it possible to maintain schedules during the severe winter season, is a firm believer in preparedness and has worked out a few basic principles which have been found to be very beneficial in connection with the operation of the road. These include keeping barns and pits clean, well lighted and comfortable, making systematic and regular inspection and overhauling of all equipments, keeping an available supply of spare parts on hand, dipping and baking armatures, both old and new; protecting motors and detail equipment by suitable covers and guards, maintaining ample snow-fighting equipment, overhauling all snow-fighting equipment before winter and providing trained snow-fighting crews for all available apparatus.

TABLE I—SNOW-FIGHTING EQUIPMENT USED BY INTERNATIONAL RAILWAY

Total Cars	Class	Types of Apparatus	Single or Double Trucks	Driving Motors per Car, Hp.	Total Weight, Tons	Aux. Motor Broom or Fan, Hp.	Shown in Fig. No.
3	A	Rotary plow	Single	2–25	12	2–35	1
3	A	Rotary plow	Single	2–30	12	2–35	1
10	B	Sweeper	Single	2–50	10	1–40	2
4	600	Combination open and sweeper	Double	4–50	21	1–60	3
1	H	Ice digger	Double	4–40	21½	1–40	4
22	C	Shear plow	Single	2–50	13	....	5
12	C	Scraper plow	Single	2–30	9	....	6
3	D	Shear plow	Double	4–50	30	....	7
1	E	Combination flat and plow	Double	4–50	22	....	8
3	E	Combination flat and plow	Double	4–40	22	....	8

Up to the present time this company has found that with the snow-fighting equipment recorded in Table I it has been able to keep the right-of-way cleared of snow for regular traffic. This equipment is distributed over the system, as shown in Table II. All of the cars are mounted on 33-in. wheels and equipped for double-end operation.

METHOD OF ATTACK OF GREAT IMPORTANCE

Too much importance cannot be laid upon the methods used in fighting snow on railway properties. This company has adopted the following fundamental essentials in connection with its snow-fighting program:

Under no conditions are passenger cars used to buck snow. At the first sign of a snowstorm each snow-fighting equipment is manned with a trained crew of three men, who receive a special rate of pay for this service. They are available for immediate action and are ordered out on the road shortly after the snow begins to fall.

A dispatcher located at a central office keeps in telephonic connection with all carhouses and directs the operation of the snow-fighting equipment and records all data on sheets similar to Table II, which gives a complete log of each snowstorm.

Immediately after each storm one of the first things done is to repair all breakdowns and get equipment in good condition for the next snowfall. A reserve force is kept available to prevent working the regular men to the breaking point.

To obtain some definite information as to the equipment failures experienced by this company during the past winter season, the weekly trouble reports were carefully examined and the percentage of crippled cars and of armature failures for each week, covering a period of nine months from September, 1919, to May, 1920, were tabulated. In addition to the above, the maximum snowfall for the above corresponding nine months was obtained from the local Weather Bureau records. These figures were plotted and are shown in an accompanying graph.

WHAT THE RECORDS SHOW

By referring to this graph several outstanding points are to be noted as follows:

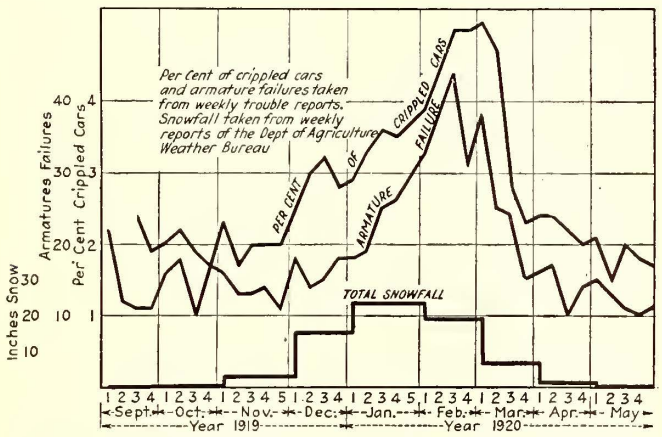
1. The maximum percentage of crippled cars for one week is 5.1 per cent. The average number of cars in service over this period was 880.

2. The maximum number of armature failures for one week is forty-four. With 3,180 armatures in service, this figures 1.4 per cent failed, which is a very creditable record. During this same period some companies operating in the New England territory reported armature failures for one week as high as 9.3 per cent.

3. The peaks on the curves show that the percentage of crippled cars and armature failures lagged about one month behind the peak of the curve representing the snowfall. This condition shows that failures occur about one month after the equipment has been subjected to severe operating conditions during the heavy snowfall.

4. Although not shown graphically, one can picture in his own mind, by drawing upon his imagination while studying these curves, an available supply of cars, schedules being maintained, normal traffic conditions and satisfied patrons.

In reviewing the above, it is only fair to state that certain local operating conditions such as wide streets, few heavy grades and the distribution of traffic on this system are favorable to this company and no doubt



RELATION OF EQUIPMENT TROUBLES TO SNOWFALL DURING WINTER 1919-1920

responsible for a certain percentage of this good showing. However, we should not lose sight of the fact that thorough preparedness and organized team work have played their part in producing these results and are entitled to consideration and a large share of the credit.

The spirit of appreciation on the part of the officials of their men is shown by the fact that on one occasion when a minor complaint relating to some of the equipment reached the ears of one of the higher officials, instead of censuring the operating official responsible for this line of work he intimated that probably his men were pretty well tired out from the good work recently done in keeping the road operating smoothly during the past severe winter season. He suggested that a banquet be given them in recognition of their services. This affair was made very informal and attended by the officials and the men and was staged very successfully. All expenses were borne by the company, and it was voted a decided success, as it created a better understanding between the men and the officials.

The operating officials of this road, fully awake to the importance of this work, and believing it possible to improve their record of the past year, have been carefully studying the weekly reports of equipment failures and car pull-ins, with the idea of reducing them to a minimum. In connection with this, they have been on the alert to better their snow-fighting facilities and have in mind the following additional improvements: Dipping and baking of completely wound motor frames, standardizing the type of cleating for motor cable leads, improving methods of babbitting bearings, changing from cast-iron to cast-steel wheels on all snow-fighting equipment, adding two new Russell type snow plows, three new combination open-car type sweepers* and one new ice digger to snow-fighting equipment, arranging crews operating snow-fighting equipment so as to be under the direct supervision of the mechanical department.

TABLE II.—RECORD OF DISTRIBUTION OF SNOW-FIGHTING EQUIPMENT

Started snowing 7:15 a.m. Date 12-29-19.
Stopped snowing 6:00 a.m., 12-30-19.

Carhouses	Plows	Sweepers	Time Out	Time In	Remarks
Cold Spring...	C-2	....	3:00 a.m.	8:00 a.m.	Light circuit.
	C-3	....	1:30 a.m.	9:00 a.m.	O.K.
	C-11	....	3:30 a.m.	9:50 a.m.	O.K.
	C-30	....	.....	.....	
	C-31	....	3:00 a.m.	3:30 p.m.	Broken wing hook
	C-43	....	1:30 a.m.	9:40 a.m.	O K.
	D-3	....	2:30 a.m.	1:30 a.m.	O.K.
	E-24	....	11:45 p.m.	11:30 a.m.	Grounded field No. 2
	A-4	....	.....	.....	
	A-5	....	.....	.....	
	A-8	....	.....	.....	
	.....	B-7	12:15 a.m.	9:30 a.m.	Broom worn out No. 2 end
	.....	669	12:00 M.	8:30 a.m.	O.K.
	.....	685	12:00 M.	8:30 a.m.	O.K.
Forest.....	C-14	....	1:30 a.m.	3:40 a.m.	Wing broken
	C-19	....	3:50 a.m.	1:40 a.m.	O.K.
	C-25	....	.....	.....	
	.....	B-3	12:25 a.m.	8:00 a.m.	O.K.
Hertel.....	C-5	....	1:15 a.m.	4:15 a.m.	Grounded field No. 2
	C-9	....	3:00 a.m.	8:30 a.m.	O.K.
	C-16	....	2:10 a.m.	6:30 a.m.	Brakes found O.K.
	C-22	....	5:15 a.m.	9:00 a.m.	O.K.
	C-28	....	5:30 a.m.	7:00 a.m.	O.K.
	E-21	....	5:15 a.m.	10:15 a.m.	O.K.
	D-1	....	12:30 a.m.	12:30 p.m.	O.K.
	A-3	....	.....	.....	
	A-6	....	.....	.....	
	.....	665	1:35 a.m.	8-25 a.m.	Broom worn out
	.....	674	12:30 a.m.	7:15 a.m.	O.K.
Walden.....	C-15	....	5:45 a.m.	10:15 a.m.	O.K.
	C-17	....	2:00 a.m.	9:20 a.m.	O.K.
	C-20	....	.....	.....	
	.....	B-2	12:30 a.m.	9:10 a.m.	Broom worn out No. 1 end
Broadway....	C-1	....	.....	.....	
	C-4	....	1:40 a.m.	6:55 a.m.	Broken chain
	C-7	....	1:30 a.m.	7:45 a.m.	Broken chain
	C-24	....	5:20 a.m.	8:30 a.m.	O.K.
	C-26	....	.....	.....	
	C-29	....	4:30 a.m.	9:00 a.m.	O.K.
	C-40	....	1:00 a.m.	11:30 a.m.	Broken chain
	E-23	....	.....	.....	
	.....	B-5	11:55 p.m.	10:30 a.m.	Broom worn out No. 1 end
	.....	B-6	12:30 a.m.	7:30 a.m.	Broom worn out No. 1 end
	.....	B-10	12:00 M.	7:20 a.m.	Broom worn out No. 1 end
Seneca.....	C-8	....	2:00 a.m.	6:55 a.m.	O.K.
	C-18	....	2:50 a.m.	9:15 a.m.	O.K.
	C-21	....	.....	.....	
	C-23	....	.....	.....	
	E-22	....	4:55 a.m.	11:15 a.m.	O.K.
	.....	B-1	12:25 a.m.	6:35 a.m.	O.K.
	.....	B-8	12:50 a.m.	7:15 a.m.	Broom worn out No. 2 end
Lockport.....	C-30	....	7:50 a.m.	11:30 a.m.	O.K.
	C-41	....	.....	.....	
Niagara Falls..	C-10	....	2:10 a.m.	3:45 p.m.	O.K.
	C-13	....	12:00 M.	10:00 a.m.	O.K.
	D-2	....	.....	.....	
	A-7	....	.....	.....	
	.....	B-9	.....	.....	
Whirlpool....	C-38	....	5:30 a.m.	3:00 p.m.	O.K.

Signed N. PERSONS.

THINGS EVERY COMPANY CAN DO

It will be granted that the solution to this problem is not the same for all railway companies. However, it is reasonable to assume that a few fundamentals can

*This is an attachment which is applied to standard open cars and was described by Mr. Hulme in the ELECTRIC RAILWAY JOURNAL, Jan. 18, 1919.

be segregated and applied to practically every railway company operating within the zone of snow. The most important of these are as follows:

Maintain comfortable, clean and well-lighted carhouses and shops.

Provide for regular and systematic inspection and maintenance of equipment.

Keep motors and detail equipment well protected by suitable covers and guards.

Dip and bake armatures.

Do not use passenger cars to buck snow.

Provide adequate snow-fighting apparatus.

Take immediate action in connection with fighting snowstorms.

No one will question the fact that the things outlined above will cost considerable money and require a large expenditure of time and energy to put them into effect, but it should not be ignored that where such essentials have been neglected, the experiences of the past few winters recall some appalling results. It is no secret that many railway companies spent enormous sums of money trying to keep their roads open and cars operating for a few months during the past winter. The results at best were very unsatisfactory to both the operating company and the traveling public. It is safe to say that if half the money spent for these emergencies had been used in systematic preparation to meet such conditions the results would have been very much more gratifying. Bearing these things in mind, each operator should ask himself this question, "Does it pay to prepare for winter operation?" then reason out some practical answer and get busy immediately.

Paints Used by Electric Railways

Some Fundamental Requirements for Protecting Railway Equipment and Structures from Deteriorating Influences and Producing a Pleasing Appearance

BY NORMAN LITCHFIELD

THE use of paint by electric railways naturally falls into two groups, the one for buildings and structures and the other for passenger cars. Such freight cars as are used belong, on account of the character of the paint used, in the building and structures group. There are also two fundamental reasons for the use of paint, the primary one being to protect equipment and structures from the deteriorating effect of the weather and the secondary one being to present a pleasing appearance. The latter reason is really the controlling one in connection with passenger cars, because it is apt to be the paint which forms the basis of the public's judgment on the company's property. Gears may be noiseless, flat wheels may be unknown, detentions may be few, but if the cars and structures need a coat of paint the property looks neglected, and the traveling public forms its opinion accordingly.

In the achievement of the desired results it is of course essential that an economical procedure be pursued, the word "economical" being used in its true sense, and not as "cheap." Methods of painting and the materials to be used are usually decided on by the executive, but often they become the concern of those whose judgment is biased by favoritism, or at least affected by a lack of knowledge of what constitutes a durable protective covering. The whole subject of painting is furthermore one which was but little understood until a comparatively short time ago, and even now is undergoing considerable development. It is therefore difficult to form a correct judgment and it still remains a highly technical subject. Therefore, whatever remarks are made herein should not be taken as intimating that the author feels that any specification, in itself, can replace integrity, experience and skill on the part of the manufacturer. The making of paint is such a complicated process that it calls pre-eminently for these qualities. There are, however, a few fundamentals that the user may keep in mind to his advantage, and while all of these are well known to the chemist it has been the author's experience that they are not generally recognized by users.

To begin with, it is absolutely essential that the article to be painted should be clean and dry, for no paint, no matter how high its qualities, will hold over a dirty or wet surface. Methods of cleaning may vary all the way from simple wire brushing to "pickling" or sand-blasting. For different objects and materials each has its advantages and the more elaborate methods necessarily add considerably to the cost and lessen production. These facts must be borne in mind, for it is doubtful whether such methods as sand-blasting will pay in many instances. A questionable instance is that recently recommended by the committee on standards of the equipment painting division of the American Railroad Association. This committee said "that the new steel (freight) car upon completion of construction should have the exterior thoroughly cleaned and prepared by sand-blasting." As before stated, such a procedure would add considerably to the first cost of the car and except for thin sheets this seems hardly justifiable. So the user must decide as to how good a preparation his material needs before the application of the priming coat. One thing which cannot be stated too positively is that the surface must be dry. Any object which is wet or "frosted" will not long retain its coating and it is well to recognize the fact at the outset.

PIGMENTS CAN BE DIVIDED INTO TWO GROUPS

Having thus given some consideration to the surface of the material, it then becomes essential to have some understanding of just what a paint is. A good definition is that found in a series published by the American Society for Testing Materials: "Paint is a mixture of pigment with vehicle intended to be spread in thin coats for decoration, or protection, or both; pigment is the fine, solid particles used in the preparation of paint and substantially insoluble in the vehicle; vehicle is the liquid portion of a paint."

From a protective standpoint the priming coat is of the utmost importance. The pigments used in primers generally fall into two groups: (1) Oxides of lead,

zinc and iron and (2) carbon and graphite. Mention is not made of the salts of chromium in the foregoing, on account of their expense.

Of the oxides of lead, the one with which users are most familiar is that known as "red lead," which consists generally of the sesquioxide (Pb_3O_4) with a certain admixture of litharge (PbO). It has for many years been considered one of the finest protective coatings for steel which it is possible to obtain.

"White lead," or "corroded white lead," consists of basic carbonate of lead. It is used largely as a priming coat for wood, either with or without tinting. "Sublimed white lead" is a mixture of the sulphate and oxide of lead. "Sublimed blue lead" is a mixture of lead and zinc compounds with some carbon and lead sulphide. Both the sublimed white lead and the sublimed blue lead are made by a smelting process, which it is claimed give them an ability to withstand heat and gases which attack other pigments.

Among the zinc pigments the chief is "white zinc," or zinc oxide. Another important one is "lithopone," which is a compound of sulphide of zinc and sulphide of barium.

The chief iron pigments are the red and brown oxides, which are both different varieties of iron sesquioxide or ferric oxide (Fe_2O_3). Carbon and graphite are both used in the uncombined state, the carbon pigment being formed by burning either petroleum or natural gas. Graphite is found as a mineral, and in addition an artificial graphite is now being made. To lessen the cost of the lead paints it is quite customary to substitute a certain amount of "barytes" (barium sulphate) for some of the lead salts, and these are not objectionable if not used in too great quantities.

In addition to the true pigment, experience has shown that to make satisfactory paint a certain amount of "inert" material must be added; that is to say, a material which does not combine with or affect the other material in any way. One authority gives as the reason for this that it provides particles of different size, which thus fill up the voids better, just as for the same reason aggregates of different size are used in the manufacture of concrete. These inert materials are generally silicious in their nature, such as silicate of magnesium, commonly known as "asbestine" silica, and aluminum silicate (china clay). They are in no sense adulterants, for, as before explained, experience has shown that their presence is necessary.

Rust Prevention Is Essential for Steel

It has long been recognized that some pigments offer a greater resistance to rust than others, and a great deal of attention has been given this subject in the past few years, numerous experiments having been made both in the laboratory and the field. An elaborate service test was conducted by the paint committee of the American Society for Testing Materials over a period of six years, commencing in 1908 and terminating in 1914.

In this test steel panels were carefully prepared with as perfect a surface as possible and exposed to the salt air of Atlantic City, N. J. A system of credit points was worked out covering the various qualities of the pigment, a total of ten being considered perfect. The panels were examined by each member of the committee before painting, and at intervals thereafter, each inspector making and recording his own observations separately. These individual observations were published each year, and at the close of the six years' test an average was obtained.

The composition of the pigments is given on page 79 of the A. S. T. M. Proceedings for 1910. The pigments were each ground in quantities given in table form in the report, in two-thirds of a gallon of raw linseed oil and one-third of a gallon of boiled linseed oil. No drier was included because of the unknown factor which would be introduced by the lead content of such drier. The final results are given on page 259 of the 1914 Proceedings and are as follows, ten being considered perfect:

American vermilion (basic lead chromate)	7.5
Sublimed blue lead	6.0
Burnt umber, zinc lead, etc.	5.5
Lamp black, graphite and barytes	5.5
Red oxide of iron with barytes	5.0
Carbon black and barytes	5.0
Chrome green	5.0
White lead and barytes	5.0
Zinc oxide and chromate	4.5
Willow charcoal	4.5
Red lead	4.0
Zinc chromate	4.0
Zinc and lead chromate	4.0
Magnetic black oxide of iron	4.0
Natural graphite	4.0
Artificial graphite	0.0

Perhaps the most interesting feature of the above list is the comparatively low rating of the red lead. The "comparatively" is used advisedly, inasmuch as it should not be understood that red lead is not a good primer, for it is, but simply that it does not stand pre-eminent, as once thought. Another interesting point is the high standing of the oxide of iron. It is this paint which is familiar to all as the dark red or brown freight car color. Later tests indicate that the iron oxides are very desirable primers, which seems quite reasonable from their kinship to rust itself. Another form of this pigment (iron oxide) has been familiar to all car builders and users for years as "metallic" paint, and its good qualities, known to all, are substantiated by the most recent tests.

In addition to the purely protective qualities of the pigments, there is the question as to whether the pigment will prevent or encourage the spread of rust under the paint film once a spot of rust has started. A pigment which prevents or discourages such spread is said to be "water inhibitive." Extensive experiments have been carried on to determine the relative action of pigments in this respect, and while too great faith cannot be placed on the results of "accelerated" tests, the fact seems to be fairly well established that there is a difference between pigments in this regard and that two of the pigments show marked characteristies, namely, blue lead, as preventing the action, and carbon, as stimulating it. For this reason it is considered that pigments other than carbon are more desirable for a priming coat, although carbon is still extensively and to a degree successfully used as a primer, and in any event is an excellent finishing coat.

Paint may be purchased mixed ready for use, but customarily it is obtained in a semi-paste form, which is thinned by the user to the desired consistency. The liquid portion of the semi-paste is or should be pure linseed oil, this being used generally raw, not boiled. Other oils are sometimes mixed with the linseed, but this is not considered the best practice.

For thinning the semi-paste paint the old and still the best practice is to use a mixture of linseed oil and turpentine with the addition of a suitable amount of drier or so-called "Japan." The cost of linseed

oil and turpentine, however, has brought about the use of substitute materials, some of which have proved successful and are in general use by the most reputable paint manufacturers. Any substitutes used should always be mixed with a certain amount of linseed oil, and furthermore it is claimed that they to some extent add desirable properties which linseed oil alone will not give. Among the oils used are China wood oil, Soya bean oil and Menhaden fish oil. The thinner commonly used in place of turpentine is that known as mineral spirits, which is a hydrocarbon distillate (benzine).

While linseed oil itself has a drying tendency, it is customary to add a certain amount of drier or "Japan." Driers are composed of salts of lead, manganese or cobalt boiled in linseed oil and thinned with turpentine or a mixture of turpentine and mineral spirits. Resins or gums (not rosin) may also be used. Common salts entering into the composition are chiefly litharge (oxide of lead, PbO) and sugar of lead (lead acetate).

The above is the barest sketch of the constituents of paint, and when the story is told of the materials in the paint, but one-half of the total is known, as the dissection of paint is much like dissection of the human body, giving much information, but information of a type which is not of much value without a knowledge of the personality of the man, which is only known by intimate experience. So with paint. Probably no material is so difficult of analysis as paint, and in no material is it more necessary to have integrity of manufacture. The railway engineer must therefore convince himself, either by experience and study or by consultation with those in whom he has confidence, what type and composition of paint will be most suitable for his particular purposes, and then draw his specifications to suit, so that the reputable manufacturers may give him or his purchasing agents prices honestly made, all on the same basis and with the intention of furnishing an article which will meet the railway specifications and be compounded in the best manner known to the art. Let his chemist check it if he will, but it is certain that chemical analysis cannot take the place of experience and integrity in preparing and compounding a satisfactory paint.

Some Painting Specifications for Cars

Standard specifications for paint are practically nonexistent, except as far as individual manufacturers or users are concerned. Hopes were entertained that as a result of the tests made by the committee on preservative coatings for steel of the American Society for Testing Materials that society would prepare standard specifications, but up to date the committee, we understand, has not felt that its work has progressed to the point where it can safely issue any standards on the subject.

Numerous railway specifications are extant, but as these are more or less private in character they are not generally published and are somewhat apt to reflect either the particular ideas of the chemist who prepared them or some especial condition or set of conditions prevailing on his road and not directly applicable to the general user.

The recent operation of the steam railroads by the United States Railroad Administration, however, caused the issuance of a quite complete set of painting specifications for freight cars, and it may be of interest to review the main features of these specifications.

Specification R80 covers the general requirements for paint and painting materials. In it provision is made for matching standard tints, submission of samples, etc. A variation of 2 per cent either way is permitted from the percentage of total pigment portion or total liquid portion. The individual constituents are also permitted to vary 2 per cent either way.

Specification R82 covers the painting of wooden box cars. This requires the outside wood work to be painted with one coat of dark red oxide primer and two coats of dark red oxide finishing paint. The steel work in the superstructure has one coat of red lead primer and one coat black finishing paint. The underframe (steel) gets one coat of red lead primer and one coat of black finishing paint.

Materials Used for Different Coats

The composition of these paints is as follows:

Red Lead Primer.—Two volumes of reinforced red lead semi-paste paint and one volume of standard thinning mixture. The red lead semi-paste is covered by specification R810 and calls for: "Pigment 82 per cent and liquid 18 per cent, the pigment portion to consist of red lead, not less than 65 per cent, and the remainder to be silicious matter, such as aluminum silicate, magnesium silicate, silica, or a mixture thereof. The red lead shall contain not less than 85 per cent true red lead (Pb_3O_4), the remainder to be litharge (PbO). The liquid portion shall consist of raw linseed oil."

Red Oxide Finishing Coat.—One volume dark red oxide semi-paste paint, 1½ volumes standard thinning mixture. The dark red oxide semi-paste is covered by specification 812-A, which requires that grinding proportions shall be: Pigment 70 per cent and liquid 30 per cent. The pigment portion shall consist of ferric oxide, not less than 30 per cent, and the remainder shall be silica or silicious earth pigments. The liquid portion shall consist of raw linseed oil.

The black finishing paint used on the underbody steel work consists of 1 volume black semi-paste paint and 1½ volumes standard thinning mixture.

The black semi-paste paint is covered by specification R811, which requires that the grinding proportions shall be pigment 50 per cent and liquid 50 per cent. The pigment portion shall consist of lamp black, not less than 20 per cent; red lead, not less than 5 per cent, and the remainder shall be shale black, aluminum silicate, magnesium silicate, or a mixture thereof.

The lamp black shall be of such quality as to produce the standard color and shall not contain more than 2 per cent of ash. The liquid portion shall consist of raw linseed oil. The thinning mixture used throughout in all these paints is covered by specification 822A, which requires that "the mixture shall consist of the following materials by weight: Fixed oils, minimum, 40 per cent; drier, maximum, 10 per cent, and mineral spirit, maximum, 50 per cent." The term "fixed oils" is used in the specification in contradistinction to the volatile products.

The specification goes on to say that "the fixed oil portion shall contain at least 50 per cent of linseed oil, the remainder being drying or semi-drying oils." A better wording would have been, the remainder being "other" drying or semi-drying oils, inasmuch as linseed oil itself is the "drying" oil par excellence. The specification then proceeds, "the drier may be of the oleate, linoleate or resinate type. If resinate is used, the rosin shall be practically all neutralized."

With the painting of passenger cars we become more concerned with the decorative than with the protective side of the subject. In general a higher quality of paint is required, containing a more finely ground pigment, and of course a much greater degree of attention is paid to the preparation of the surface of both wooden and steel cars. In fact, it may be said that too much attention has been paid in the past to obtaining an exceedingly smooth surface and a high polish. The painting of passenger cars in the past has been based on the methods which grew up in the painting of the expensive and highly polished horse-drawn private carriages just as the railway coach itself was an outgrowth from the stage coach, which it closely resembled in its early years. Thus a typical schedule for the painting of exterior of steel passenger cars was as follows:

Schedule for Painting Steel Cars

"Steel parts are to be sand-blasted and primed with a metallic primer, giving sufficient time to dry thoroughly, which will take approximately two days. On the third day a coat of surfacer is applied, and when dry the rough places are filled in with putty and a surfacer compound. After this has dried, three coats of surfaces are applied. The surface is then rubbed down smooth with pumice stone and water and is then ready for the application of the body color, of which it is customary to apply two coats. The lettering and striping is then applied and the surface given three coats of varnish."

This is obviously a very elaborate and costly process, extending over some eighteen days, and in reality is one which will not bear analysis. To produce on a commercial vehicle traveling through the dust and grime of our cities a highly polished surface of a character which we would not think of attempting to produce on the most expensive private house, which as a general thing lasts as a structure many more years than the average car, seems ridiculous. Shorter and quicker methods are therefore coming into vogue, a typical schedule being:

First coat, metallic primer; second coat, body color; third coat, surfacer compound and putty; fourth coat, body color; fifth coat, varnish, and sixth coat, varnish. Others are substituting enamel paint for the body color and varnish, with a good deal of success and a reduction in cost.

Cars Painted with Enamel

A recent recommendation of the committee on maintenance and care of paint and varnish of the paint division of the A. R. A. is "that when cars are painted with enamel without varnish the car should be primed and surfaced in the usual way and be given two coats of oil varnish enamel, which dries very slowly." Clear varnish enamel does not give the same surface as oil varnish enamel. The "surfaces" referred to in the foregoing are of the same nature as the "rough stuff" of the old carriage painters, this being described by Sabine in his work "The Technology of Paints and Varnishes," as follows:

"Rough Stuff.—A silicious filler, ground to a moderate degree of fineness mixed with some white lead. The liquid is essentially a rubbing varnish. The thing aimed at is to make a sort of paint which will dry rapidly to a very hard surface, capable of being ground down to a smooth, glassy finish, and at the same time have about the same rate of expansion and contraction as the foundation on which it rests, so that it will not crack and come off."

The body color pigment is usually ground in Japan and thinned with turpentine, the Japan being a "liquid made by cooking gum shellac with linseed oil in a varnish kettle, litharge being usually added to give drying properties." The pigments used are as a general thing those already listed in this article, the desired color or shade being obtained by the addition of organic coloring matter. Thus the familiar "Tuscan Red" is composed of 75 per cent or more sesquioxide of iron with some carbonate of lime and about 15 per cent organic coloring matter.

With regard to the protective properties of the various coats applied to passenger cars, interesting comment is made in a recent paper presented by C. H. Hammond before the paint division already mentioned, as follows:

"The steel primer is a thin varnish-like substance and is not recommended as a protection to steel when used alone. It must itself be protected by other paints. Surfacer is simply another form of putty and the only reason it is used is to obtain a level surface. The two color coats are made up of body color ground in Japan and thinned to a working consistency by the mixing in of turpentine or turpentine substitute. In these three classes of materials, the priming coat, the surface coats and the color coats will not protect steel from rusting. The real protection from rust is the varnish, two or three coats to be applied on top of all the previous unstable coats."

Old Method of Painting Unsatisfactory

Mr. Hammond goes on to state that the old method of painting does not in his judgment give satisfactory results, and that in reality one coat of body color and three coats of varnish are all that a steel passenger car body really needs, "that the body color should be furnished in paste form, ground in equal parts of raw linseed oil and gold size Japan and reduced with raw linseed oil to a consistency that will cover with one coat. The lettering may be done one day following the preceding and on the following day the first coat of varnish can be applied, followed by two more forty-eight hours apart." Some opposition was expressed to these views at the meeting, and we quote them simply to show the tendency away from the old elaborate "coach painting" method.

Other practices are being adopted to lessen the time required to paint a car and to give a durable finish, much attention being given among other things to providing means for artificially drying the paint between coats, thus shortening the time and also baking the paint. Proper facilities have to be provided for heating the air to about 180 deg. and to providing the proper moisture content in the air. It is being done successfully and holds out much promise. Trade preparations are also being used which replace the primer and surfacer coats, thus saving time.

In conclusion it may be said that the whole subject of painting is in a state of flux, the tendency being to break away from elaboration of decoration and finish. This is a proper tendency, but care must be exercised not to forget the fundamentals that cannot be lightly swept away and which depend for their fulfillment largely upon the honesty in the manufacture and care in application.

Cutting Energy Costs in Seattle

Power Department Reduces Car-Mile Energy Consumption on Municipal Railway, Principally by Inducing Economical Operation of the Cars

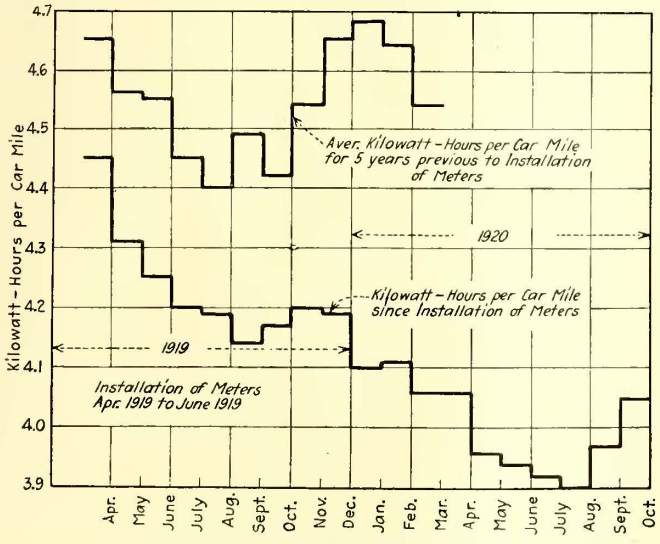
BY S. E. GOODWIN
Supervisor of Power Seattle (Wash.) Municipal Street Railway

WHEN the city took over the electric railway lines in Seattle, the power department set for itself the task of saving energy in all possible directions. Energy is purchased by the city on a long-time contract at a rate of 1 cent per kilowatt-hour, delivered to the railway feeders, so that the department is concerned in savings from substation to wheel tread.

Before the purchase of all of the lines in this city, a power-saving campaign had been initiated on the two lines operated by the Seattle Municipal Railway. This campaign, which began early in 1919, was so successful in its results as to lead to its adoption for the enlarged Municipal Railway system.

In order to determine just how much energy was used on the cars, as well as to provide an incentive for careful operation, the kilowatt-hour meter was adopted for use on the cars as best adapted to the desired end. The selection was made after a careful study of other devices used on cars to stimulate careful operation.

A few cars were equipped for trial with the meters in February, 1919, and the result was so encouraging that about forty-five more equipments were ordered for the remaining cars. Before all of these had been installed the city purchased the railway property from the Puget Sound Traction, Light & Power Company, commencing to operate it on April 1. Additional meters were then ordered for 100 cars operating out of the Fremont carhouse, and in August an order was placed for about 300 additional meters for the remaining cars.



ENERGY CONSUMPTION PER CAR-MILE ON SEATTLE MUNICIPAL STREET RAILWAY, COMPARED WITH PREVIOUS FIVE-YEAR AVERAGE
(Energy measured at car)

During the power-saving campaign the power department made a number of stop-watch tests on several lines over level stretches of from 600 to 1,000 ft. and found as follows: A motorman starting from standstill can, after attaining just enough speed, coast between 50 and 60 per cent of the distance between the stops in the same time that it would have taken him to cover the distance without coasting, but keeping his power on to such a point as to necessitate immediate application of the brakes to bring the car to rest at the same points. This is due, of course, to the fact that by the non-coasting method the motorman builds up a certain speed which has to be overcome by braking, whereas the coasting motorman rolls along at a more uniform speed and consumes no greater total time between stops. This fact is mentioned here, although quite familiar, because with us it was one of the strongest talking points that we have in proving to the men that coasting a good proportion of their mileage does not necessarily cause them to fall behind their schedules.

R-151 200M 1-20 L.&H. 83107

POWER RECORD

SEATTLE MUNICIPAL STREET RAILWAY

LINE: Mount Baker 1ST CAR NO. 284

DATE Nov. 13 RUN NO. 2 2ND CAR NO.

MOTORMAN J.W. Ham BADGE NO. 812

TIME A.M.	TIME P.M.	PLACE	METER READING
5:50		Barn	0167
6:05		N. end	

WRITE REMARKS, IF ANY, ON BACK OF CARD

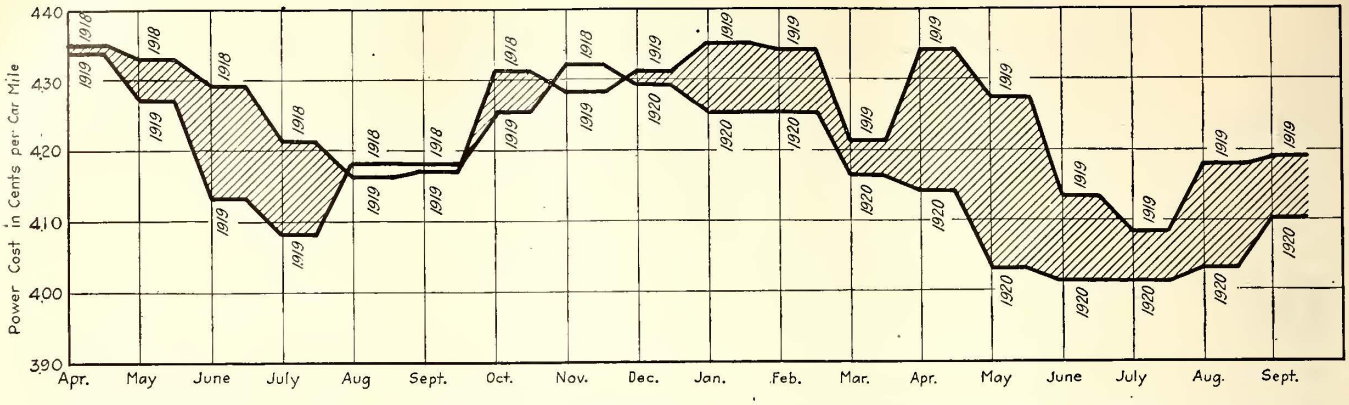
MILES K.W.H.

SAMPLE POWER RECORD FORM—ORIGINAL 3 IN. X 7 IN.

In inaugurating the power-saving campaign, two instructors of power saving were sent out to ride with motormen and to show them how, by proper feeding of the controller, by the use of more coasting, and by improved braking, they could lower their power records from 5 to 15 per cent. Informal talks were given to small groups in carhouses by instructors, and bulletins on power saving were issued periodically in an effort to interest the motormen in the advantages of power saving.

FOLLOWING UP THE RECORDS

During the first ten months of the power-saving campaign $5 monthly prizes were awarded to the regular and relief men on each line having the lowest energy consumption per car-mile. This scheme was later abandoned, one of the principal reasons being the difference



GRAPHICAL RECORD OF COST OF ENERGY IN CENTS PER CAR-MILE, SEATTLE MUNICIPAL STREET RAILWAY, SHOWING EFFECT OF POWER-SAVING CAMPAIGN

in numbers of passengers carried on certain runs and the consequent use of more power to make the extra stops. Difference in types of cars on the same line was also a cause of more or less complaint among the motormen.

Individual records are computed from meter cards. A list of comparative records, without the names, is then typed for each line and a copy sent to each motorman, a check mark being placed opposite his own record; each man thus learns his relative standing, but does not know who made the other standings. With the limited clerical force available for this work, we cannot compute each man's record for each entire month, so we take three lines per week and figure the records for these trainmen for a week or ten days. Each man thus gets a report of his work only about once in two months. It is interesting to note, however, what a good saving has been obtained despite this very limited follow-up. Also, since last May, almost no instruction has been given the motormen, nor is it planned to give more than can be done by the chief motorman incidental to his various other duties. The saving shown, therefore, is due almost entirely to the mere presence of the meters on the cars.

The following data regarding the several types of cars in use in Seattle may be of interest. We have 233 single-end, double-truck cars, weighing from 44,400 to 55,000 lb., and having gear ratios of 15: 71, 17: 69 and 17: 67. The motors are of several types, General Electric No. 80 predominating. There are 154 double-end, double-truck cars varying in weight from 38,000 to 49,000 lb. Thirty-one of these have been converted into one-man cars of the large type. The gear ratio is mostly 17: 67 and the motors General Electric No. 58, No. 67 and No. 80.

Nine rebuilt one-man cars of the small type weigh about 22,000 lb. each and have two GE No. 58 motors with a gear ratio of 16: 67. The safety cars were first put into operation in February, 1918. There are now fifty-four of these, weighing 13,000 lb., with gear ratio of 13: 74 and equipped with Westinghouse No. 506 AN2 motors. In order to make the power consumption comparison with previous years fair, in view of the installation of the more economical safety cars, we have figured

SAVING POWER

COASTING. The most important item in the operation of a car from the power-saving standpoint is coasting. A good record does not result from a few long coasts, but is attained by taking advantage of the numerous short coasts just before stops, slow-downs and curves. It is easy to coast down hill and thus save power, but all you have gained thereby may be lost by using excess power on the remainder of the run.

The following conditions show a few of the ways in which small amounts of coasting are possible.

1. Coast behind a leading car or vehicle instead of using power until brakes must be applied sharply to make a stop.

2. Coast up to each stop. Throw off the power a little sooner than you have been in the habit of doing, letting the momentum of the car carry it a ways before applying the brakes. This method does NOT cause a loss of time.

3. Coast into curves and special-work. At many turns the car will roll well into the curve before application of power becomes necessary.

4. In starting down grade give the controller but a notch or two. It will pick up speed rapidly after it is started. On some grades the car will start sufficiently by merely releasing the air.

5. Coast wherever your schedule permits using up slack time. Much of the time spent waiting at end of line or at passing points could be better spent coasting on the main line.

6. Remember that you are operating safely when running with power off; you are ready for an immediate stop if necessary.

7. Except for operating electric switches never use power and brakes at same time. This principle appears to be so self-evident as to require no explanation, yet experienced motormen are observed to violate this simple rule.

8. A motorman who makes non-coasting stops often wonders why it takes him so long to get over his line. It is because passengers do not get up from their seats and get ready to alight until they feel sure they are not going to be thrown to side of car or pitched violently forward.

DO NOT RUN ON RESISTANCE POINTS. There are only two running positions of the controller: FULL SERIES and FULL MULTIPLE. Operating at any of the intermediate points means a loss of power, and if continued, results in burning out the grid resistance. Make it a rule not to feed controller beyond series position unless you intend to continue around to full multiple.

APPLICATION OF BRAKES. The proper method of applying brakes is to apply required pressure of air first, then as the car slows down, reduce this pressure gradually Avoid the practice of "fanning" the brakes. This wastes air and power and causes needless wear on air-valve and brake rigging.

A WORD TO CONDUCTORS.

Conductors can greatly assist in power conservation by observing the following suggestions·

1. See that your car leaves terminal on time. Leaving ahead of time places extra burden on your follower and leaving late means more power to make up time.

2. By attentiveness to duty and alertness in meeting unexpected circumstances, conductors can do much toward getting their cars safely away from stops with the minimum amount of delay.

3. A conductor, by giving bell for a stop as soon as he knows a passenger wishes to alight, gives the motorman a chance to throw off his power and coast up to the stop.

CONCLUSION.

The Economy meters have been placed on the cars for the purpose of giving a direct check on the power used.

In the home we are always careful to turn out the lights when they are not needed. The house meter is similar in construction to the meter on the car, the difference in size being due to the difference in amount of consumption. It is a fact that a motorman will use as many kilowatt-hours in a single half-trip, on most of the lines, as he uses for lighting his house for a whole month.

After a car has been brought up to speed you have stored up a large amount of energy which will carry it hundreds of feet without power. GIVE THE CAR A CHANCE TO COAST. Experiment between certain stops, timing yourself one trip, using all the power you can and the next trip coasting after getting up to speed. You will wonder how you got through in the same time and with probably 20% less power.

S. E. GOODWIN,
Supervisor of Power.

Approved.
D. W. HENDERSON,
General Supt. of Railways.

THREE PAGES OF INSTRUCTION FOLDER SHOWING HOW POWER CAN BE SAVED

all the safety-car mileage at 60 per cent of the equivalent two-man car mileage, on the basis that the safety cars use 60 per cent as much power as the larger cars. This makes allowance for the small cars, so that the saving in power as shown in the accompanying curves is due entirely to better operation.

Bond Testing

Power lost in the bonding of the rails is, of course, largely a preventable loss. A survey made immediately after the acquisition of the lines by the city showed 1,222 bonds in need of repair. Bond testers were followed by a paving repair and welding crew from the road department, and this crew replaced defective bonds with new ones of the AW-3 type. Ohio Brass gas weld. A second survey of the entire trackage was completed early last summer, and 1,263 bonds were found to be in need of repair. Of this number, 211 had not been reached by the repair crew since the discovery of the defects on the first test, owing to the need for the services of the welders on numerous construction jobs. The total number of bonds on the system is 48,600; of this number there are now not more than 350 defective.

Meter Inspection

The Economy meters installed on the cars have now been placed on a regular inspection basis. The meter element is taken out after a run of about nine months and thoroughly cleaned, oiled and tested. An old one-man car has been fitted up with a testing rack and work bench, and this is run to one of the carhouse yard tracks and the meter elements are changed on the cars standing in the yard. Two men are thus able to overhaul from twelve to eighteen meters per day. Upon completion of the work at one carhouse, the test car is moved from yard to yard until all meters have been overhauled.

The kilowatt-hour meters at the substations of the Puget Sound Power & Light Company, which measure 95 per cent of the total railway power, are tested once each month by two of that company's electricians, assisted by a representative of the Municipal Railway. Adjustments are made in the monthly power bills for any discrepancies over 2 per cent in the accuracy of these meters. As the monthly consumption is close to 5,000,000 kw.-hr. it is quite essential that these meters be maintained at a high degree of accuracy.

To return to the power situation on the property in general, the economies which have been effected by the use of meters and otherwise, as mentioned, are reflected in the charts which accompany this article. These charts are self-explanatory; the record speaks for itself. Averaged over the eighteen-month period from April, 1919, to September, 1920, as compared with a similar period one year earlier, there was a net monthly saving due to the use of the meters of about $1,000. In making the calculation we have assumed in the cost of power the following elements: Total cost of energy purchased for railway operation, interest at 5 per cent on the investment in meters and their installation, etc., depreciation of the meters at 5 per cent per annum, superintendence, records, follow-ups, and monthly prizes to March, 1920, when the awarding of the prizes was discontinued.

The watt-hour meters used on the cars are of the "Economy" type, sold by the Economy Electric Devices Company. L. E. Gould, president of this company, and his associates have co-operated with us in making our campaign successful.

Electrical Testing in Omaha

Methods and Equipment Used for Testing Circuit Breakers, Field Coils, Armatures, Etc., Are Described and Pictured

IN THE accompanying five pictures are shown some of the equipment which is used and the practice followed in testing and repairing motors and other electrical equipment in the shops of the Omaha & Council Bluffs Street Railway, Omaha, Neb. At the left of the barrel in Fig. 2 is shown a transformer arranged for testing field coils. The primary of this transformer is connected to the source of energy supply through the small lever-type switch at the left of the switchboard panel seen at the right of the picture. Each of the button contacts of this switch is connected to taps on the primary of the transformer. The condition of the field coil is then tested by reading the voltmeter and ammeter on the switchboard just above the small switch referred to. While the coil is being tested, it is subjected to mechanical pressure by means of two wooden levers 5 ft. long, one of which is shown at the left of the barrel. The voltmeter used in this connection is cut in or out of the circuit by means of the plug which appears on the switchboard just below the meter.

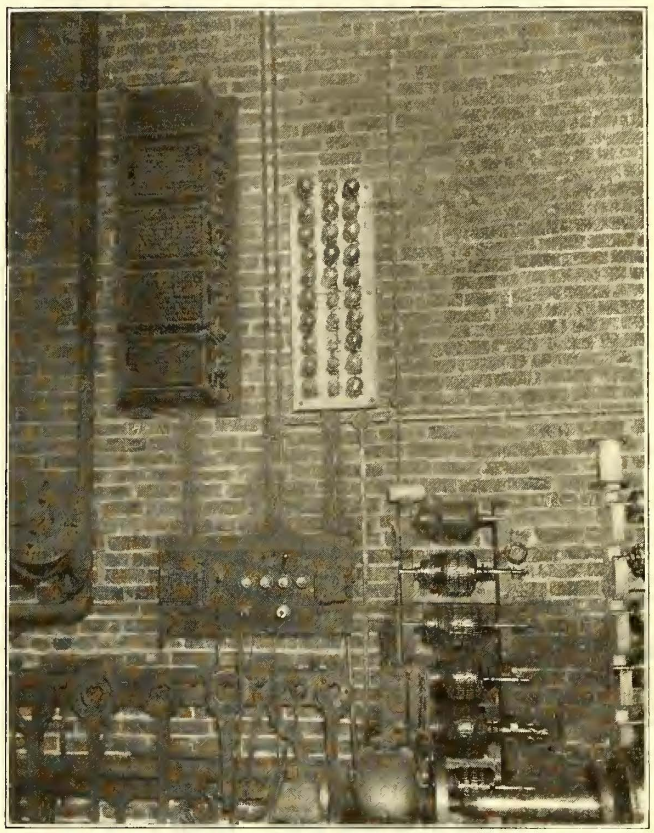


FIG. 1—LAMP BANK AND GRID RESISTORS FOR CONTROLLING TESTING CURRENT

The water rheostat made from a barrel connected with running water and equipped with the necessary adjustable plate, which is seen at the center of Fig. 2, is used in testing circuit breakers. These are mounted on a board between the switchboard and barrel, where pins are so located that any standard breaker can be mounted without the use of tools. Three pairs of leads coming out from the bottom of this board with polarity marked are provided for different types of breakers. The heavy current used in making the test is broken by means of

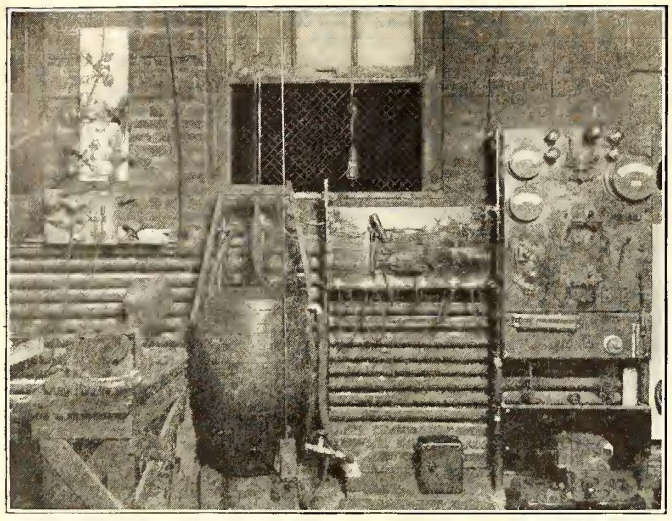


FIG. 2—VARIOUS ELECTRICAL EQUIPMENT USED IN TESTING ARMATURES, FIELD COILS AND CIRCUIT BREAKERS IN THE OMAHA SHOPS

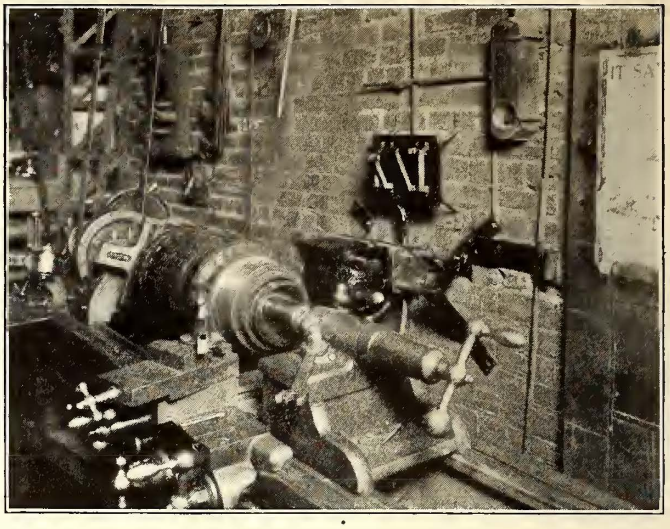


FIG. 3—ADJUSTABLE TRANSFORMER USED FOR TESTING ARMATURES WHILE MOUNTED IN LATHE

the four old circuit breakers mounted on the floor just in front of the switchboard and usually manipulated by foot. Calibration is accomplished by means of the direct-current ammeter which is mounted at the upper right-hand side of the switchboard.

This switchboard also carries other switches for use in connection with a small transformer mounted back of the switchboard and employed for break-down tests of armatures. Old armatures are subjected to 800 volts pressure, while new ones are tested up to 1,600 volts. In making these tests a bank of 220-volt lamps is used in series with the armatures.

Fig. 3 shows a convenient mounting of an armature testing transformer. This is supported behind the lathe used in turning and slotting commutators as well as banding the armatures. When this mechanical work is finished the electrical test for shorts can be very readily and quickly made. The testing transformer is mounted in a special bracket on the wall and it can be adjusted along the wall to line up with the center of any size armature core and toward or away from the wall to come within $\frac{1}{8}$ in. of the armature. When adjusted to the right position it is held rigidly by means of a small rod placed through holes in the bracket. When finished all armatures are given a final test with this transformer before being taken out of the lathe.

In Fig. 1 is shown the scheme of control for obtaining the proper current for testing different size armatures. Current for testing main motor armatures is taken through the grid resistance which is seen mounted on the wall. This cuts the current used down to about 30 amp. A circuit breaker is connected in the circuit for protection against a ground. For testing air compressor armatures the current is drawn through the bank of lamps, also mounted on the wall. The amount of current in this case is controlled by the four button-type switches through a range from 1 to 6 amp.

The current thus controlled, as shown in Fig. 1, is applied to any motor under test by means of the small testing crab seen in Fig. 4, which may be clamped on any winding stand and used on any size armature. In making these tests a switchboard-type ammeter, shown to the left in Fig. 4, has been converted to use as a millivoltmeter by connecting in series with it a small compensating coil taken from a wattmeter. This can be adjusted to give a good, clear reading on the meter regardless of the size of wire on the armature.

Fig. 5 shows the unique practice followed in the Omaha shops of gas-welding broken armature leads instead of soldering them. In doing this work the other leads adjacent to the one to be soldered are protected from the hot flame of the acetylene torch by means of a sheet of asbestos, the operator making his weld through a small hole in the sheet.

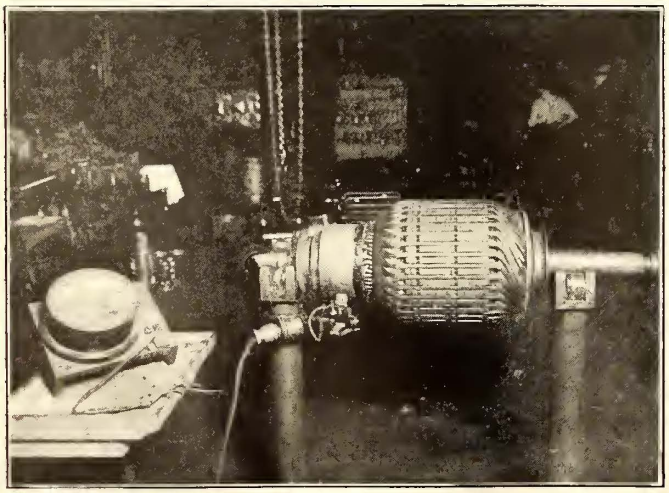


FIG. 4—TESTING CURRENT THROUGH COMMUTATOR

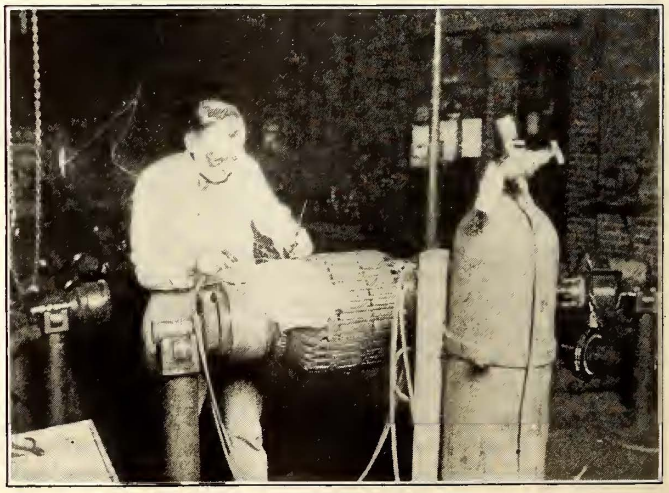


FIG. 5—GAS-WELDING BROKEN ARMATURE LEADS

Maintaining Track Under Public Trustees*

Track Rehabilitating Work, Regrading and Welding Which Were Carried Out by the Eastern Massachusetts Street Railway During the Years 1919 and 1920

BY FRANK B. WALKER
Engineer Maintenance of Way Eastern Massachusetts Street Railway

DOUBLE TRACK LINE RAISED FROM 8 IN. TO 14 IN. TO PROVIDE BETTER DRAINAGE

WHEN the Massachusetts property of the old Bay State Street Railway was acquired by the Eastern Massachusetts Street Railway one of the first problems was to put the tracks in good, safe operating condition and to reduce future maintenance costs. Four points were given especial consideration—joints, ties, ballast and drainage. Among the various items of equipment purchased were two Thermit-welding outfits, twelve Lincoln arc-welding type W machines, six Seymour grinders, making a total of thirteen; fourteen Universal grinders, seven Indianapolis welders, making a total of fourteen; five Erico welders or bonders, one Lincoln bonder, or a total of five; five Ford roadsters, eight Ford trucks, eight Stewart 2-ton trucks and two Stewart 1-ton trucks.

Since June 1, 1919, we have relaid 210,000 ft., or 39.7 miles, of track, overhauled 874,000 ft., or 166 miles; put in 193,000 ties, Lorain-welded 9,300 joints, Lincoln-welded 6,500 joints, Thermit-welded 1,600 joints, or a total of 17,400 welded; put in 520 pieces of special work, put in 1,200 pair new angle bars, taken the vertical bends out of 10,000 joints, surface-welded 9,900 joints and bonded 27,000 joints.

On paved streets we have done very little reconstruction except when it was done concurrently with the city's paving work. If and when a city or town removed the paving from the track zone and our track needed repairs or renewal we did our trackwork and the city did the paving. In case of change in grade or location the city was called upon to pay for not only removing and repaving but for all expense incident to changing grades and line, including ballast lost, etc.

In several cases where tracks were changed from center to side location the city or towns made the new excavation, supplied all the new ballast and uncovered the old track. We removed the old track, laid the new one and the city or towns then repaved the new as well as the old track zones. On country lines we raised our tracks up to or above the level of the highway and on many miles left the track entirely open or half open, depending on local conditions; the purpose in using open or half open section being to secure better drainage and to reduce snow trouble and cost of future maintenance. The trouble with these lines was that they were too low to start with and as the highways were rebuilt from time to time our tracks were left down in the mud. Where state highways are being rebuilt and the grade of the shoulder materially changed the commission is paying for the cost of raising our track to the new grade.

18,000 JOINTS WELDED

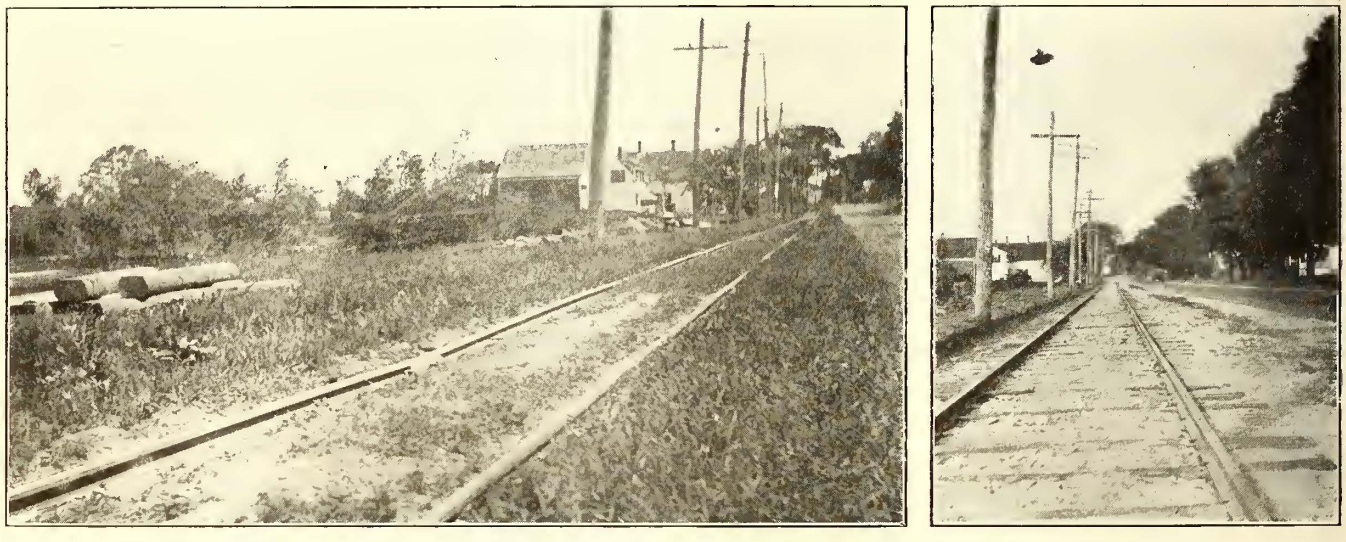
It was also realized that one of our greatest causes of bad track was bad joints, so it was decided to have all joints on the system finally welded. We probably had 240,000 joints on the system and welded 3,000 in 1919 and 15,000 in 1920. We still have a long way to go. We have great hopes of the arc-welding process, but,

*Abstract of paper read before the New England Street Railway Club, Dec. 2, 1920.

like all such processes, the work must be carefully watched. During the past year we employed several welding experts to start us right, but found that we have to work out our own salvation with our own men really to get anywhere. In making the 1920 budget we planned to Thermit weld all new 9-in. and 7-in. girder rail, to Lorain weld all old good quality 9-in. and 60-lb., 70-lb. and 75-lb. T-rail, where lines needed rehabilitation in long, continuous stretches and where the joints were very bad, and to arc weld 9-in. and 60-lb., 70-lb. and 75-lb. T-rail where the lines were overhauled and where joints were not beyond the repairing stage, also to arc weld new and relayed 60-lb. and 75-lb. T-rail. The Thermit process is the most expensive and probably the most satisfactory joint. The Lorain joint has worked well on the softer or rather older types of rail, but high percentages of breaks come on the higher carbon rails of all classes, whether new or several years old. Out of 28 Lorain joints of 9-in. rail rolled in 1913, twelve broke the first day. We had to Thermit weld them as we had the street all torn up. The track work in connection with the Lorain welding is quite expensive.

Broken stone is, as we all know, an ideal ballast, but why take out good, firm compacted sand or gravel which has supported a track in paved streets for twenty years or more without trouble and put in broken stone at $4 per cu.yd.? It is absurd and an economic waste. Ballast serves two purposes only—first, to hold the track against movement; second, to assist drainage. I much prefer poor ballast to poor surface drainage. On steam railroad prairie lines in the Dakotas, where no gravel or even sand was available within several hundred miles, we held track on black gumbo mud by pitching the slope from top of tie at center to bottom of tie at ends and then lip slicking down the surface when wet, to form a water shed. Our policy on our country lines here has been to get the track up on ballast if available, but get drainage. Frequently we found our ballast on top of the track instead of under it. We are now putting our ballast under the ties.

We were rarely bothered with poor ballast under our old paved track, but if necessary in relaying we have used 6 in. of good gravel or broken stone. On country lines hundreds of miles were in bad shape, tracks were



BROCKTON-EASTON LINE, WITH 60-LB. T-RAIL BEFORE AND AFTER REHABILITATION

Careful attention was given to the repairs of joints. Trackmen tend to make repairs in a careless or half-hearted way. Mere tightening of bolts will not do the trick on either light T or heavy girder rails. We now insist on having the ties retamped or replaced if necessary, new plates and new bolts put in if the old ones are worn, and in case of cupped joints, these are filled with surface welders and then ground properly. We found many of our welders were surface welding cupped joints without seeing that joints were first properly repaired. We started a campaign to get better grinding. One trouble was found in that grinders, as well as surface welders, did not have true straight edges, and I always carried one in my car to test joints whenever I stopped. Considerable study has been given to instruct our grinders on all classes of work.

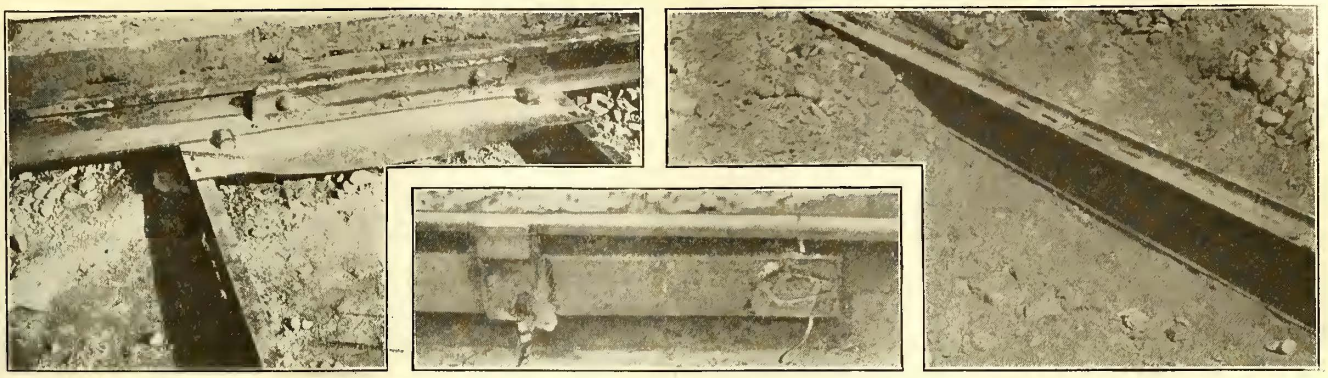
On our joint work we have been quite successful in using vertical rail benders. These were built by our trackmen, usually out of old rail, and if the joints were raised higher than the track surface and then tamped up strong they usually held. Frequently it was necessary to rebend some joints. The use of this rail bender ahead of the Lorain welder on badly surface bent 9-in. girder and light T-rails helped materially.

too low and were almost all backfilled with mud or gravel. We have attempted to raise up such lines where considerable work was done and to leave the track either open or half open. We also suffered in the past from poor drainage, and of all the serious defects in trackwork, we class poor drainage as the worst. We have tried to remedy this by raising up the track and by opening the section similar to steam roads, to dig ditches, to place catch basins and to lay pipes.

We bought 165,000 chestnut, oak and creosoted pine ties last January and on account of car shortage did not get deliveries, so we purchased 100,000 chestnut ties from the Blue Hill reservation late in the spring, and as these came slowly we had to curtail our work in August on account of the shortage.

Great saving was made by supplying each division with a cutting torch. We even cut bolt holes and ends off new rails until we discovered that we should not use the torch on high carbon rails on account of heat cracks. The torch works fine in cutting out rails for joint repairs and we have hundreds of joints Lorain welded where 12-in. dutchmen were cut in with the torch and the jointing is as good as a saw cut.

Each roadmaster was furnished with a Ford auto-



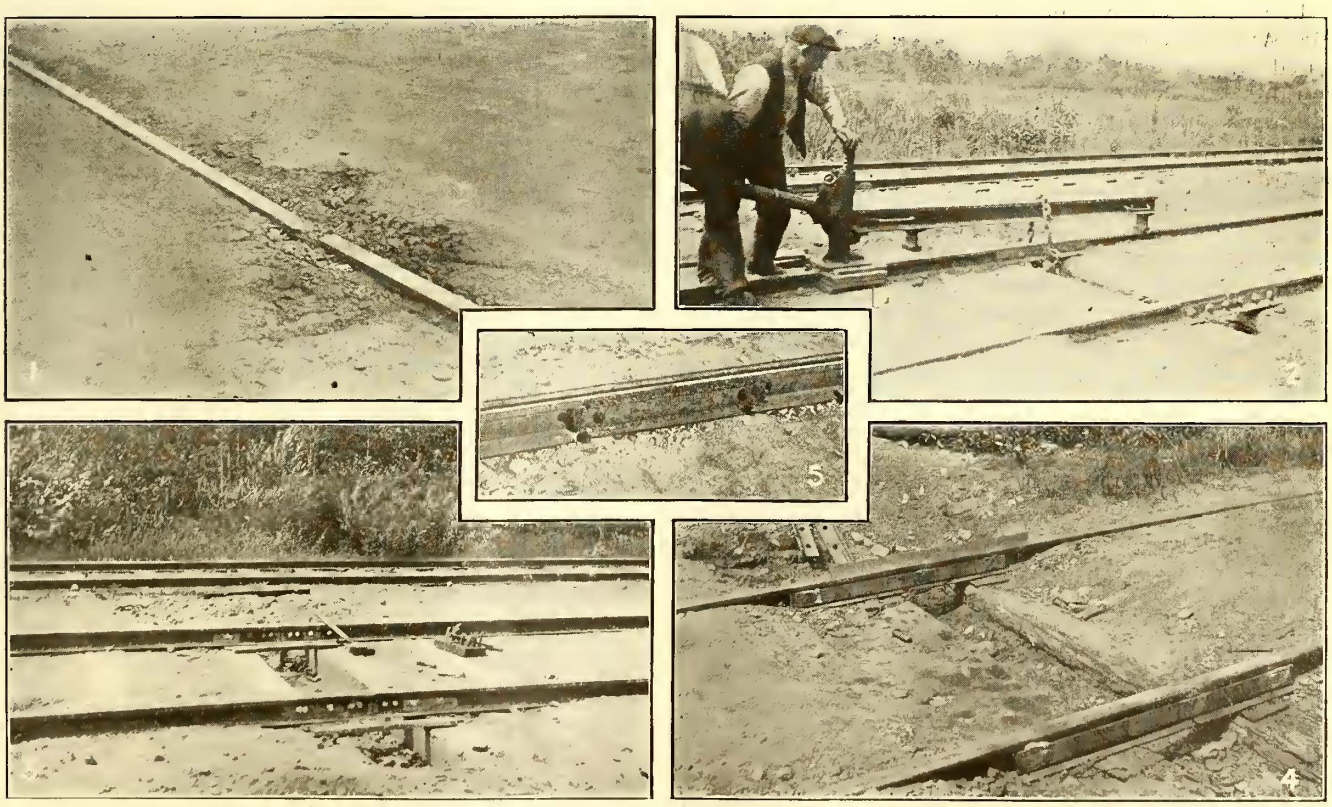
VARIOUS TYPES OF JOINTS REHABILITATED BY WELDING

At left, 7-in., 91-lb. T-rail joint with welded bars and twin steel ties. At right, method of preparing old 9-in. tramhead rail for arc welding. In the center, Lorain welded 9-in. rail with typical failure.

mobile with a light body. These have proved very useful. And on ten divisions we furnished 2-ton Stewart trucks with a large dump body. On the headboard was placed a small hand winch for loading a grinder, welder or bonder onto the truck. The tailboard comes off and the sideboards are designed strong enough for skids, having hooks to hold them on to the truck body. These trucks have proved extremely useful and are going all the time.

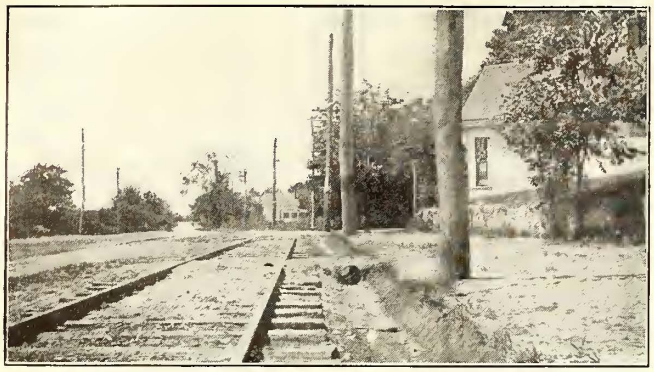
Our derrick cars are used chiefly for rails, large loads of ties and special work, the trucks being used for all sorts of hauling, ties, fastenings, ballast cleaning and getting gangs onto and off work.

We have had some interesting bridge work, but I can take time to mention three jobs only: (1) The replacing of footings under some of the steel columns of the Raynham trestle. This is interesting only as it shows that street railway bridges, like many steam railroad bridges built fifteen or more years ago, usually had poorly designed foundations and the footings were not built high enough. (2) The Thermit welding of the 6-in. turning shaft of the North Chelsea drawbridge. We operate 1,100 cars per day over this bridge and did this welding for the city. It took 125 lb. of metal. The shaft was removed and taken to a shop. A 7-in. billet was cut with a torch and bolted onto a heavy erecting plate with the shaft in line and about a 1½-in. gap. Work was started about 3 p.m., and the weld was poured at midnight and by 7 a.m. was ready for machining. (3) The arc welding of the diagonal bar of the Merrimac River Bridge on Bridge Street, Lowell. This bar, 1¼ in. x 2½ in., was bent by a derailed car. After straightening it was, as we expected, too long. We then conceived the idea of cutting out a 5-in. section and arc welding splice bars onto the ends. Before doing so we set up in our shop yard on a 45-deg. angle a sample bar and spliced and welded it. The sample was 1¼ in. x 2½ in., the splices were 1⅛ in. x 3½ in. each and the length of

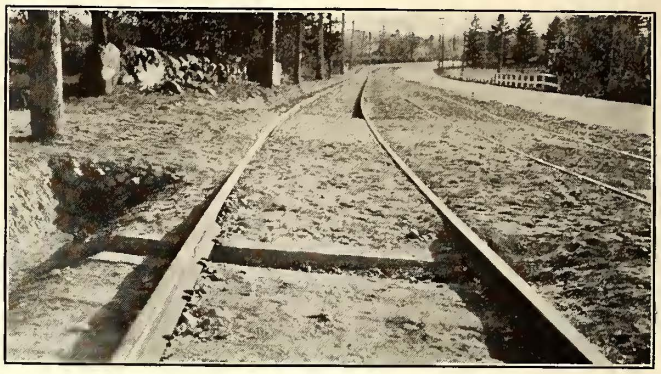


VARIOUS STAGES IN THE REHABILITATION OF BADLY BATTERED JOINTS

1. Condition of joint before work. 2. Vertical rail bender used in raising joints. 3. Second stage in Lorain welding. Joints sand blasted and rail raised on shims. 4. Finished Lorain joint. 5. Lincoln arc-welded joint.



SIDE-LOCATED T-RAIL TRACK, TWENTY YEARS OLD, AFTER REPAIRS



LOWELL-BOSTON LINE WITH ARC-WELDED JOINTS AND IMPROVED DRAINAGE

welds 14 in. This sample after welding was tested out in the Technology laboratory and broke at 208,000 lb., with elastic limit of 138,000 lb. The weld held and the bar broke near the end of the weld. As there were 56 lin. in. of weld on each end, it developed 3,700 lb. per inch of weld.

The bridge weld was completed in January, 1920, and holds without signs of failure. This bridge was built of iron in 1884 and a physical test on the piece we cut out was as follows:

Yield point	46,000 lb. per sq in.
Tensile strength	56,750 lb. per sq in.
Elongation	19.0 per cent
Reduction area	34.5 per cent

Our loads on this bridge, which was not designed for cars, cause stresses as high as 20,000 lb. per sq.in.

DISCUSSION ON MR. WALKER'S PAPER

In the discussion which followed the presentation of Mr. Walker's paper, H. M. Steward of the Boston Elevated Railway said that in regard to new rails the Lorain joint is not as successful as with older types of rail, but nevertheless it enables one to rehabilitate track cheaper than with any other type of joint. In regard to hard rail good results were obtained with kerosene torches.

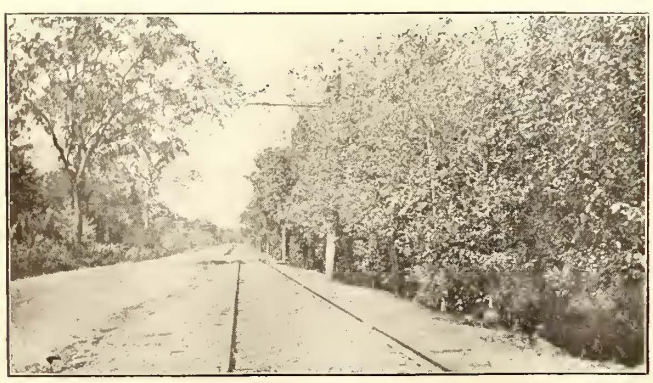
George E. Haggas of the Cumberland County Power & Light Company, Portland, Maine, referred to the work that his men have been doing. He said that on a stretch of double track approximately 3,000 ft. long they used a 6-in. 100-lb. T-rail on cedar ties with gravel ballast and split block granite pavement which consisted of old 9-in. pavement cut in two and relaid. The subsoil on this street was clay, which made it extremely important to provide drainage. One drainage method which has worked out with particular satisfaction is to remove all material for a depth of from 6 to 12 in. below the tie and to fill in this space with ledge rock, and then to provide an outlet from this into the sewer.

H. W. Sanborn of the Rhode Island Company said that in Providence there is an ordinance requiring 6 in. of crushed stone ballast under the ties, which under some conditions seems entirely unnecessary. Mr. Sanborn said he had found in bending 60-lb. rail that while trying to bend both rails at once the bend ran back from the joints. The difficulty was overcome by first raising one rail and then the other.

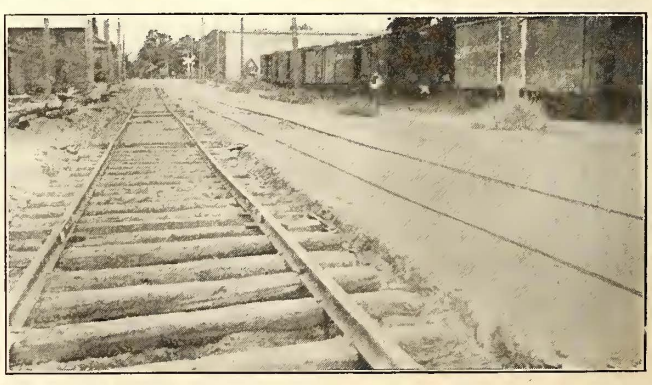
Thomas W. Williams of the Union Street Railway, New Bedford, Mass., said that in regard to putting new plates on old rails they had found that frequently the rail soon becomes worn at the end and becomes just as loose as before repairs were made. They welded a little strip in place and then ground this off and found it worked very satisfactorily.

In answer to a question as to why a space of 2 in. is left out of the seam weld of the Lincoln weld, Mr. Walker stated that in St. Louis they find more seam uncovering and more cracking where the rail is welded straight through, so they carry the welding up to within an inch of the end, thus leaving 2 in. at the joint. The cracking may be due to some temperature stress or to fractures in the head of the rail and they have found less cracking when this method was followed.

F. I. Hardy of the Eastern Massachusetts Street Railway spoke of the service they had obtained from some track with Indianapolis welded joints. These have now been in service for twelve years without a single break. In rehabilitating old track where the rails and joints were bent, they use the surface bender to bring them back into shape, then turn over the plates, bolt them and weld them with the Indianapolis welder.



BROCKTON-EASTON LINE RAISED FROM 6 IN. TO 2 FT. AND REBALLASTED



READING-WAKEFIELD LINE DURING PROGRESS OF WORK

Field Inspection of Railway Track Paving

Some Practical Notes on the Duties of Inspectors and the Essential Requirements of Satisfactory Specifications for the Ordinary Types of Street Pavements

BY HOWARD H. GEORGE
Engineer Maintenance of Way Public Service Railway, Newark, N. J.

AS LONG as the duty to maintain paving rests with railway companies it should be their aim to see that such work is done with the best materials and according to the best practice consistent with the requirements, and this means reliable inspection of labor and material entering into the work. Some companies are prone to overlook the value of such competent supervision of paving work and consider that an occasional visit of the department head to the work or the presence of an ordinary laborer on the job provides a sufficient safeguard of the company's interests. With the idea of emphasizing the importance of adequate supervision of paving it would be well to consider first some of the duties that devolve upon a paving inspector, the object and intent of such inspection being to secure full compliance with the contract and specifications and the performance of first-class work by the contractor in such minor details as may not be specifically mentioned, but are implied by the contract and specifications.

The inspector should report to and be under the direction of the head of the maintenance-of-way department. He should read carefully and make himself thoroughly familiar with the contract and specifications for the particular work to which he is detailed and he should hold the contractor to a strict compliance with the specifications unless he receives instructions to the contrary from the company official to whom he is responsible.

The inspector should make out daily reports on forms provided for the purpose and also keep in a field book a detailed record of each day's work, which should contain the following data: (1) The date of his assignment to the contract and the date of its actual commencement and completion; (2) detailed force account for each working day and the amount of material used; (3) condition of weather each day; (4) delays, reasons for and the period of duration; (5) conditions of sidewalks along the line of paving previous to commencement of work, to forestall any future claims for damages; (6) accidents; date of accident, names of persons concerned and witnesses, cause of accident; (7) any neglect or refusal on the part of the contractor to comply with the contract specifications; (8) damages to persons or property by reason of any act or omission on the part of the contractor; (9) oral instructions or orders received from his superior, and any other matters pertaining to the contract that might be worthy of record; (10) a record of the various types of paving used, such as new specification block, clipped or unclipped block relaid, and their kind, type of joints with which paving is laid, such as sand, cement, tar and gravel, etc., and the exact terminating points of each change.

In order that the work at all stages may be so carried on as to cause the least possible interference with the operation of the cars and with a minimum of inconvenience to the public generally the inspector should see that the street is not unnecessarily obstructed and that the contractor provides temporary passageways at crossings and wherever necessary. He must not permit the contractor to stop the operation of cars during the course of the work and should see that no materials are permitted on or near the track that would interfere with the use of the tracks or endanger the safety of passengers.

The inspector should see that all materials, as they are brought on the work, are piled compactly and neatly at such points as he may designate, and in such a way as shall comply with the regulations of the municipal authorities. All loose material, excavated matter and rejected materials should be removed from the site as soon as possible. He should take special care to see that no material is piled around fire hydrants, and that the space in front of them is kept clear at all times and accessible to the fire apparatus. All necessary signals and warning signs should be placed on the work to protect the public, and city monuments and bench marks must be preserved from injury by the contractor. In case it becomes necessary to move or lower any monument the inspector should notify the City Engineering Department and the contractor should not be permitted to move it unless authorized to do so by the City Engineer.

The inspector should examine all material as it is brought on the work and see that it conforms to the specifications before permitting it to be used. Should the inspector at any time suspect that the material used is not in accordance with the specifications samples should be taken by him, with a record of the location, and his superior notified immediately.

DETAILS OF THE WORK

It should be the duty of the inspector to see that no part of the paving is laid at a higher elevation than the top of the head of the rail, unless specially provided for on the plans. He should see that the space adjoining the web between the head and base of the rail is filled either with paving or a suitable rail plaster, and should not permit the contractor to pave against the rail until this space has been filled.

Where welding of the joints is contemplated and for any reason has not been completed prior to the laying of the pavement, if tar and gravel or cement joints are provided for the latter, the inspector should see that this is omitted for a sufficient space around each joint to permit easy removal of the paving block to accommodate the welding apparatus. The inspector should report to his own engineering department any variation from the ordinary paving that requires special measurements and keep sufficient records to enable him to designate such places when called on for them.

The above points cover in a general way instructions prepared for the guidance of paving inspectors on the Public Service Company's line. In addition to these general instructions, the inspector should watch out for the following points, but this is not to be construed by the inspector to mean that they are the only items to be checked, because he is to keep a close supervision over the entire job:

Suspension of Concrete Work

Cement must be effectually protected from water or dampness. Packages of cement which when turned out contain hard lumps should be rejected. Where the contractor is to place the concrete foundation for the paving the inspector shall see that the specified proportions are strictly adhered to. Where the sand and stone are supplied to the mixing board by wheelbarrows and the cement in bags the inspector shall measure same to see that the contractor is using the right proportions of cement, sand and stone. One standard bag of cement will be considered as 1 cu.ft. and a barrel of cement as 4 cu.ft.

In mixing the concrete the method of gaging the proportions must be accurate and the operation of mixing it by hand must be done on suitable mixing boards. The inspector must see that the concrete is deposited as quickly as it is mixed.

When a concrete mixer is used the inspector must acquaint himself with the theory and principle of operation of that particular type of mixer and be able to detect at any time any change in the proportion or uniformity of the mixture. When the mixer is of the automatic-feed type the inspector must test it at least once during each day's work, at times unexpected by the foreman, by feeding measured quantities of cement, sand and stone, in the proportion specified, into the respective hoppers. If the mixer is gaged properly and feeding freely the measured quantities of materials will be exhausted simultaneously. Should some cement be retained in the cement hopper after the sand and stone are exhausted it is an indication that the mixer is either improperly gaged or that the cement feed is clogged. Whatever the trouble is it must be corrected before the mixing is allowed to continue.

Accuracy of Mixer Should Be Tested

When the contractor employs a concrete mixer into which the materials are not loaded in batches the inspector should not depend for the securing of proper proportions on the accuracy of the machine gaging or the proportion of the shovelers used. The material must be placed in properly proportioned piles, not containing more than 10 cu.yd. in the case of sand, broken stone or gravel, and the inspector must see that the machine exhausts all material simultaneously. Should it be impossible to obtain these results, due to improper piling of material, the inspector must require the use of measuring boxes for proportioning the charges for the mixer.

The test for the degree of mixing or turning will be that all fragments of stone are fully covered with mortar. Grouting of concrete after it has been laid, or the application of neat mortar to the surface, and the sweeping of the surface with street brooms to make it smooth or to cover up defects must not be permitted. Concrete made of fine stone in the stated proportions of mixture may be used for leveling depressions.

The inspector shall see that the concrete is protected from injury while setting and that no hauling or trucking is done over it except on planks, and only after a proper hardness has been reached.

The principal care of the inspector should be to see that the asphalt is not laid at too low a temperature. The minimum temperature permitted by our specifications is 250 deg. F. While the main or interior mass of a wagonload may be well above that temperature, the top and outer part of the load may be, particularly in cold weather, too cold to be safely used. Some of this colder portion may be sufficiently reheated by mixing it with the hotter material, if properly handled in unloading, but any material that is so cold as to be lumpy when unloaded, or, more particularly, when being raked out, should be discarded. This applies to both surface and binder mixtures. The best practical guide is the manner in which the mixture behaves in raking. It should always be so hot that it will, under the rake, break up into a uniform crumbling or powdery mass. If it does not do this it is too cold, whatever its temperature may be.

Before the binder is laid all loose material, rubbish, street dirt and other matter foreign to the concrete surface shall be removed and the concrete surface swept, with street brooms if necessary, properly to clean it. Neither binder nor surface mixture shall be laid upon wet surfaces. Before the spreading of the surface mixture on the binder the latter must be cleaned of all foreign matter and swept if necessary. If the binder course already laid has become covered with mud from wagons or other travel it must be swept clean. No loose fragments of binder material must remain on the surface. Any part of the binder course that may have become broken or loosened must be taken up and new material laid in its place with the same care as the original.

How Binder Course Is Laid

Nearly the same care in raking and equally as careful rolling should be required as for the surface course. If the binder is not thoroughly compressed and becomes cold before the surface course is laid it is likely, in the future hot weather, to soften and yield under heavy travel, and thus start small depressions in the pavement.

The joints against a cold edge of previously laid surface must be cut back until solid, fully compressed material of full thickness is reached and the raw edge completely but thinly painted with liquid bitumen. No masses or fragments of cold mixture must be allowed to remain on the surface of the binder, in advance of the placing of the surface course, to be covered up by the latter.

Such cold masses will not be compressed by the roller, but will later, under the hot sun and heavy travel, yield and start depressions in the pavement. Raking requires skill and the tines of the rake must penetrate to the binder, so that the raked material will be a uniform mass from top to bottom.

The inspector must insist upon the roller being placed upon the freshly raked surface just as soon as the material will bear it without being squeezed out or displaced laterally. The tendency is to keep the roller off too long, thus permitting the chilling of the surface and preventing its proper compression. The inspector must not take the contractor's word as to how soon the rolling may be begun, but should have trials made until he is able to judge for himself. The rolling of the heavy

roller should be very thorough; the roller should be kept at work constantly until the surface is too cold to be impressed. In operating the roller lengthwise of the street the rolling should begin at the gutters and work toward the center of the street whenever practicable. Cross rolling and diagonal rolling must be insisted upon wherever the width of the street will permit.

Asphalt surfaces must not be laid when rain or snow is falling or so long as the surfaces are wet. Surface mixture raked out and caught in a shower before it is well enough rolled to exclude water must be taken up and discarded.

Care Necessary for Block Paving

The more important things for the inspector to look after are: (a) The quality and shape of the blocks, (b) the sand cushion, (c) the setting of the blocks, (d) the ramming of the surface and (e) the filling of the joints.

Assuming that the general quality of the stone has been approved, the inspector will need only to observe and reject blocks made from soft, weathered or otherwise defective stone. Any material divergence from the correct form or from the sizes specified as permissible will be readily caught by the eye as the blocks are brought to the street and such defective blocks thrown out. The proper dressing of the blocks is important and should be watched carefully. While the inspector is not expected to examine each individual block, close observation of the blocks as they are handled and laid will enable him to detect and reject those that are materially defective in shape or dressing, or excessively wide joints will call attention to them as they are set.

Screened sand must be used for the cushion bed. It should be moderately coarse and must be fairly clean and pure. The tendency with contractors is to use any dirty sand or sandy loam available on the street. Such material, especially if it becomes filled with water, will yield under the blocks and will not support them properly. The sand bed should not vary materially in thickness. It should be laid and graded not more than 50 ft. nor less than 20 ft. in advance of the setting of the blocks.

Setting the Blocks

Blocks of uniform width and depth must be selected for each course, and each block must be laid upon a full bed of sand and "struck in" at the base, so as to bring the stone in close contact with its neighbor in the preceding course, and thus to insure the closest possible joint. The inspector must see that the joints in the line of traffic are close and that the alignment of the courses is true. This is most important, as a crooked or wavy course lessens the chances of getting close joints, not only along that particular course but along the courses that are to follow. The inspector must see that all longitudinal joints are broken by a lap of at least 3 in.

The operation of ramming is not to be permitted to approach within 20 ft. of the end of the paving. After ramming the surface of the pavement may look somewhat wavy and uneven. The inspector must then see that it is back-rammed. All blocks below the general plane of the surface must be raised and more sand placed thereunder and the blocks rammed again to an even bearing.

Whether sand or grit is used for partly filling the joints before paving cement or pitch is poured, care must be exercised in placing the sand or grit in the joints. Dumping a wheelbarrow load on the surface and then sweeping the joints full is not to be permitted under any circumstances. Sand and grit or gravel should be dried before being used and put into the joints as nearly as possible to a uniform height, as called for in the particular class of granite pavement. For pitch joints the contractor shall remove the gravel for the depth of about 1 in. below the surface before applying the pitch. The latter should be poured into the joint while at such a temperature as to be perfectly fluid.

Use Care in Clipping Old Blocks

In clipping, care should be taken that all blocks are of as nearly uniform size as possible and that the sides are even and square, in order to insure uniform width of joints. Any block that falls below the minimum specified size after clipping must be rejected. The inspector must use special care in the inspection of brick, asphalt or other artificial block and prevent the use in the pavement of any broken, chipped or otherwise defective blocks. A contractor will often use such brick and lay them with the defective side or face next to the sand cushion. This should not be permitted. The contractor should not be allowed to fill the joints of any stretch or section of paving with cement, pitch or other filler until such paving has been thoroughly examined by the inspector for defective blocks and such blocks replaced by perfect ones.

However carefully lumber may have been inspected before its manufacture into blocks the subsequent seasoning, treating and handling will develop many defects and they will need close observation.

Under certain conditions wood blocks will develop a great many "season cracks," which should not condemn them unless the cracks open for the full depth and to more than one-third of the thickness of the block. "Shakes" result from the separation of the wood along the growth rings and if well defined or open should condemn the block, though in many cases the blocks, after the defective part has been trimmed off, may be used.

The inspector shall see that the required crown is given to the concrete before the same is set, as on account of the even size of blocks any inequality of foundation more easily affects the surface. When these blocks are to be placed under the head of the rail, as in T-rail, the inspector should see that they are placed tight against the web of the rail and that all voids are completely filled, to avoid any loosening by the action of the cars on the adjoining rail.

Inspection of Macadam Paving

The inspector must see that the stone is spread in a uniform layer to the specified depth before rolling and that the rolling is continued until the stones are thoroughly settled into place and show no movement under the roller. The inspector should see that the binder is applied in thin layers and that it is not rolled until dry. The application of binder with intermittent rolling must be continued until all the voids in the stone are filled. Water should then be applied in such quantities that a wave of mud forms in front of the roller. The rolling must continue until the pavement is thoroughly consolidated.

The inspector should see that the road is again rolled after the final coat of screenings is spread over the

surface. He shall not accept the same until the surface becomes thoroughly consolidated, hard and smooth. Before the application of a bituminous dressing the inspector must see that the surface is so swept that the ends of the 1½-in. stones are exposed. Such dressing must not be applied except when the temperature is above 50 deg. F. and the weather is clear.

The inspector should bear in mind that the foregoing instructions are general and intended as a guide to be used in connection with and as a supplement to the contract form and specifications. He must not conclude that because no mention is made of some specification provision in these instructions they are of minor importance and may be neglected or violated. The contract specifications govern in every case and he should be held to strict accountability for the enforcement of every and all provisions contained therein.

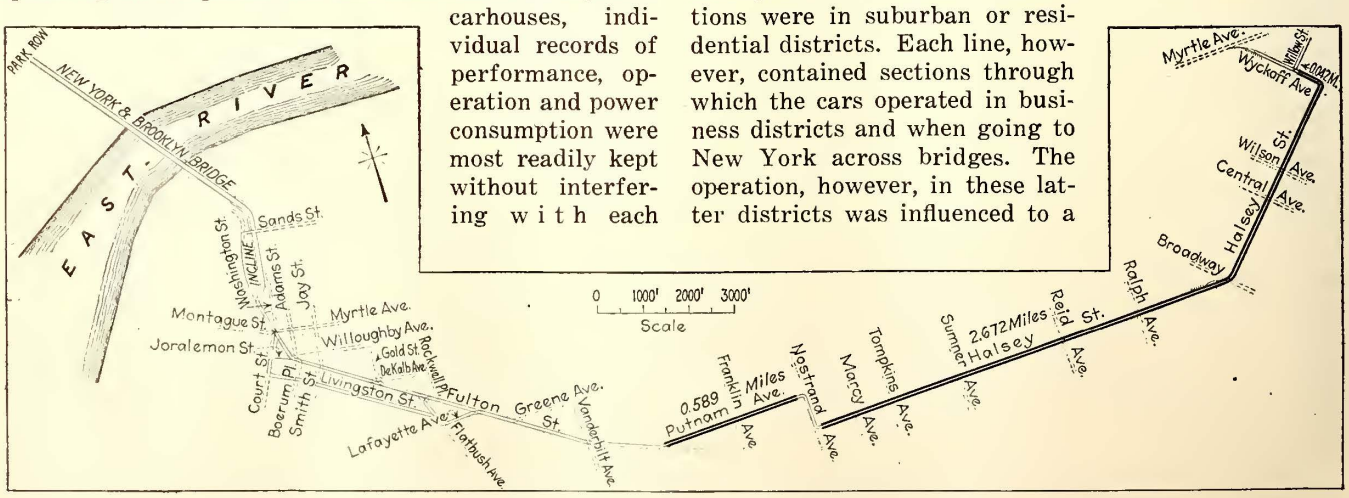
It is believed that most engineers will admit the desirability of securing the services of a competent inspector on paving work, as much so, in fact, as is true in the case of purchasing track or other materials under specifications. It will also probably be conceded that the ordinary laborer or inexperienced engineer would not possess the qualifications necessary to fit him for the work, since, if he does his work properly, he must not only be on the job all the time but must possess certain qualities of judgment which can only be gained through experience and practice. This argument being sound, it is evident, then, that the best results can only be expected through the employment of trained and competent inspectors, and the above outline of some of the points which the latter should be required to look after may serve as a guide where men are being trained for this work.

Power Saved by Use of Checking Devices

Results of a Very Thorough Test Made in Brooklyn (N. Y.) Show That the Economies Effected by a Properly Organized Power-Saving Campaign Should Exceed 15 per Cent

IN ORDER to determine the efficiency of the principal types of car-energy-checking devices now being used, the Brooklyn Rapid Transit Company inaugurated a test during the latter part of 1919. Three different types of these checking instruments were tested, and a sufficient number of each type was used completely to equip three separate lines of the system. In this test 220 cars were used.

Forty-four cars were equipped with coasting recorders of the Rico type and were placed in operation on the Flatbush-Seventh Avenue line. One hundred Economy kilowatt-hour meters were installed on cars and placed in operation on the Greene and Gates Avenue line. Seventy-six Arthur power-saving recorders were installed on cars and placed in operation on the Putnam and Halsey Street line. Previous tests on these lines had shown that the service characteristics were quite similar and were directly comparable. Also, the cars and equipment used on these lines were such as to permit ready comparison without complicated calculations. By confining each type of instrument to cars operating on a separate line and maintained at separate carhouses, individual records of performance, operation and power consumption were most readily kept without interfering with each other. Before this test was started certain sections of all the lines on which it was to be conducted were arranged so that all energy supplied to them was metered through Sangamo kilowatt-hour meters installed in the substations supplying these sections. An accompanying illustration shows a map of the Putnam-Halsey Street line, on which the metered sections are indicated. This arrangement is typical of that which was used on the other lines and serves to illustrate the methods by which accurate readings of the power consumed in operation were obtained for comparable sections over which cars equipped with different types of instruments were operated. In order to facilitate the calculation of the mileage made in metered and non-metered sections by the various cars a table was made for each line, giving the total mileage, the mileage of the metered sections and the mileage of the non-metered sections for the various runs which cars on these lines could make. An accompanying table gives this tabulated mileage for the Putnam-Halsey Street line, which will serve as an illustration of the manner in which these tables were arranged for the other lines. All of the metered sections were in suburban or residential districts. Each line, however, contained sections through which the cars operated in business districts and when going to New York across bridges. The operation, however, in these latter districts was influenced to a



ROUTE MAP OF PUTNAM AND HALSEY STREET LINE

Line _____ Direction ____ Date _____

Car No.	Time In	Meter Reading Fulton	Meter Reading B'dway	Meter Reading Wyc.	Time Out	Time Run	Minutes Power On

Line _____ Direction ____ Date _____

Car No.	Time In	Meter Reading	Time Out	Meter Reading	Time Run	K.W.H.

Line _____

Date	Number and Type of Cars 1400	2500	4500	9000		Total	Car-Miles	K.W.H. at Sub. Sta.	K.W.H. Per Car-Mile	Avg. Wt. Car Light	Total Passengers	Passengers Per Car	Avg. Wt. Car Loaded	W. H. Ton Mile	Schedule Time Trip	Total Cars

Line _____

Type of Car	Motors	Gear Ratio	Diam. of Wheels	Wt. of Car Light	Wt. of Car Light Tons	

Line _____ Direction ____ Date _____

Car No.	Time In	Time Out	Time Run	Time Coast

FORMS USED FOR RECORDING TEST DATA

large extent by traffic and service conditions which if considered would introduce too great a variation to insure accurate comparison.

Frequent and recent tests had been made of the operation of the cars and equipment over these lines for other purposes, so that a large amount of data was available for use regarding the service characteristics of each section. These data included such records as scheduled speed, number of stops per car-mile, average duration of stops, average number of passengers on car at one time, and other similar data of value and interest in making comparisons.

At the beginning of the test, cars were operated for one week with covers installed over the car instrument faces, so that they could not be read by the motorman. During this period the motormen were supposed to operate in the normal manner in which they had been in the habit of operating their equipment and without particular regard to any great saving in power. During this period, however, records were kept at the substations of the power consumed in the metered sections and records of the equipment used and service characteristics were also kept. These included the number and type of cars operated, the car-miles made, the average weight of the cars, light, the total number of passengers carried, the average passengers per car, the average weight of the car loaded and the scheduled time for the trip. This information, together with the power readings at the substation, enabled computations to be made showing the kilowatt-hours per car-mile and per ton-mile consumed. All this information was carefully tabulated and plotted in the form of graphs for convenience in comparison. For the convenience of those designated to obtain and record this information, various forms were prepared with spaces to be filled in for tabulation. An accompanying illustration shows the headings for some of these forms.

The test was started July 9, 1919, and the preliminary operation with the car power-checking device faces covered ended July 16 at 6 a.m. On that day all instruments were immediately inspected and the shutters were removed from the meter faces. On July 17 readings were taken of the various power-checking instruments installed on the cars by inspectors in order to obtain a comparison of the data recorded on the car and the

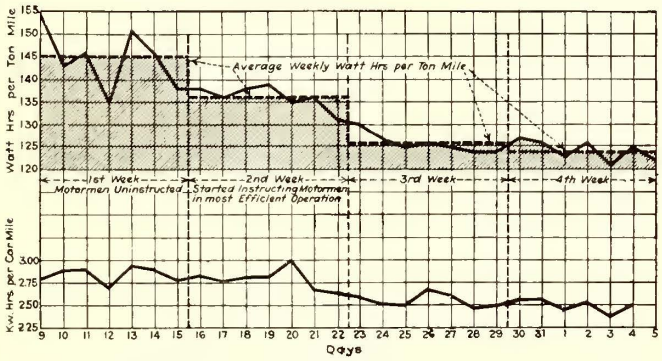
ROUTE MILEAGE FOR PUTNAM AND HALSEY STREET LINE

Route	Metered Section	Non-Metered Section	Total Mileage
Ridgewood depot to Wyckoff and Halsey	0.042	0.314	0.356
Wyckoff and Halsey to Park Row via Fulton Street	3.261	3.524	6.785
Wyckoff and Halsey to Park Row via Livingston Street	3.261	3.703	6.964
Wyckoff and Halsey to Borough Hall via Fulton Street	3.261	1.946	5 207
Wyckoff and Halsey to Borough Hall via Livingston Street	3.261	1.947	5 208
Wyckoff and Halsey to Fulton and Flatbush Loop	3.261	1.331	4.592
Wyckoff and Halsey to Halsey Street Depot	0.976	.....	0.976
Halsey Street Depot to Park Row via Fulton Street	2.285	3 524	5 809
Halsey Street Depot to Park Row via Livingston Street	2.285	3.703	5.988
Halsey Street Depot to Borough Hall via Fulton Street	2.285	1.946	4 231
Halsey Street Depot to Borough Hall via Livingston Street	2.285	1.947	4.232
Halsey Street Depot to Fulton and Flatbush Loop	2.285	1.331	3.616
Halsey and Reid to Park Row via Fulton Street	1.621	3 524	5.145
Halsey and Reid to Park Row via Livingston Street	1.621	3.703	5.324
Halsey and Reid to Borough Hall via Fulton Street	1.621	1.946	3.567
Halsey and Reid to Borough Hall via Livingston Street	1.621	1.947	3.568
Halsey and Reid to Fulton and Flatbush Loop	1.621	1.331	2 952
Halsey and Nostrand to Park Row via Fulton Street	0.589	3.524	4.113
Halsey and Nostrand to Park Row via Livingston Street	0.589	3.703	4.292
Halsey and Nostrand to Borough Hall via Fulton Street	0.589	1.946	2.535
Halsey and Nostrand to Borough Hall via Livingston Street	0.589	1.947	2.536
Halsey and Nostrand to Fulton and Flatbush Loop	0.589	1.331	1.920
WYCKOFF AVENUE SHUTTLE			
Wyckoff Avenue and Halsey Street to Myrtle Avenue	0.042	0.364	0.406

power furnished by the substation as indicated by the kilowatt-hour meters. A relation was thus established between the amount of power supplied to the various sections and the amount of coasting as indicated by the cars equipped with coasting recorders, the number of minutes that power was applied as indicated by cars having power-saving recorders and the kilowatt-hour readings as indicated by the instruments on cars with watt-hour meters. Graphs were plotted showing these various relations, together with ratio of kilowatt-hours consumed at substations to car-miles operated.

MOTORMEN INSTRUCTED IN PROPER OPERATION

On July 18 representatives of the several power-checking-device companies visited the inspection depots and explained to the motormen the working of their devices and began instruction in connection with the



AVERAGE POWER CONSUMPTION GRAPHS FOR TEST PERIOD

proper handling of cars so that the men would be able to make the best possible records. The test, together with the recording and calculation of data, then proceeded and various graphs were plotted to show the improvement made by the use of the various devices and the results of the power-saving campaign.

It is not the intention of this article to give any comparisons of the various power-checking instruments or the results accomplished by each individual type of instrument, but rather to give general data which might apply to any type. With this idea in view a composite graph has been plotted showing the average watt-hours per ton-mile and the average kilowatt-hours per car-mile which were obtained for the three lines on which the tests were conducted. The average weekly watt-hours per ton-mile for all the lines is also shown. By comparison of these, it will be seen that the average for the fourth week is aproximately 15 per cent less than the average obtained for the first week, before motormen were instructed in the use of the devices.

In general this saving would indicate that if a power-saving campaign would result in the same saving for all the cars operated by the Brooklyn Rapid Transit system the first cost of the power-checking instruments could be saved in from two to three months, and that a further saving of less than 1 per cent would be sufficient to carry the cost of inaugurating a power-saving campaign and maintaining the power-checking instruments as well as covering all carrying charges and operating expenses for the carrying on of this work. Some very surprising results were also indicated as to the difference in power consumption used by a good motorman and a careless one. This ratio considered on a power consumption basis was about in the ratio of 2 to 1.

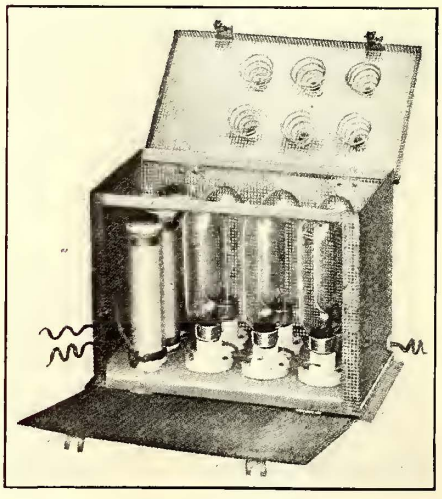
Electric Locomotive Versus Motor Cars

OWING to the intensive study being given to heavy electric traction in Great Britain, the railway papers in that country are considering carefully the several phases of the problem of substituting electric for steam motive power. In its November issue the *Railway Engineer* of London editorially rather favors the locomotive, stating that one of the chief factors which will make for the adoption of electric locomotives for main-line passenger work, rather than motor coaches in conjunction with trailers, is that it will enable the present rolling stock to be employed. On many systems the main-line stock is of high class and capable of being used for many years. The necessity for rendering this obsolete would mitigate against the gradual electrification of the main lines. It would, of course, states the *Railway Engineer*, be possible to convert existing stock to enable it to run as trailer coaches in multiple-unit trains, but the adoption of electric locomotives would obviate this. Again, with electric locomotives the dividing of trains at junctions, slipping of coaches and working of rolling stock over foreign lines all become possible. The use of the electric locomotive also removes from the passenger coaches the noise and vibration inseparable from the motor coach.

Constant Current Regulation for Incandescent Headlights

THE General Electric Company, Schenectady, N. Y., has developed an automatic regulating device which maintains practically normal voltage on the headlight lamps with varying trolley potential. This is called the "Geco Resistor" and has a low initial cost and its maintenance is also very inexpensive, as there are no moving parts or contacts to get out of order.

The device consists of six units mounted in porcelain sockets and three resistance sticks, two of which are used to dim the headlight within city limits. The third stick is to adjust the "Geco" for the maximum trolley voltage of the system. These elements are encased in a perforated metal housing equipped with hinged covers, which provides ready accessibility. On the top cover six conical springs hold the resistor units firmly in the sockets. The "Geco Resistor" has a positive temperature coefficient. With a drop in trolley voltage the resistance of the "Geco" becomes correspondingly less, thus maintaining practically constant current through the headlight lamps. A rise in trolley voltage causes the resistance to increase and governs the flow of current in a similar manner. A special incandescent headlight lamp must be used when operated with the "Geco Resistor."



NEW TYPE RESISTOR FOR INCANDESCENT HEADLIGHTS

Fuel and Transportation the Leading Topics

Mechanical Engineers Hold Annual Convention in New York—Railroad, Motor Truck and Waterway Transportation Discussed — Fuel Sessions Are Well Attended—Wood Floors for Shops and Factories Form Topic of the Forest Products Session

THE forty-first annual meeting of the American Society of Mechanical Engineers was held in the United Engineering Societies Building, New York City, Dec. 7-10, inclusive. The program included a large variety of subjects and separate sessions were held under the auspices of the various sections devoted to fuel, forest products, machine shops, management, railroads, design, research, transportation and power. In addition to the program of papers excursions were made to neighboring power stations and a varied series of informal entertainments was also provided.

The feature of the fuel session, which was held on the afternoon of Tuesday, Dec. 7, was a symposium of papers on fuel supply, conservation and production. This session was opened by Prof. L. P. Breckenridge, Yale University, with a discussion of the fuel supply of the world. The latest available data on the supply, production and use of the various fuels were shown graphically in the form of curves and charts. A few statistics are well worth remembering. Over half the world's supply of coal is located in the United States; about 40 per cent of the annual production of the world's coal is mined in this country, and the annual production in the United States is about 500,000,000 tons of bituminous and about 85,000,000 tons of anthracite coal. The supply of fuel oil in the United States it is estimated will be used up in from twenty to thirty years. Our production, which is about 356,000,000 bbl. annually, is 60 per cent of the world's total output. Professor Breckenridge emphasized the statement that the time has arrived when the fuel problems of the world must be given consideration in a large way. In his plea for thrift and conservation he says:

"The difficulty of securing a supply of coal, coupled with the high price paid for it, has itself brought about a desire to exercise all possible care in its use. The public at large more and more realizes the need of co-operation to secure conservation in some large way. It is in connection with the last plan, 'Co-operation for Conservation' rather than 'Individual Thrift,' that the writer sees the most promising chance for initial success. Especially is this true as a wise first step. Individual thrift should always be practiced, but the large savings of fuel that could be made by co-operation are way beyond anything that would be expected from individual effort. The suggestions for coal conservation which are given are not new; some of them have already begun, but it is only when all of them are fully realized that we shall be able to feel that we are really making satisfactory progress in preventing waste of fuel as well as waste in labor and capital which are required to produce and transport fuel."

The next speaker, David Moffat Meyers, New York, in his paper on fuel conservation, laid much stress, as did Professor Breckenridge, on the need of a definite fuel conservation policy. He said that prevention of waste and conservation involve no experimental features, but merely require the application of well-known engineering principles. How vital the fuel question is as a national issue is not yet realized by the public at large, but when this realization comes a solution may be looked forward to which will check this great and uncontrolled waste.

At the forest products session, held Tuesday afternoon, papers were presented describing various features of the wood-working industry and the equipment and machinery used in wood construction and preservation. A paper on "Creosoted Wood Block Factory Floors," by L. T. Ericson, chief engineer of the Jennison-Wright Company, Toledo, Ohio, is of interest in connection with electric railway shop floors. Mr. Ericson said that the creosoted wood block flooring is a logical development from street paving, but in this development a great many mistakes have been made due to a misunderstanding of the problems involved. The principal reason for most of the troubles encountered with this type of flooring is the fact that wood expands and contracts with various conditions of atmosphere and the moisture content of the blocks. It is, therefore, necessary to lay the individual blocks in such a way as to allow for this change in volume, which in extreme cases may be as much as 5 per cent. The individual units in the floor must be bound tightly in place with a binder which will allow for expansion and contraction and which will exclude water from the under side of the floor. As long as the blocks are held tightly and

Suggestions by L. P. Breckenridge for Preventing Waste of Coal

1. Extend improved mining methods.
2. Extend improved methods of preparation of coal at the mines.
3. Reduce hazards of coal mining.
4. Operate mines a maximum number of days per year.
5. Utilize mine waste.
6. Increase use of byproduct coke oven.
7. Extend use of blast-furnace gas for power generation.
8. Extend use of gas producer, gas and heavy oil engines.
9. Develop waterpower.
10. Better the performance of steam locomotives.
11. Purchase of power by small industrial plants.
12. Furnish owners of homes and public buildings with correct and simple instructions for heating.
13. Extend "custom" of coal shortage to induce storage of coal when demand is low.
14. Extend electrification, as the full use of electrical energy offers the most promising means of saving coal. Conservation by co-operation of water power, steam power and electricity opens up large possibilities for saving fuel, capital and labor as outlined in Mr. Murray's super-power scheme.

firmly in place and a smooth surface is maintained the floor will wear almost indefinitely, but as soon as the blocks become loose and the surface becomes rough they will break up into sticks very quickly. The three most essential requisites for success are to use thoroughly air-seasoned lumber, to provide a smooth solid foundation base and to have a waterproof and elastic binder for holding the units in place.

Conditions to Be Met in a Successful Installation

The majority of floors are dry most of the time, consequently the lumber should be thoroughly seasoned in order to keep the shrinkage to the minimum. Blocks cut from green or semi-dry lumber will shrink in volume to such an extent that they will often have to be taken up and relaid. If it is possible to do so it is advisable to use a concrete base for the installation of these floors. The base should be strong enough to carry the entire load and should be finished smooth and level so that it will not be necessary to use a cushion between the concrete and the blocks in order to secure a level floor and uniform bearing for the individual units.

> **The people do not desire government ownership and operation, and I believe that they are willing to pay such rates and charges as may be necessary to secure successful private operation provided that the roads under private management are able to give and do give such service as the public reasonably desires and is entitled to. If they fail to do this the public will demand a change.**
>
> —DANIEL WILLARD.

The use of a sand cushion between the blocks and the concrete, which was almost universally used a few years ago, was largely accountable for a great many of the failures. Sand shifts easily under traffic and heavy loading and also affords pockets for the collection of moisture under the floor. Wherever a cushion is necessary between the concrete and the blocks it is advisable either to use a mixture of portland cement and sand or a bituminous mastic. The latter is preferable in a great many cases on account of being both waterproof and elastic. The sole functions of a cushion should be to level up the inequalities of the base and, in the case of the bituminous cushion, to furnish a waterproofing membrane on the under side of the floor. It is standard practice today to lay the blocks directly upon a smoothly finished concrete base without any cushion whatsoever. It is also customary to give the base a thin, even coating of coal-tar pitch before installing the blocks so that the under side of the blocks may be thoroughly sealed and made waterproof.

The elimination of cushions and the use of a successful waterproof binder in the joints of the blocks, thereby eliminating the possibility of shifting of the base and a loosening of the units, has permitted a reduction in the depth of the blocks used. Factory floors are now being very successfully installed throughout entire manufacturing plants with blocks as shallow as 2 in. in depth.

For dry locations the blocks should be driven up tightly together when installed; there is a tendency, however, for a slight further contraction in the volume of air-seasoned blocks when placed in the floor of a steam-heated room, and therefore it is necessary to provide a binder in the joints to hold the blocks in place after this contraction has occurred and to exclude moisture and foreign matter from seeping under them.

Floors which are to be subjected to considerable moisture or to weather conditions should be laid with ample provision for expansion. It is good practice to provide ample space between the individual units to take care of this expansion. These joints should be flushed full of a waterproof, elastic binder, which should preferably be coal-tar pitch of a consistency which will not soften up under atmospheric or room temperatures.

The progress report of the research sub-committee on "bearing metals" was made at the business meeting on Wednesday, Dec. 8. In this report is described an instrument recently perfected, called the microcharacter, to determine the microcharacteristics of alloys. By means of the use in this instrument of a very accurately cut sapphire point instead of a needle point it has been possible to formulate a tentative scale of microhardness. This instrument makes it possible to test not only various bearing alloys but also steels suitable for journals whether hardened or soft.

A paper on "Static Adjustment of Trucks on Curves" was presented by R. Eksergian, Baldwin Locomotive Works, at the railroad session on Wednesday afternoon. The adjustment of the running gear of a locomotive on curves and the lateral reactions developed are considered from geometrical limitations imposed which govern the length of wheelbase, and the lateral displacement of trucks, together with a study of lateral devices for exerting guiding reactions between truck and the frame of the rigid wheelbase. The speaker then considered the effect of the major lateral reactions developed between the various parts of the running gear.

The effect of the centrifugal force and the overturning moment which it produces, resulting in a change of load on the non-crossed part of the equalization, was next discussed in order to arrive at the proper journal load in the design of the driving and trailing-truck axles. The principal reactions developed in a two- and four-wheel engine truck and formulæ for the flange reaction of the guiding axle are derived in terms of the lateral force exerted at the center pin of the truck. An analysis is made of the lateral forces developed in skewing the rigid wheelbase of a locomotive in curve. Finally formulæ for proper guiding and maximum flange reactions for the entire running gear are developed for three common types of locomotives.

Mr. Willard Reviews Transportation Situation

At the session on transportation, the leading address was by Daniel Willard, president of the Baltimore & Ohio Railroad. The keynote of Mr. Willard's address was his recommendation to the Council of National Defence of November, 1917, from which he quoted:

> A nation should have a national transportation system and such a system should embrace and make proper use of all available and suitable agencies. The fullest possible economic co-operation should be encouraged and required between all such agencies. Inasmuch as the business of transportation for hire partakes of a monopolistic character, all agencies so used should be subject to governmental regulation in the public interest.
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> * * *
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> Among the many agencies of transportation the following are in most common use: The natural and artificial water-

ways, with the various craft designed to operate thereon; the highways, with the different vehicles and contrivances designed to operate thereon, and the specialized roads, such as electric and steam railways, with the special equipment designed for each. Other agencies may be developed.

* * *

The co-ordinated transportation system of a nation should be so adjusted that each agency will perform the particular function for which it is best adapted, and, speaking broadly, that country which is provided with the most efficient transportation system—other things being equal—ought to be the most prosperous.

He then reviewed what the railroad had done in the period during and subsequent to federal control and emphasized that what had been shown was that if the country is to have a completely articulated transportation system this can be done only by the co-ordination of different transportation agencies, including steam and electric railways, coastwise and inland waterways, the highways, improved and unimproved, the motor truck, etc.

He said he feels sure that the people do not desire government ownership and operation, and he believes that they are willing to pay such rates and charges as may be necessary to secure successful private operation provided that the roads under private management are able to give and do give such service as the public reasonably desires and is entitled to. If they fail to do this the public will demand a change.

He said further that it is in the larger public interest that each transportation agency should be used to the extent that it is economically desirable. To give less use than that of each agency would be wasteful. Some who were interested in a particular agency have tended in the past to try to extend its use beyond proper economic limits, and such mistakes should be avoided. He emphasized the proper economic place of the motor vehicle in short-distance traffic in conjunction with the railway. He closed by saying:

"Whatever may have been the attitude of the railway managers in the past, that is not their attitude at the present time, and I am certain that they will be glad collectively or individually to co-operate with all other transportation agencies in such way as will inure to the greatest public good, because in the end all enterprises of an individual character must be tested by that rule. Whatever contributes to the public good is likely to endure, and anything inimical to the public good is certain to fail."

FEEDERS FOR RAILROADS DISCUSSED

Charles A. Morse, chief engineer Chicago, Rock Island & Pacific Railroad, then addressed the meeting on "Feeders for Railroads." He traced the development of small branch lines from the early days when they could use equipment transferred from main lines to the present, when main line equipment is too heavy for branch line use.

Today, he says, the situation has changed and it is doubtful if branch lines which feed main lines can be substantiated economically. It will bear careful investigation to see whether or not branch rail lines should not be discontinued and their work taken over by motor trucks on hard surfaced roads which the public is compelled to support by taxation anyway. It is not fair to tax main line passengers to support branch lines, and where branch line facilities are continued their extra cost should be charged to those they serve.

After a paper on inland waterways, Francis W. Davis of the Pierce-Arrow Motor Car Company presented a paper on motor trucks, discussing this subject under three heads, first, the field; second, the present status, and third, the improvement of truck transportation.

The field he defined as being in the short haul and at terminals for the motor truck; and as a supplement to electric railways, for the motor bus. Motor transportation is an ally of rail transportation and releases cars for long hauls, where they are most efficient, and acts to conserve rail equipment in general.

Mr. Davis gave figures to show the relative cost and time of shipping by rail and truck for various lengths of haul, from which he concluded that the economical limit where rail was cheaper than truck was about 70 miles. He discussed at length the present status of the motor truck transportation and suggested as improvements for the future development of the highways, to which, he says, the motor vehicles contribute materially in license fees.

He made the final point that the motor industry as a whole will welcome sound and uniform legislation and will aid in securing it.

Whatever contributes to the public good is likely to endure, and anything inimical to the public good is certain to fail. DANIEL WILLARD.

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Motor transportation is an ally of rail transportation and releases cars for long hauls, where they are most efficient, and acts to conserve rail equipment in general. FRANCIS W. DAVIS.

At one of the other sessions of the convention Gustav Lindenthal presented a paper on "The Transportation and Terminal Problem of New York as Affected by the Hudson River." It will be recalled by readers of the JOURNAL that the general transportation problem in and around the metropolitan district of New York was discussed before the American Society of Civil Engineers, New York Section, recently, as reported in the Nov. 27 issue of the JOURNAL, page 1095. This paper of Mr. Lindenthal's should be read in connection with this previous discussion before the Civil Engineers.

Mr. Lindenthal gave many data which were presented at this previous transportation session regarding the population in New Jersey, which is really tributary to the city life of Manhattan in the same degree as the population of about the same size living on Long Island and separated by the East River.

To the local problem across the Hudson River, namely, that of transporting passengers, must be added the big problem of passenger and freight transportation from seven large trunk line railroad systems, and Mr. Lindenthal points out that with the exception of about 300,000 passengers all the rest of the traffic comes by floating equipment across the river as it did eighty years ago.

Mr. Lindenthal's concrete suggestion is the building of a bridge over the Hudson River, located at or below Fifty-ninth Street, where the banks on both sides are high and favorable for bridge construction. The proposed bridge would have two decks 180 ft. wide, the lower accommodating eight railroad tracks and two tracks for a moving platform, the upper deck being set aside for highway traffic, four lines of surface electric railways and twelve lines for vehicles, with two sidewalks.

Necessary connections between elevated railroads and the New York Central tracks along the riverfront on the West Side would be made, as well as with a proposed union passenger station.

Mr. Lindenthal compares the estimated cost of the bridge of $100,000,000 to the $400,000,000 estimate of twenty under-the-river tunnels which had been proposed to handle similar traffic. He also points out that the bridge would be constructed in much less time.

Mr. Lindenthal then analyzes the passenger traffic on the railroads, the street railways and the moving platform in its distribution on the Manhattan end. He further points out how freight transportation would be made and articulated with the distributing system on Manhattan Island.

One of the features of the plan is a moving platform which would cross Manhattan Island under Fifty-seventh Street and eliminate all crosstown surface passenger transportation for the large number of through passengers which would exist at that point following the completion of the bridge.

Sheet Asphalt Pavement Withstands Severe Service

REPLACEMENT of worn-out tracks in Main Street by the Memphis (Tenn.) Street Railway recently showed the extent to which sheet asphalt pavements will withstand heavy traffic when laid under strict engineering supervision and with proved materials. This asphalt pavement was put down in the fall and winter of 1904-05. The asphalt extended from curb to curb and was laid flush with the track rails. At the time the pavement was originally laid new 90-lb. steel rails were

PAVEMENT CUT AWAY FROM TRACKS TO ALLOW REPLACEMENT OF RAILS

with one operation. Two castings used to support the that replacement was necessary and to carry out this work the asphalt was cut out along the double tracks, as shown in the accompanying illustration. The cutting disclosed that there was still 2 in. of wearing material left in the pavement. At a crossing at Main Street and Madison Avenue it was necessary to take out large sections of the pavement between the tracks in order to replace special trackwork. This pavement was also of asphalt and extended to the rails. The traffic to which it had been subjected was extremely heavy and the wear of the surface had been so uniform as to be scarcely discernible. For the original pavement construction Bermudez Lake asphalt was used. The contractor was the Hornaday Construction Company of Greenwood, Miss.

Saving Through Use of Anti-Friction Bearings

Tests Show Considerable Savings Result From Use of Anti-Friction Bearings on Railway Cars and Equipment

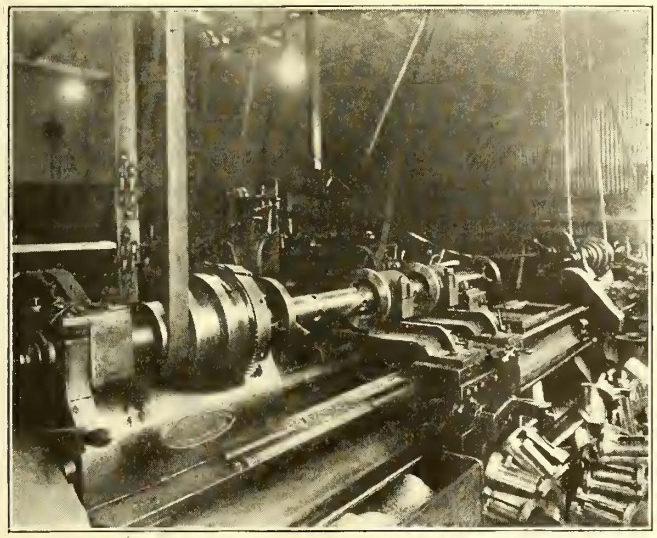
PROBABLY the most extensive use of anti-friction bearings has been on safety cars, and the mechanical troubles experienced with some types have raised a question as to the desirability of their use. The saving in power from the use of anti-friction bearings has been one of the greatest factors in favor of their use. Tests in this country and in Europe have shown savings in power costs of from 20 per cent to 30 per cent. These savings must necessarily vary with the weight of cars, loads, grades, curves, condition of the track, weather, speed, frequency of stops and skill of motormen. Some tests made by the Third Avenue Railway, New York City, showed a saving of approximately 25 per cent in power cost. The car tested weighed 18 tons and had the axles of eight wheels equipped with anti-friction bearings. The truck was a Brill 39-E Maximum traction type. The car was operated between the post office and Fort George, involving a mileage approximately 100 miles per day, with from eight to ten stops per mile.

Much of this saving is due to the decreased frictional resistance of the anti-friction bearings over the sleeve-type bearings in starting a car, and consequently the more frequent the stops and starts the greater will be this saving. Through this reduced friction the acceleration is also increased so that the current in the motors begins to fall off quicker. The coefficient of friction or the measure of frictional resistance for sleeve-type brass bearings on electric railway car truck journals at starting is from 5 per cent to 14 per cent, with an average between 9 and 10 per cent. The coefficient of friction for roller or ball bearings is less than 0.01 per cent. This decrease in journal friction causes a great reduction in the demands upon the motive power necessary to start and therefore this reduction can be applied to accelerating the car, with a consequent material reduction in running schedule.

Upon first consideration one is apt to assume that there will be no difference in the rates of retardation from the two types of bearings. But theoretically there should be an increased rate on cars having anti-friction bearings. The real limit to braking force of any car is the slipping or skidding point of the wheels on the rails. As soon as the wheels skid the retarding force is greatly reduced and a much longer stopping distance results. The usual type of friction bearing surrounds approximately only one-third of the circumference of the axle journals. This permits the brakes to push the wheels with the axle away from its bearing seat and positive resistance to the action of the brake does not occur. This yielding of the axle and wheels results in an unsteady or "chattering" action between the brake shoes and wheels which causes high and low spots in the braking effort produced. With this condition the wheels are more liable to become locked and slip. With anti-friction bearings the box entirely surrounds the journal, thus affording a positive resistance of the wheel to the brake shoes. This increase in retardation or the production of a more steady retardation also has its effect on the scheduled speed of the car and increases the miles per day that can be operated.

Boring Two Sets of Axle Bearings at Once

VARIOUS steps in the finishing of railway motor axle bearings as carried out by the Connecticut Company in its New Haven reclamation shop were described in the ELECTRIC RAILWAY JOURNAL for March 20, 1920, page 585. Since that time a further improvement has been put in use, as illustrated herewith, which makes it possible to bore out two sets of axle bearings



FINISHING TWO AXLE BEARINGS AT ONCE IN NEW HAVEN SHOPS

with one operation. Two castings used to support the bearings during the boring operation are bolted to the carriage of the finishing lathe. The bearings previously finished on the outside are clamped in these supporting jigs, which provide for accurate lining up and centering, so that the inside when bored out will be central with the outside surface. The boring bar as shown in the illustration is driven by the head stock in the lathe centers. This boring bar has openings to receive the finishing tools, which are clamped securely in position by set screws. When once set up bearings can be readily removed and new ones inserted for boring without disturbing the boring bar or the bottom portion of the supporting jigs. A considerable saving in the time taken to finish axle bearings has thus been effected.

Careful Oil Handling Reduces Bearing Troubles

AMONG a number of causes leading to hot bearings it has been found that some are due to foreign material in the oil caused by improper handling. A recent publication of the Vacuum Oil Company, entitled "Bearings and Their Lubrication," gives some suggestions of interest.

When the barrels of oil are delivered by the manufacturer, it is important that they be stored under cover. They should never be left in the open exposed to the sun and rain. Rain water particularly, if the barrels are stood on end, will find its way through the staves and gradually dissolves the inside lining of the barrel, causing it to spread throughout the oil. When such oil is used the presence of the lining material will cause excessive heating of the bearings.

When a barrel is opened the bung should be started by striking the staves with a mallet. If an auger is used fine chips of wood and dirt from the outside of the barrel may easily find their way through the opening into the oil. In any case the oil should always be poured through a strainer into the oil can. If this is not done the small chips of wood and other impurities will go into the bearings, with disastrous results.

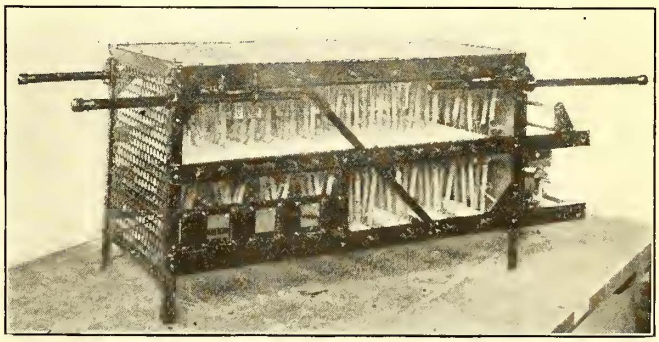
Dirty oil cans are responsible for many hot bearings and cans should therefore be kept scrupulously clean. The cans should be closed at the top or provided with covers, so as to prevent, as far as possible, the entrance of dirt. An oil can should never be used for more than one grade of oil, and in order to prevent mistake the name of the oil should be marked plainly on the can.

When the oil is drawn directly out of the barrels for use the overflow usually runs onto the floor or into "save-alls," which are not always clean. There is always the danger that some of this oil, including the dirt, will be used for lubrication. It is good practice to keep the oil in cabinets, preferably locked, so that the oil will not be tampered with by unauthorized persons. Oil waste may thus be minimized.

New Resistor-Type Arc Welder

THE General Electric Company has developed an electric arc-welding equipment incorporating new features, and especially adapted for welding rail bonds on electric railways. It is also applicable to welding work in shops where energy loss is not objectionable.

The apparatus consists of a wire resistance unit, mounted in a light metal frame, with suitable leads for connecting to the power supply circuit and to the electrode holder. Switches provide a welding current with range of from 60 to 200 amp. in 15-amp. steps. The complete device is easily portable by two men and will not be injured by exposure to the weather. The circuit



RESISTOR-TYPE ARC WELDER

is controlled through a contactor, operated by means of a push-button switch located close to the electrode holder. This arrangement permits the operator to open the circuit at a point remote from the weld and thus avoid flashing.

New Adhesive Paper Tapes

THE Irvington Varnish & Insulator Company, Irvington, N. J., announces that it has just perfected a new line of adhesive paper tapes for use in insulating armature coils and for general railway repair work. These tapes can be furnished in widths from ½ in. up and in rolls of 10, 36, 72 or 100 yd. They are made with several different degrees of tackiness and are specially treated so as to retain their adhesive qualities over long periods so as to permit storing without danger of losing their effectiveness. They have a dielectric strength of 7,500 volts and also possess high mechanical strength.

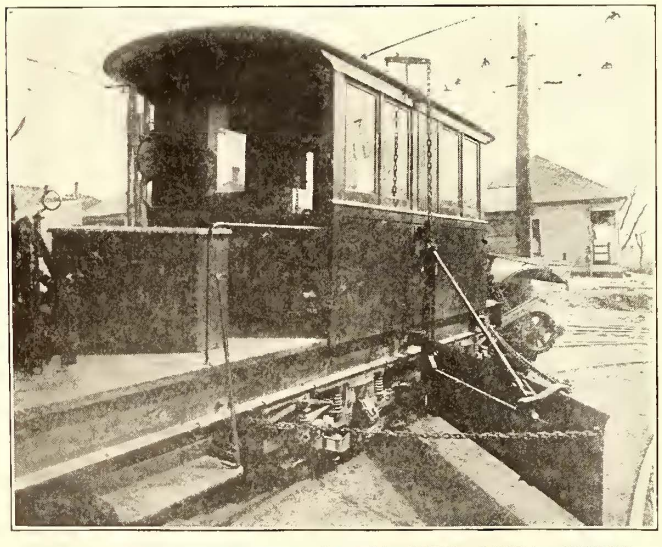
Special Design Sweeper Proves Efficient

Rotary Brush, Consisting of Broom Corn Reinforced by a Facing of Steel Bristles, Has Proved Both Effective and Economical

THE Sioux City (Iowa) Service Company has placed in service the fourth rotary snow sweeper built in the company's shops and embodying several unique features designed by C. M. Feist, master mechanic. The first of these machines was built in 1910, another one in 1916 and two in 1917, so that there has been ample opportunity to try them out thoroughly and determine their worth for keeping the right-of-way clear of snow.

The outstanding feature of construction is the design of the brushes. The foundation for the rotary brush at each end comprises three cast-steel spiders mounted on a 2½-in. shaft which is connected by sprocket and chain to a 30-hp. street railway motor mounted on the platform and housed in a box. A sheet of steel extends the entire length of the brush shaft and is wide enough to project beyond the spokes of the three spiders. This sheet is riveted to the spokes and further strengthened along the outer edge by a ¼-in. x 6-in. mild steel plate riveted in place. The broom sections are fastened to the outer edges of the four webs thus formed. The brooms are made of broom corn and are similar to a floor broom without the handles, for they are well sewed and of the same width top and bottom. They are reinforced by a facing of spring steel bristles made of 22-in. lengths of 0.114 x 0.026-in. flat steel, bent in the middle and laced through holes in a stick of hickory. This stick and the broom are fastened between 2½-in. channels with 1½-in. bolts, and the channels are bolted to the spiders with six ¾-in. bolts.

The idea underlying this construction as a substitute for the usual long rattan bristles is that the steel sheets

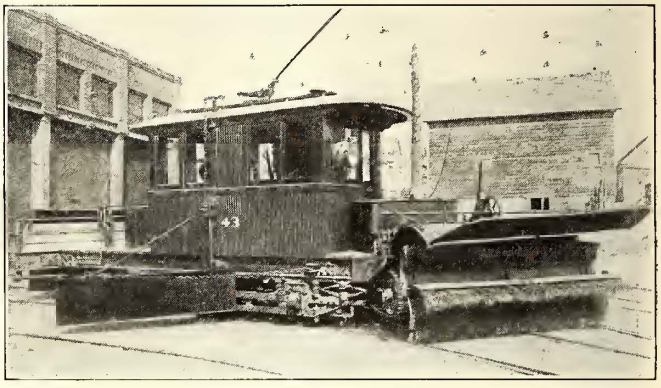


SPECIALLY DESIGNED SIOUX CITY, IOWA, SNOW SWEEPER SHOWING BRUSH CONSTRUCTION

take the strain in handling crusts of snow and also bear the weight of the snow, while the short well-supported broom corn, extending only about 10 in. beyond the spider, sweeps clean and takes care of the variation in paving level. It is claimed that the sweepers of the Sioux City company have been able to handle snow that the ordinary sweeper would not negotiate.

The broom is driven at a speed of 300 r.p.m., and the speed is controlled by means of a controller and grid resistances and also through an adjustable countershaft.

Another interesting feature of these sweepers is that the side wing is carried in a cradle supported by heavy hinges, with an arrangement whereby the forward pull on the outer end is made from the cradle rather than the wing itself, as is usual. The plate forming the wing is so supported in the cradle as to permit it to be bent backward upon striking any obstruction. This flexibility



THE SIDE WING IS SO FLEXIBLY SUPPORTED THAT IT WILL NOT BREAK UPON HITTING AN OBSTRUCTION

is obtained by the use of heavy springs which bear against the bottom edge of the wing, permitting it to rise to clear an obstacle and automatically to return to position without breaking.

The Sioux City sweepers are double-ended and the position of the brush at either end, speed of rotation, etc., are entirely controlled from drums and wheels mounted inside the car body. The main frame of the sweepers is made of 12-in. I-beams for the side members with 12-in. channels bolted across the ends by means of gusset plates. All castings used are steel, of special design, from patterns made in the company's own shops.

In addition to being more effective than the ordinary rattan sweeper, Mr. Feist states that it is more economical to maintain these brushes. One filling of these home-made brushes usually lasts through one winter and the replacement expense is less than for rattan brushes.

Transparent Protectors for Passes

RAILROAD passes, building and plant passes, membership cards, truck drivers' licenses, authorizations of various kinds and many other similar articles, which are generally made of paper and have to be shown frequently, become bent, broken, torn and dirty from handling and carrying about in the pocket. They are generally carried in leather or imitation leather cases and the face of the pass is shown through a transparent cover.

An ingenious substitute for the more or less cumbersome leather case is made by cementing the card between two pieces of transparent sheeting. This can best be done by spraying the pieces of sheeting with a solution of one-third wood alcohol and two-thirds amylacetate, and, after allowing them to dry for about ten minutes to avoid blurring the ink, placing the card between them and uniting them by hydraulic pressure. Satisfactory results can usually be obtained in a somewhat simpler manner by coating the card on both sides with a pyroxylin solution, using a camel's hair brush.

F. A. E. S. President Speaks in Chicago

Herbert Hoover Urges Engineers to Get Behind Federation Movement for Active Part in Great Political and Economic Questions

UNDER the auspices of the general committee of technical societies of Chicago a small group of engineers gathered for dinner at the Engineers' Club Dec. 10 to take advantage of Herbert Hoover's presence in the city and hear what he might have on his mind as the newly elected president of American Engineering Council, through which the Federated American Engineering Societies acts. W. L. Abbott, Commonwealth Edison Company, presided at the meeting. After Mr. Hoover had spoken of the federated movement of the engineers he responded very generously to questions asked him on various world situations, to the great interest and enlightenment of the seventy-five engineers present.

Mr. Hoover said that he had been led to accept the presidency of American Engineering Council because of the opportunity it afforded for great and good influence in coping with the growth of great national associations which is tending toward a division of the population into great economic groups. All of these associations are inspired by a selfish motive and seek to dominate the action of legislative bodies through a "terrorism little less than sovietism," or at the very best are attempting to bring pressure on government. He said that if this selfish purpose is allowed to continue on the part of these numerous associations it would lead to destruction and that we have come to a parting of the ways. In this situation the engineers hold a unique position, for in their great organization there is nothing they could not ask for that would not at the same time be as good for all the population as it would be for the engineers.

Referring to the members of Congress, Mr. Hoover said they have shown a great appreciation of the engineers who have been sent to them to testify before legislative committees by Engineering Council and that they have been glad to find some one upon whom they could depend for exact information not colored by a selfish interest.

Mr. Hoover laid emphasis upon the point that if we are to have the influence in public life of the disinterestedness, detachment and adherence to scientific facts embodied in the engineers, and to keep apart from the influence of the numerous selfish bodies, we must have an organization to do it—some definite engine to perform this work.

As president of the Institute of Mining and Metallurgical Engineers Mr. Hoover said that he had opposed the participation of this association in public matters, and had felt very strongly that it should keep to its function of developing the technical and ethical aspects of the profession. At the same time he has strongly favored going into the Federated Societies in order to provide an influential organization of engineers which would be so constituted as to be able to enter into the great problems facing the public and have this as its primary object. He considered that the movement applied as well to state and municipal affairs as to national matters.

He urged that the matter of the detail laws governing the internal workings of the federation were immaterial and that these could be drawn up or rearranged to meet all requirements. He considered that it was very material that the association be of engineers, that the organization be so constituted that it will sense the sentiment of the engineers of the country before committing them to policies, and that the big thing now is to get behind the movement and lend immediate support so that the work of the federation may be effective during the next twelve months in the solution of the tremendous problems which we now face.

During the course of his speech Mr. Hoover referred to the public regulation of public utilities and other natural monopolies. He said that by taking away rate control the initiative for expansion of facilities to keep pace with the demand for service was also largely taken away. He said that we have yet to devise laws that will protect the public from natural monopoly and at the same time keep this initiative. Under the present system no financial group is ready to take the responsibility of financing the necessary expansion of these monopolistic businesses. He did not want to see government ownership. While this matter of regulation is one of the great problems which the people must solve, he said that "no one in Washington has held his head in his hands ten minutes trying to solve it." On the contrary, the primary effort has been to coin phrases that would get into the headlines and pull votes.

Confident a Better Labor Situation Is Possible

Mr. Hoover also made a very interesting brief analysis of the labor problem. He said that at present organized labor is between two fires. There is the radical element on one side, demanding the one big union idea, with the object of dictating to government and the ultimate socialization of industries. But labor realizes that this cannot be attained as long as craftsmanship is the basis of the organizations. In other words, it will be necessary to destroy the present structure of the labor organizations before it is possible to bring about any radical change in structure.

On the other side there is capital, which is being counseled in many quarters to take advantage of the present favorable situation to crush out organized labor altogether. Between these two forces Mr. Hoover said that the craft basis of organization may be crushed out, and he thought it was worth while to consider the advisability of supporting this form of organization. He contended that labor will be organized in some manner, regardless of any effort to suppress it.

He said that labor is now earnestly groping for some method of alteration of the whole economic operation of its organizations, to get away from the principle of limited production. It is now seriously proposed that every effort be put toward the problem of how we can get maximum production within reasonable physical limitations. He said that while some people would claim that this attitude of labor was insincere, he believed it was honest and considered it the greatest mental revolution we have ever seen. Mr. Hoover pointed out that the great underlying objection to the closed shop is that it has always meant less production, and he thought that if this could be changed there would be little well-founded objection to the real purposes of organized labor. He contended that if organized labor could be brought into co-operation with organized employers we would see a tremendous advancement in industrial conditions, and he thought that the engineers were the best equipped men to give attention to this problem.

Association News

Topics at Chicago

THE printed program of the mid-year conference of the American Electric Railway Association at Chicago, Feb. 10, shows that addresses will be presented on the following topics, all connected with the main subject of electric railway financing:

"Review of previous financial methods":

Summary of the changing methods of financing capital improvements from the days of early electrification down to the present, with reasons therefor; influence of low rates of return on such methods, as disclosed by large proportion of capital securities represented by interest-bearing debt; influence of the holding company and probable future; war-time financing; post-war financial methods.

"Present requirements for mortgage securities":

What competition requires in the way of relation of cash invested to amount of loan; influence of previous history on electric railway investments; margin of earnings over interest charges; flexibility of mortgage provisions; necessity of ample staple earnings as a condition precedent to re-establishment of credit to be derived from automatic regulation or cost-of-service franchises; characteristics of interest-bearing securities which the general market is likely to absorb during the next year or two.

"Necessity for financing by sale of capital shares":

Importance of providing for return on new capital that will invite the investment of new money through the purchase of issues of capital stock; requirements in the way of franchises or methods of regulation which will support such plans of financing.

"Home-town financing—partial mutual ownership":

Desirability of large local interest held by car riders; influence on local regulatory ordinances, etc.; cost of capital procurable by this means; methods of distribution.

"Municipal aid in future financing":

Definition of conditions under which municipal co-operation is required; moral support and abandonment of street railway as political issue; pledge of municipal credit through guarantees; municipal aid for rapid transit in the construction of subways and elevated lines.

"Are financial reorganizations necessary?":

The criteria for determining the particular conditions which will make financial reorganizations of electric railway corporations probably necessary before their credit can be re-established.

Advocates Support of Bureau

CONTINUATION of the investigation of electrolysis by the Bureau of Standards is urged by Charles L. Henry of the American Electric Railway Association in a letter to the chairman of the appropriations committee of the House of Representatives. The letter, in part, is as follows:

The Bureau of Standards advises that the Secretary of Commerce has recommended, in his report to Congress, among other items relating to public utilities, that $25,000 be appropriated and made immediately available for the investigation of electrolysis and that the matter would be presented, if at all, to the House by the legislative, executive and judicial appropriation bill.

On account of the change in the make-up of the appropriations committee, I beg to inquire of you as to what branch or subdivision of that committee this bill would come before and the name of the chairman of the subdivision. All public utilities—those which use electricity, and gas and water companies as well—are very much interested in the question of electrolysis and are watching with great interest the development of the exhaustive examination being given to the question by the Bureau of Standards. These utilities have been and are co-operating with the Bureau of Standards in this work and have a committee advising and acting with the Bureau of Standards, composed of a representative from the national association of each one of the public utilities interested and affected. The American Electric Railway Association has as its representative on that advisory committee Mr. Phillips of Pittsburgh, a splendid engineer and a thoroughly reliable and gentlemanly business man. It is believed by all who have been taking part and assisting in the work that the Bureau of Standards will work out a solution of the problem before it in such a way as will be beneficial to all concerned, with a view to doing, in the best way and with the least expense and burden to the utilities, what is necessary to give full protection against the evil effects of electrolysis.

We feel very anxious that the $25,000 appropriation asked—to be immediately available—should be granted, so that this necessary and desirable work of the Bureau of Standards can go forward.

Letter to the Editors

Earnings for November of P. R. T.

PUBLIC SERVICE RAILWAY
NEWARK, N. J., Dec. 13, 1920.

To the Editors:

I notice in the ELECTRIC RAILWAY JOURNAL of Dec. 11 an article headed "P. R. T. Increase Disappointing. Mr. Mitten Appears to Be Vindicated by First Month's Result Under Commission Ruling."

This heading is somewhat misleading, particularly as the figures are misprinted. It is evident from the table that the actual passenger earnings for November, 1920, were $3,656,587 instead of $3,056,587 as printed. This would give a percentage of increase of 21.08 per cent over the previous year, and under the present depressed condition of the industrial situation in Philadelphia there is no reason to think that the normal increase would be more than 5 per cent, and if that was the case the increase attributable to the higher fare would be 15.3 per cent. It seems to me such an increase is about all that could reasonably be expected for the first month the new rate was in effect under present industrial conditions.

The experience of companies making such increases is that it takes some little time before the full benefit from the increase in rate is received.

P. S. YOUNG, Vice-President.

[NOTE.—The position taken by the P. R. T. as given in the note was that while the actual result of the new schedule closely approximates that estimated under the flat rate of 5 cents per passenger without transfers, the economies expected with the latter fare, as in handling the receipts, were not possible with the fare ordered by the commission. The typographical error to which Mr. Young refers occurs in the total or final figure in the table as printed, a "0" appearing in place of a "6."—EDITORS.]

The latest word from Germany indicates that a number of the smaller electric railway systems there have discontinued operation, and most of the larger systems are showing deficits although the fares have been greatly increased. The most favorable feature is that gasoline is so expensive the railways do not fear competition from motor buses or private automobiles.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Commissionership Still Open

Toledo Anxious to Secure More Applicants for the Position of Street Railway Director

After a cursory examination of the applicants for street railway commissioner under the recently adopted Milner cost-of-service ordinance at Toledo, Ohio, by the street railway board of control at its meeting during the week ended Dec. 11, it was decided by the board that Henry E. Riggs, dean of the civil engineering department of the University of Michigan, should be brought to Toledo to give advice to the board in choosing a man for the place.

Professor Riggs is one of the three men who served on the valuation board which fixed the price of the property of the Toledo Railways & Light Company before the ordinance was drawn by the cost-of-service commission. David Goodwillie, at that time city service director, was chairman of the valuation committee. He is the member of the board who made the recommendation to hire Mr. Riggs for expert advice.

The board also announced that further applications would be sought. Written notices were received from fourteen men and one woman. A number of local men have not made written application. They are known to the board as "receptive candidates."

Many of the applications which have come in have been from out-of-town men. Some of them are from electric railway executives and many have come in accompanied by clippings from the ELECTRIC RAILWAY JOURNAL referring to the local situation.

Mr. Goodwillie, at the meeting of the board with Mayor Cornell Schreiber last Thursday, declared that he had concluded that there were three essential qualifications for the man who should have the position:

1. That he be able to deal intelligently and sympathetically with the public. Many questions on rerouting and remaking schedules and altering service will have to be handled by the commissioner before being submitted to the board of control and the Council.
2. That he have the ability to gain and hold the confidence of the City Council. Most of the questions of service have to be taken up directly with the Council for final approval. The commissioner also may be interrogated frequently by Council as to the financial and operating statistics of the company.
3. That he must be able to deal successfully with the railway operating company, because in many cases the commissioner has to function as a go-between in transactions involving the city and the railway.

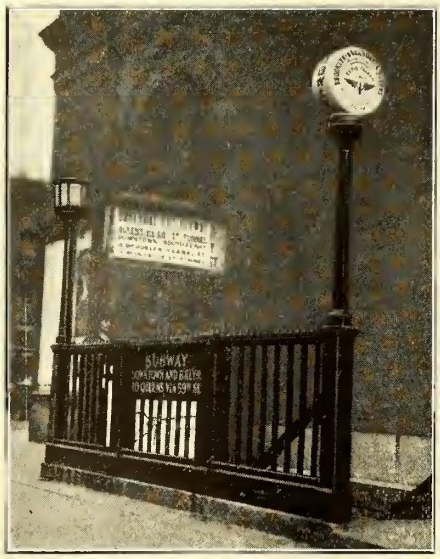
The field for applicants is open yet as the board desires to secure additional names to consider before the appointment is made.

No definite action has been taken on the salary of the commissioner. The board members are business men, free to set practically any salary.

It is not thought the separation of the property and the final acceptance of the ordinance will be filed by the Toledo Railways & Light Company and the agreement between the Community Traction Company and the present company executed before the actual expiration date of the ninety-day period allowed in the ordinance.

New Subway Entrance Lights

In New York City the entrances to many of the subway lines of the Brooklyn Rapid Transit Company are in close proximity to those of the Interborough Rapid Transit Company. On that account there has been some confusion among railway patrons not familiar with the routes of the two systems. Attempts to make plain the different systems by day by means of signs and



NEW ILLUMINATED SIGN AT SUBWAY ENTRANCES

maps placed in conspicuous places at the subway entrances have been fairly successful. In order that there may be no confusion at night the Brooklyn Rapid Transit Company is installing at many of the entrances illuminated destination signs similar to those used at garages in directing the auto driver to the supply of gasoline. On these signs names are so displayed that they can be seen at all times.

In the accompanying illustration one of these lanterns is shown installed at the entrance to a station. The lantern at the far side of the stairs is of the old type of octagonal shape without any lettering. The new lamps are, perhaps, not quite so ornamental as those first installed, but they convey information as well as give light. Moreover, they cost less than the original lamps.

Mr. Murray on Radials

Author of Recent Report Gives Details of Some of Economies of New Haven Railroad

W. S. Murray, electrical engineer of New York, was questioned at the session of the Ontario Hydro-Radial Commission during the week ended Nov. 27 with respect to the report prepared by him on the subject of radials for Ontario. Mr. Murray declared that hydro-radials were a necessity for the province and should be built at the present time, even if short parallel lines could not be acquired. He stated that the New York, New Haven & Hartford Railroad saved $750,000 a year on coal on the electric division and the same amount on motive power and in overcoming train waste.

C. E. Friend, comptroller of the Canadian National Railways, stated that the Niagara, St. Catharines & Toronto electric line was purchased by the Canadian Northern in 1910. At that time the gross income was $268,173 and the operating expenses $168,173. The Canadian Northern paid $2.214,316 for the road and spent an additional $1,425,000 on it. Mr. Friend stated that the Hydro Commission was to pay $3,544,000 for the road when taken over. The gross income for the first nine months of 1920 was $715,000 and the operating expenses $604,000. The net was $111,-000 and the surplus $21,000.

E. P. Coleman, general manager of the Dominion Power & Transmission Company, Hamilton, stated that the revenue last year on the Hamilton-Oakville line was $184,476 and operating expenses $178,729. This did not include taxes and other items. The operating deficit was $986 without depreciation.

The Hamilton-Brantford line, 23.19 miles, was valued at $1,809,600 with equipment. It operated at a surplus if depreciation were ignored. The 7-mile Dundas line showed a deficit of $8,174.

George C. Royce, manager of the Toronto-Suburban Railway, said the cost of 68.5 miles of track was $3,600,000, an average of $53,700 per mile. The line showed deficits of $119,170 in 1918 and $102,407 in 1919. For the first nine months of this year a deficit of $30,000 was shown.

During the sittings of the Ontario Hydro-Radial Commission at Toronto during the week ended Dec. 4 much evidence was given by representatives of steam railways to the effect that the electric radial railway system proposed to be constructed by the Hydro Commission on behalf of Ontario municipalities could not possibly be made to pay unless the lines were assured of local freight traffic.

Plan for Lease at Detroit

City and Railway Officials Seek to Avoid Duplication of Facilities—Important Terms of Lease Outlined

The submission of a leasing proposition to city officials of Detroit, Mich., for approval having been authorized at the meeting of the directors of the Detroit United Railway on Dec. 1, negotiations were started proposing the leasing by the city of all the company's lines within the corporate limits when Elliott G. Stevenson, counsel for the Detroit United Railway, Mayor Couzens and members of the Street Railway Commission met on Dec. 6. The plan suggested provides for the taking over by the city of the lines together with the equipment, the company to receive a 6 per cent return on its investment and the city to have the right to purchase the lines at any time. The negotiations were started at the suggestion of city officials.

THE company's proposed plan provides for a board of arbitration consisting of seven members, two members to be appointed by the city, two by the company and three more to be selected by the first four members. This board would place a valuation on the property of the company and would be empowered to agree to the terms of the proposed lease. At any time during the life of the agreement, the city could purchase the lines at a price to be determined by the board.

Valuation Matter First

The first question to be settled will be the basis of valuation. The value placed upon the property by the Detroit United Railway is understood to be approximately $31,000,000. It is believed by the city officials, however, that the company would consent to $27,500,000 and $33,000,000 as minimum and maximum figures for the arbitrators to consider. No proposal has been made to the city for the separate sale of any of the so-called day-to-day agreement lines. According to the Mayor, the main question to be considered now is the leasing of all lines within the city, with the idea of taking up the proposition to purchase at a later date.

If the city leases the lines the company is willing to give an option for purchase. Under the terms of the proposed option the company would allow deductions from the option figure of money invested by the city for maintenance. Present Detroit United cars and cars of the municipal railway would be operated over the company's lines and all the depreciation of the company's tracks and rolling stock would be taken care of by the city.

City's Power Limited

According to the opinion of the Corporation Counsel, the city is not empowered to take over any of the day-to-day agreement lines which the company has built and pay for them out of the bond issue authorized last April until the city system is in operation. A 60 per cent majority of the voters favoring the proposal would then be required before the lines could be purchased. In the event negotiations on a price failed the Detroit United Railway could not be ousted from the day-to-day lines, since the agreement provides that the city purchase the lines if it contemplates their continued operation. In case the city ousted the Detroit United Railway from the day-to-day streets and requested the company to tear up its tracks, new tracks could not be constructed under a construction program. This procedure would necessitate discontinuing operation over the day-to-day streets.

No attempt has been made by the city to cross existing tracks and the opinion has been expressed that under the existing state legislation the municipal lines have no authority for such crossings, either at intersections of electric or steam lines. If the law regulating the crossing of existing tracks has to be amended by the Legislature before the State Utilities Commission can grant the municipality permission to cross existing tracks, at grades, then the municipal system cannot be completed until this problem has been settled.

After the proposition was presented to the Street Railway Commission, Mr. Stevenson left the meeting. The matter is one that will require lengthy consideration before the question is settled. If the city and the company agree to the terms of the proposed agreement the matter will have to be submitted to the voters at a special election. A three-fifths affirmative vote would be required, according to the charter, to ratify the proposal.

Complying with the Mayor's request the Detroit United Railway on Dec. 9 submitted a memorandum containing a general statement relative to the proposed leasing of the company's lines to the city. In the hurried preparation of the outline the company aimed to make the statement sufficiently complete to enable the commission to determine whether it was worth while to proceed further with the matter.

There is one feature in the memorandum that has not been discussed with the Mayor and the commission, namely, the provision relative to the creation and maintenance of a sinking fund. According to Mr. Stevenson, to outline at this time any satisfactory arrangement with reference to how the situation would be dealt with at the end of a lease, if entered into, would be very difficult and involve more consideration and study than he has been able to give to the matter.

He believes that the lease, if entered into, should contain a provision for a sinking fund that would pay for the property at the end of the lease, entitling the city to a transfer of the title to the property unencumbered at that time and the transfer to the company of the accumulated sinking fund, which would then equal the value of the property fixed under the plan discussed.

The following is a memorandum setting forth in a general way the more important of the terms and conditions upon which the company would be willing to enter into an agreement with the city in respect to the street railway system:

1. A lease to the city for a term of thirty years of the street railway system in the city of Detroit with the inclusions and exclusions substantially as set forth in the schedule to the proposed contract signed March 17, 1919, and submitted at the election on April 7, 1919.
2. The rental under such lease to be 6 per cent per annum on the fair value as of Jan. 1, 1921, of the property above referred to. Payments to be made in equal monthly installments out of the revenue accruing from operations.
3. The city to maintain each class of property up to the standard of the physical condition thereof on Jan. 1, 1921.
4. The fair value to be determined by an impartial and disinterested board of arbitrators of seven members, two to be chosen by the city, two by the company and these four to choose the other three. The basis of determining fair value to be the cost thereof as of Jan. 1, 1915, plus additions thereto since that date. The cost at Jan. 1, 1915, shall be ascertained as to labor, materials, etc., at the average prices prevailing Jan. 1, 1910, to Jan. 1, 1915, and as to additions since Jan. 1, 1915, either at the cost as shown by the books of the company or at the market prices prevailing at the date of expenditures. The existing depreciation would, of course, be determined by the board as an incident to determining the fair value.
5. All taxes to be paid by the city.
6. Insurance in the amount usually carried, to be maintained and paid by the city.
7. An option giving the city the right to purchase at the end of any calendar year at the fair value so determined as of Jan. 1, 1921.
8. In the event of the default of the city in paying the rental, taxes, insurance, or maintaining the property, and such default continuing 90 days after notice, the company to have the right to reenter and to operate the property until the default is made good. The city also to have the right to surrender possession to the company at any time on six months' notice, in which event the company shall operate for the benefit of the leasehold estate during the balance of the term of the lease upon and subject to all the terms and conditions of the lease including the same as to the rate of fare.
9. The right to be given the city to assign or sublet to a responsible corporation with capable and experienced managing officials.
10. A sinking fund of 2 per cent per annum on the fair value to be created by paying into the Sinking Fund Commissioners of the city, out of the revenues of each month, ½ of said 2 per cent. This to be invested by the said Sinking Fund Commissioners in bonds yielding at least 4 per cent. Interest to be added to the fund. This will accumulate sufficient to pay for the property at approximately the end of the term, at which time the sinking fund will be turned over to the company (to the extent of the fair value of the property), and the system and property will belong to the city.
11. The company to have the right to run its interurban, passenger and freight cars substantially as at present, for not less than six nor more than ten years upon substantially the same terms as set forth in the proposed contract of March 17, 1919.
12. Materials, supplies, etc., to be treated as set forth in Paragraph 3 of the proposed contract of March 17, 1919.
13. The rate of fare to be fixed in accordance with Sec. 14 of Chapter XIII of the city charter — the rental being included under subdivision (C) of that section and the sinking fund above mentioned being maintained in lieu of that provided in subdivision (D) of that section, which contemplates a purchase.

Not having come to any definite decision relative to the action to be taken on the leasing proposition submitted by the Detroit United Railway, the Street Railway Commission sent a communication to company's attor-

ney asking that the company name a price at which it would sell approximately 55 miles of its city lines which the city officials maintain are day-to-day lines or lines upon which franchises have expired.

The so-called Fort Street system from Artillery Avenue to Baldwin Avenue and the Woodward Avenue line from the Detroit River to Milwaukee Avenue are the so-called non-franchise lines.

The commission is eager to arrive at an early decision of the matter before it in order to make proper recommendation to the City Council and the people thereon.

It is not thought that the Detroit United Railway will look with favor upon the sale of the lines which the commission named—especially the Fort Street and Woodward Avenue lines. The company does not admit that it is operating on Fort Street without due rights. The claim is made that inasmuch as the city did not take advantage of the Supreme Court decision to order the company off Fort Street but instead ordered it to make improvements and renewals, under existing conditions the decision no longer holds.

Auto Bus Unable to Compete With Pacific Electric

The auto bus has been defeated in its attempt to compete with the Pacific Electric Railway, Los Angeles, Cal., for business between that city and Pasadena and between Los Angeles and Alhambra. On page 684 of the issue of the ELECTRIC RAILWAY JOURNAL of Oct. 2, 1920, were outlined details of the plan of the Pacific Electric Railway to fight the auto bus stage lines that had applied to the California Railroad Commission for rights to operate auto bus lines between Los Angeles and Pasadena and between Los Angeles and Alhambra. The Pacific Electric Railway met this invasion by applying to the commission for permission to withdraw its commutation rates between Los Angeles and Pasadena and between Los Angeles and Alhambra provided the commission granted the bus lines operating rights.

It has now developed that bus line applicants withdrew their requests when it was shown that the commutation rates of the Pacific Electric Railway between Los Angeles and Alhambra were lower than the bus line could afford to meet. The rates offered by the bus line were 17 cents one way and 30 cents round trip, while the one-way fare by interurban is 21 cents and the round-trip rate 36 cents. The commutation fares of the Pacific Electric Railway are from 8 to 16 cents less than the one-way tickets.

Members of the City Commission of Alhambra asked the bus company in entering the field to reduce its fares to meet those of the Pacific Electric lines' commutation fares. The bus company replied that the best it could do would be a straight 15-cent fare each way. In consequence it withdrew its application.

Legislative Gossips Busy

Much Speculation in New York About the New State Administration's Public Utility Program

All sorts of rumors are afloat as to what is to happen to the Public Service Commissions in New York State. Some have it that a single-headed commission is to be created for the entire State; others that the up-state commission is to be organized on the same plan as the Public Service Commission of the First District; others that a single commission of five members is to take over the entire State; and a few express belief that in the final analysis nothing will be done at all.

In some quarters a tendency exists to investigate the personnel, appointment and acts of the members of the Public Service Commission for the Second District. The consensus of opinion seems to be, however, that if any of the appointees of Governor Smith to the up-state district should tender his resignation, it would relieve the incoming administration of much responsibility. Just what legislation will eventually be enacted will be determined when a legislative program is finally settled by the party leaders. On the other hand, the reorganization of the public service commissions may be deferred for another year waiting the opinion of the people on changes in other fundamental laws.

As regards the general traction situation, but more particularly the situation in New York City, Governor-elect Miller at the Saint Regis on Dec. 14 said to the newspaper men:

> I haven't made up my mind on the subject. In fact, I haven't made it up on various problems that will face me after the first of the year.

A question of great importance to the incoming legislature is, "Who will succeed Senator George F. Thompson, frozen out of public life at the recent election, as chairman of the public service committee in the Senate?" Senator Charles J. Hewitt, the next ranking member of the committee, who has specialized on highway legislation the past few years, is slated to be chairman of the Senate finance committee. Senator N. Monroe Marshall graduates from the Senate to the State Treasurership and Senator Clayton R. Lusk is one of the candidates for president pro tem., which by the process of elimination would leave Senator Mortimer Y. Ferris, the sponsor of the Ferris water power constitutional amendment, the logical chairman of this committee, provided he wants it.

However, with only nine Democrats in the Senate in 1921 out of a membership of fifty-one and nearly half of the members new ones, such a reorganization is liable to take place that few of the committees of last year will preserve anything of their identity. This always means a serious set-back in the progress of what might be termed evolutionary legislation; that is legislation which goes over from year to year, finally crystallizing in such shape as it will eventually become law.

In the Assembly, the judiciary committee will no doubt again be presided over by Assemblyman Louis M. Martin, Oneida, who will have with him most of the Republican members of last session unless they receive other committee assignments. He will, however, be without Louis A. Cuvillier, Democrat, New York, defeated, who was one of the chief objectors both in and out of committee to the Jenks measures. It was to the judiciary committee that the Jenks bills, providing for relief to the traction companies, were referred at the last session of the Legislature.

Five Persons Killed in Accident in Kansas City

The second fatal casualty in eighteen months on the system of the Kansas City (Mo.) Railways occurred at 7 p.m. on Dec. 12 when brakes failed to work as a car started down a hill. Examination showed that a ⅞-in. steel bolt connecting the main brake pull rod with the brake cylinder was broken. The absence of this bolt prevented operation of both the air and the hand-brake mechanism. The car had been inspected as usual in the morning and had operated all day. A stop had been made at Thirty-first and Main Streets, the brakes operating; northbound the car was supposed to make a safety stop two blocks further on at Twenty-ninth Street at the top of a long downgrade. The brakes did not work. The car proceeded down an 8 per cent grade five blocks long, left the rails at a curve at Twenty-seventh Street, glanced against another car southbound, then hit a trolley pole and turned on its side wrecked. Five persons were killed and several others, among them the motorman, were injured. The car was of the one-man "safety" type, and to this is attributed the fact that so little damage was done to the car which it struck and to the third car in its path.

Since June 1 the company has carried 190,000,000 pay passengers and about 90,000,000 transfer passengers. The accident on Dec. 12, with five dead, makes a total of six in this period.

Mr. Cameron Acquitted

Bruce Cameron, former superintendent of transportation of the United Railways, St. Louis, Mo., has been acquitted of all charges growing out of the loss more than two years ago of referendum petitions on a city ordinance affecting the United Railways through an order of *nolle prosequi* entered in the Circuit Court of Green County at Springfield, Mo., by Circuit Attorney McDaniel of St. Louis. This action in the case of Mr. Cameron was predicted immediately after Richard McCulloch, president of the company, was acquitted on Sept. 7 of charges of the same general nature. The history of the cases against Mr. McCulloch and Mr. Cameron was reviewed in the ELECTRIC RAILWAY JOURNAL for Sept. 11, page 514, at the time the charges against Mr. McCulloch were dismissed.

Accident on Northern Ohio Line

A head-on collision between a regular passenger train and a freight train occurred at 11:57 a.m. on Dec. 8 on the Akron-Kent-Ravenna Division of the Northern Ohio Traction & Light Company, Akron, Ohio. The accident took place 2½ miles west of Ravenna. Two persons were killed and twenty-two injured.

The freight train, westbound, pulled into the Black Horse Siding to pass the eastbound passenger train. A westbound passenger train attempted to pull in behind the freight to meet the eastbound passenger train at this point also, but the freight had not left enough clearance for it to get in. The motorman on this passenger car whistled for the freight to pull up a little and the latter pulled right out on to the main line, the crew apparently having decided to proceed to Deitrich Siding, less than ½ mile away.

The eastbound passenger train, made up of one of the company's new Peter Witt type cars, was on time. The view between the two sidings is obscured by a curve and the crest of a hill and the passenger and freight came together head on. The motorman of the passenger car was killed, the opposing motorman bruised and burned from the stove, and a trainman deadheading to Akron with his seven-year old son was probably fatally injured and the son killed.

Controversy Over Buses Settled Satisfactorily

An agreement has finally been reached between the Chicago Motor Bus Company and the Lincoln Park Board whereby the inclosed type bus will be permitted to operate on the condition that boulevard pavements will be protected by the redesigning of the bus and a redistribution of the load so that the maximum weight per lineal inch of tire width in contact with the pavement shall not exceed 1,000 lb., and that the maximum weight per square inch of tire in contact with the roadway shall not exceed 210 lb. The Chicago Motor Bus Company operates buses from the downtown loop district north through Lincoln Park on the boulevard system.

For some time now a controversy has existed between the bus company and the Lincoln Park Board over the weight of buses and the compensation for the use of pavement. Several months ago the bus company put in use a new inclosed upper deck bus for handling a larger volume of all-year-round business.

The Park Board objected vigorously because of the weight involved. The new bus is said to weigh 12,500 lb. It seats sixty passengers. The board also raised the objection that the trees along the boulevard would be damaged. The controversy grew and grew until Judge Landis recently made a statement that he would discontinue the operation of the bus line altogether if an agreement could not be reached with the Park Board.

News Notes

To Chicago Via Montreal.—A movement is on foot to arrange for a special car or cars to take the members of the New England Street Railway Club to Chicago via Montreal at the time of the midyear meeting of the American Electric Railway Association on Feb. 10. The plan would be to leave Boston on Feb. 7 at 7 p.m., reaching Chicago on the evening of Feb. 9. This would allow a stopover in Montreal. A. F. Walker, of the sales department of the American Steel & Wire Company, 120 Franklin Street, Boston, has the matter in charge.

Strike in Corpus Christi.—Motormen and conductors of the Corpus Christi (Tex.) Traction Company have gone on strike because the company refused to pay them 65 per cent of actual pay during the time the service is out of commission or hampered by breakdown in the power plant. The company recently broke a connecting rod in the power plant. This hampered service to an extent that cars are not operated at night. The trainmen demanded 65 per cent of regular pay for the time lost on this account. The demand was refused by the company.

Talk of New Grant in Dallas.—Negotiations between the City of Dallas, Tex., and the Dallas Railway looking to the granting of a new franchise embodying new service-at-cost features will be resumed when Mayor Frank W. Wozencraft returns from Mexico City, where he went as a member of the party of Texans to witness the inauguration ceremonies for President Alvaro Obregon. It is regarded as practically assured that these negotiations will result in the drafting of a franchise embodying features suggested recently, and that the franchise will be submitted to the voters of Dallas for their approval at the municipal election to be held in Dallas next Spring.

Station Design Need Not Be Changed.—The Court of Appeals has sustained the contention of the Interborough Rapid Transit Company, New York, that it should not be obliged to reconstruct its stations in Queens so that the Brooklyn Rapid Transit Company can operate over the structures. Under the dual contracts it was provided that extensions in Queens should be built by the Interborough and trackage rights should be granted the Brooklyn Rapid Transit Company. The B. R. T. then designed and constructed cars without clearance sufficient to permit them to pass the station platforms on the I. R. T. lines. Repeated requests were made by the B. R. T. to the Interborough to reconstruct its stations. Finally the matter was taken to the courts.

Municipal Line in Portland.—The Commission of Public Docks has constructed and is the owner of a new railway line operated by the Portland Railway, Light & Power Company, Portland, Ore. The commission's line connects the lines of the Portland Railway, Light & Power Company with Municipal Terminal No. 4. The road consists of 1.1 miles of track with one siding. The Portland Railway will furnish all rolling stock and power and will operate the line at cost for the commission. The commission consists of five members, C. B. Moores, chairman; John H. Brugard, vice-chairman. G. B. Hegardt, chief engineer and chief executive, is in charge of construction and operation.

New Franchise Sought in Hamilton.—The Cincinnati Traction Company acting in behalf of the Ohio Traction Company has applied for approval of a new franchise for operating cars of the Ohio Traction Company in the city of Hamilton. Under the provisions of the ordinance the Cincinnati Traction Company is required to procure the operation of the Cincinnati & Hamilton Traction Company, leased by the Ohio Traction Company, as a part of the railway system of Cincinnati. It is further provided that all receipts of the Cincinnati & Hamilton Traction Company shall be included in the gross receipts, and that all expenses shall be paid out of the receipts. W. C. Culkins, Street Railway Director at Cincinnati, held that if the fare on the Cincinnati & Hamilton Traction Company lines was increased from 5 cents to 8 cents it would benefit the Cincinnati transportation system.

Program of Meeting

Conference on Uniform Vehicle Law

A conference to consider the possibility of uniform traffic legislation for the different states will be held in Washington, D. C., on Jan. 10. This conference is really the outgrowth of the meeting in San Francisco last summer of the International Traffic Officers' Association, at which several drafts of such a law were considered. These were referred to the executive committee of the Traffic Officers' Association, which held a meeting to consider them on Dec. 6-8 in Cleveland. It was at this meeting that the decision to hold the conference in Washington on Jan. 10 was reached. C. M. Talbert, Commissioner of Streets of St. Louis, is acting as chairman in the call for this conference.

Invitations to attend this conference have been extended to various organizations of national scope interested in traffic conditions, among them the American Electric Railway Association, as well as to a number of similar organizations of less than national scope, but having a large membership. Suggestions, modifications or criticisms of the proposed laws should be sent to the drafting committee at least five days before the meeting.

Financial and Corporate

$29,845 Deficit in Rochester

City Street Railway Commissioner Suggests One-Man Cars for Six Non-Paying Lines

Operation of the Rochester lines of the New York State Railways in October under the service-at-cost contract resulted in a deficit of $29,845, according to a report filed with Mayor Edgerton and the Common Council of Rochester by Charles R. Barnes, commissioner of railways of that city. Six lines contribute principally to the deficit and in his report Mr. Barnes outlines plans to make them self-supporting by installing one-man cars on the six routes. The statement for October follows:

Railway operating revenues	$410,561
Operating expenses	320,331
Net railway operating revenues	$82,230
Auxiliary operations—deficit	78
Net operating revenues	$82,152
Taxes assignable to operation	23,743
Operating income	$56,408
Non-operating income	746
Gross income	$59,154
Return on investment	89,000
Deficit	$29,845

Mr. Barnes points out that as in the case of the report for September there were no deductions from revenues in the month of October for renewals and depreciation. The cumulative deficit since the inauguration of the service-at-cost contract totals $105,998. Mr. Barnes states that "this deficit has resulted from operation during months which are generally ones of the lowest revenue and maximum operating expenses." Concerning these losses Commissioner Barnes writes:

In accordance with the terms of the contract such deficits should be charged against the balancing fund, but due to the fact that the 7-cent fare did not take effect until practically the first of September it did not appear proper to charge the August deficit of $71,325 against the fund at this time, and by mutual agreement between the company and the commissioner such deficit has been transferred to an account, subject to future adjustment.

This disposition of the August deficit results in a balance in the balancing fund as of Oct. 31, 1920, of $265,527. The contract provides that when the balancing fund reaches $200,000 the fare increases. When it reaches $400,000 the fare decreases. The fund was started with $300,000.

The number of passengers, including revenue transfer and free passengers, carried during August was 8,946,767; September, 8,194,984; October, 8,191,265.

Cars were operated 703,537 miles within the city in August, 766,585 in September and 780,889 in October.

Operating revenues in August totaled $362,403; September, $408,648, and October, $410,561. The increased revenue in September and October was due to the 7-cent fare. Operating expense in August totaled $293,535; September, $302,285 and October, $328,331.

Mr. Barnes said:

The small increase in revenues in October was due to sources other than passenger revenue. The increase of $34,796 in operating expenses in October compared with August was largely due to winter operation and to the increased service. In making the comparisons the number of days in the month has been disregarded. Consideration of these would affect the comparative amounts and percentage relative to the month of September.

Accruals are made for renewals and depreciation for the purpose of creating a fund from which the proportion of the cost of reconstruction or renewals chargeable to operation is paid. No such accrual was made in the month of October nor in September. Work of this character was done during the months of August, September and October, a portion of the cost of which will be charged to the accrual made to this fund in the month of August.

Deficit Being Reduced in St. Paul

Reports show that under the 6-cent fare the St. Paul (Minn.) City Railway, included in the system of the Twin City Rapid Transit Company, has improved its service beyond the requirements stated in the ordinance under which the increase from 5 cents to 6 cents was permitted. Between the period July 19-22 and Nov. 15-19 the company has added fifty-one cars to the morning and seventy-two cars to the evening rush service. The ordinance requires fifty-five cars.

Submission by the company of its monthly report for October shows a deficit of $9,080, despite the 6-cent fare. Deficits are decreasing, however, as shown by report of deficit of $34,372 for August and $23,003 for the month of September.

The report for the month of October follows:

Revenue from transportation	$432,413
Other revenue	4,121
Total revenue	$436,535
Way and structures	4,357
Equipment	50,555
Power	47,721
Conducting transportation	156,733
Traffic	3,576
General and miscellaneous	52,919
Transportation for investment (credit)	1,421
Total operating expenses	$353,642
Net operating revenue	82,893
Taxes	39,203
Operating (gross) income	$43,689
Miscellaneous rents	83
Interest on debt	52,483
Miscellaneous debts	203
Total deductions	$52,769
Deficit	$ 9,080

Revenues reported in August were $363,023, and in September $409,065. Operating expenses reported in August were $309,325, and in September $346,143. During this period the company paid $13,000 more for equipment than it reported in August.

Sees No Redress

Corporation Counsel at Seattle Advises City Must Stand by Its Bargain in Purchasing Local Railway

In a recent opinion as to whether the city of Seattle, Wash., can return the railway properties which it is now operating to Stone & Webster and get back the $15,000,000 of bonds issued in payment for the lines, Corporation Counsel Walter F. Meier expressed the judgment that this cannot be done.

Mayor Hugh M. Caldwell asked for the opinion. He advised Mr. Meier that he understood the Harris Trust & Savings Bank, Chicago, had acquired the bonds in return for the release of a mortgage against the railway property. Mayor Caldwell then raised the point whether "the present holders or subsequent purchasers of the bonds can be bona fide purchasers without notice, so as to acquire any greater rights than the persons to whom the bonds were issued." Mr. Meier said:

In my opinion, if the present holders or subsequent purchasers of the bonds are in fact bona fide purchasers without notice, they may have greater rights than the party to whom the bonds were originally issued.

In the judgment of Mr. Meier, apparently, the recourse left the city would be in the form of a suit against Stone & Webster. He says:

If facts can be produced that would defeat the bonds in question, had they remained in the hands of the original holder, such facts, while not assertable against a subsequent bona fide purchaser for value and without notice, may be made the basis for an action against the original holder for the recovery of damages, if any, sustained by the city.

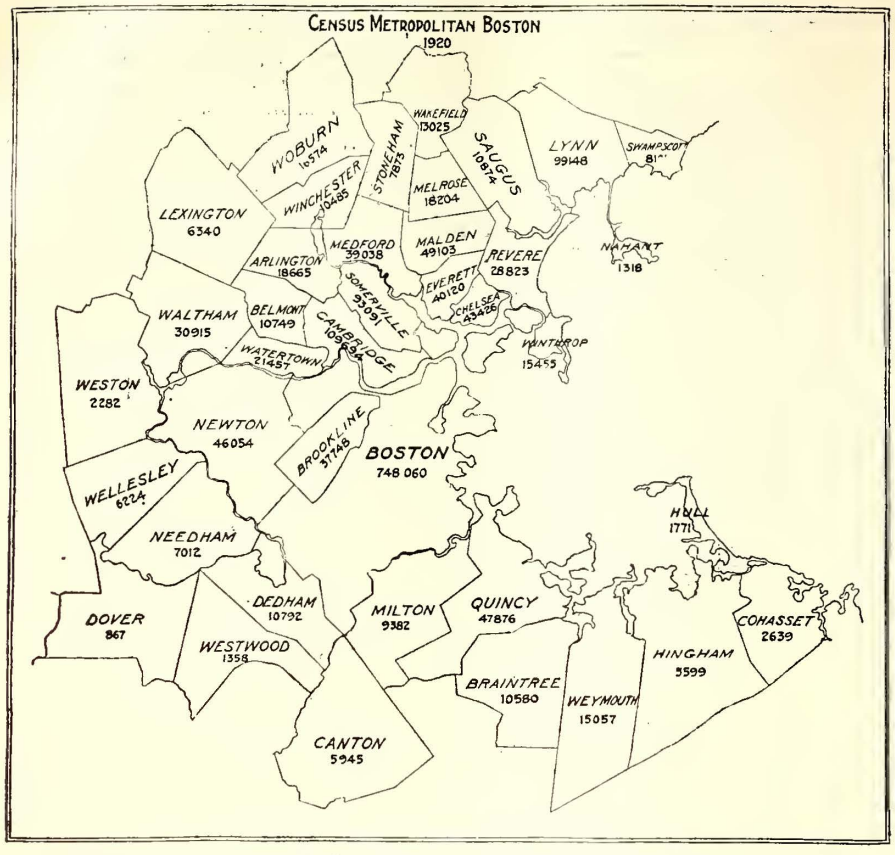
In giving this opinion, Mr. Meier referred to a case at Centralia involving utility bonds which went to the State Supreme Court. The court in this case held "that the same rule or standard which measures the rights and liabilities of individuals should be applied to the business contracts of municipal or public corporations."

The Supreme Court opinion stated:

When it becomes a question between an innocent purchaser of bonds in the open market and the city purporting to issue them, as to which should be the loser by a breach of duty on the part of the city officers, such question should be solved in favor of the innocent purchasers.

$494,858,000 of Securities in Default

According to the *Wall Street Journal* the aggregate principal amount of public utility company bonds, including gas, electric power and light and traction issues, now in default of interest is $494,858,000. Of this amount issues of traction companies make up the greater part. This authority believes that recent economic developments have turned the tide strongly in favor of utility companies and that from now on all such enterprises should show increased earnings. It says that even though wages do not come down at once, companies are already receiving better service from their employees and can now select better material from those seeking employment.



MAP SHOWING TERRITORY FEEDING BOSTON ELEVATED RAILWAY

Boston Elevated Showing Good

For the month of October, 1920, the Boston (Mass.) Elevated Railway showed a total operating revenue of $2,934,911, but with heavy maintenance expenses the net revenue of $770,736 was $72,731 less than the corresponding month of 1919. The gross income was $704,851 against $771,222 in 1919. After subtracting rentals, interest on funded debt and miscellaneous deductions the net income was only $203,149 and making allowance for dividends of $126,947 the net was $76,201 against $168,097 for the corresponding month of a year ago. In view of the fact that October month is usually a burdensome one owing to heavy maintenance expenses this showing of the Boston Elevated Railway is favorable. The remaining two months of the year will probably make a still better showing. The company's deficit as of Oct. 1, 1920, was $1,022,000, but it is very probable that the early months of the new year will see a decrease in this deficit.

The Boston Elevated serves a total population of 1,192,003, of whom 748,060 are in Boston proper. The extent of metropolitan Boston is indicated in the accompanying census map. While not all this territory is directly served by the lines of the Boston Elevated Railway, the places included in the metropolitan district all contribute to the business done by the Boston Elevated Railway. The population served by the company is shown in the following table of figures from the census of 1920 and that of 1910:

POPULATION SERVED BY BOSTON ELEVATED RAILWAY SYSTEM

	U. S. Census, 1920	U. S. Census, 1910
Chelsea (a)	17,370	12,980
Everett	40,120	33,484
Malden	49,103	44,404
Medford	39,038	23,150
Somerville	93,091	77,236
Arlington	18,665	11,187
Belmont	10,749	5,542
Cambridge	109,694	104,839
Newton (b)	6,908	5,970
Brookline	37,748	27,792
Boston	748,060	670,585
Watertown	21,457	12,875
	1,192,003	1,030,044

(a) Considering that company tracks only serve 40 per cent of population.
(b) Considering that company tracks only serve 15 per cent of population.

INCOME STATEMENT—BOSTON ELEVATED RAILWAY

Month Ended Oct. 31, 1920	Actual October 1920	October 1919	Percentage Change Over
Railway operating revenues:			
Revenue from transportation	$2,895,555	$2,780,502	4.1
Revenue from other railway operation	39,140	39,934	—2.0
Profit and loss — delayed items	215	...	....
Total railway operating revenue	$2,934,911	$2,820,436	4.1
Railway operating expenses:			
Way and structures	236,228	289,471	—1.8
Equipment	235,921	213,755	10.4
Power	350,550	241,743	45.1
Conducting transportation	980,535	889,853	10.2
Traffic	456	.....	....
General and miscellaneous	193,482	175,145	10.5
Depreciation	167,000	167,000	....
Total railway operating expenses	$2,164,175	$1,976,969	9.5
Net operating revenue	$770,736	$843,466	— 8.6
Taxes assignable to railway operation	111,783	90,649	23.2
Operating income	$658,952	$752,817	—12.5
Non-operating income	45,898	18,405	149.0
Gross income	$704,851	$771,222	— 8.6
Deductions from gross income:			
Rent for leased roads			
W. E. St. Ry. Co	$219,690	$212,635	3.3
W. E. St. Ry. Co— Tremont subway	14,694	14,574	0.8
Other roads	2,819	4,875	—158.0
Total rent for leased roads	231,565	232,085	— 0.2
Miscellaneous rents (other subways—tunnels)	143,774	113,220	27.0
Interest on funded debt (B.E.)	107,733	115,103	— 6.4
Interest on unfunded debt (notes)	13,626	19,647	—30.7
Miscellaneous deductions	5,002	6,071	—17.6
Total deductions from gross income	$501,702	$ 486,127	3.2
Net income	$203,149	$285,094	—28.7
Dividends (at 5% on common and 7% on preferred)	126,947	116,997	8.5
Net (allowing for dividends)	$76,201	$168,097	—54.6

Will You Become a Consistent Saver?

In the belief that every wage earner can be made an investor, Henry L. Doherty & Company, New York, will inaugurate a nationwide thrift and investment campaign to test how many people not accustomed to buying securities can be induced to invest in corporate obligations. This widely known banking concern through its extended experience in public utilities and corporate management believes that there are many people who are anxious to save money, but do not know how to convert their savings into investments. The benefits of thrift both to individuals and to nations are appreciated by many, but very few are aware of the high yields on many gilt-edged securities.

In announcing the plan the company says that it will not boast of success, but that the experiment is worth the money and effort spent upon its tryout. The plan will include an extensive advertising campaign to locate first prospects. No appeal will be made for volunteer workers, but volunteer help will be welcomed if offered. W. C. Freeman will engineer the campaign and results of the demonstration will be made public. In conclusion the company says:

If directly, or by collateral methods, we can make this campaign a success, our greatest desire will be to see a nation-wide thrift and investment campaign inaugurated, a campaign that will be certain to make not merely for better business conditions but for better citizenship and an improved condition for vast numbers of our great population.

Spokane Consolidation Plan Off

All consideration of the consolidation of the local properties of the Washington Water Power Company and the Spokane & Eastern Railway & Power Company, Spokane, Wash., which has been discussed in the interest of efficiency and economy off and on for several years past, is at an end. For several months past committees and engineers representing both companies have gathered data relating to the proposed consolidation. These were in the possession of D. L. Huntington, president of the Washington Water Power Company, on his eastern trip in November. On his return to Spokane recently Mr. Huntington said:

> While in New York and Chicago I had several talks with those interested in the control of the Spokane & Eastern Railway & Power Company. We discussed the question of a consolidation of the railways at considerable length. For various reasons, it is not possible at this time to bring it about.
>
> One of the difficulties confronting the owners of the lines is that the consolidation will involve the expenditure of several hundred thousand dollars. This expenditure would have to be in cash, and no one at the present time wishes to put such large sums into a property which is earning no return on present investment, to say nothing of additional expenditures.
>
> Therefore, it seems that one of the necessary steps to be taken before serious consideration can be given to consolidation will be to place the properties in a condition where they can earn a reasonable return upon the money invested in them and thus justify the expenditure of the further necessary sums that would be called for by consolidation. As every one knows, the cost of money is very high at the present time and it is not forthcoming except to enterprises that can pay liberal returns to attract it.

Hydro Commission Reopens Negotiations for Guelph Radial Railway

Chief Engineer F. A. Gaby and Secretary W. W. Pope of the Hydro Commission met the directors of the Guelph (Ont.) Radial Railway on Dec. 4 and made further overtures for taking over the road.

The commission desires the City Council of Guelph to pass a resolution requesting the Hydro-Electric Power Commission to acquire the Guelph Radial Railway (now owned by the municipality of Guelph) under the agreement already entered into between the hydro and the city. The hydro officials gave the directors to understand that E. C. Drury, the Premier of Ontario, was prepared to have an order-in-council passed covering the proposition.

Under the agreement passed last January the Hydro Commission was to have taken over the Guelph Railway and made it a part of the Hydro-radial system, but Premier Drury objected on the ground that the other municipalities had not been given an opportunity to vote on it, as they were parties to the proposed Ontario Hydro-radial railway system. This resulted in the appointment of the Royal (Sutherland) Commission, which is now investigating the entire Hydro-radial project.

After a long discussion a resolution was passed that the directors were in favor of the City Council passing the resolution submitted by the Hydro-Electric Power Commission provided that the ratepayers of Guelph approve of the same at the next election.

If the ratepayers vote in favor of the proposal, it is expected that the commission will issue $150,000 of bonds to cover the purchase.

The action of the commission in going again to Guelph is generally considered in local circles as indicating the favorable attitude of the Ontario Government toward Hydro-radials.

Financial News Notes

Road Sold for Scrap.—Warwick M. Ogelsby has announced the sale of the Cumberland Railway, Carlisle, Pa., to McGovern & Company, Inc., New York City. The road extends from Carlisle to Newville. This road discontinued operation on Nov. 1. It has previously defaulted in the payment of interest on outstanding bonded indebtedness.

Power Company Takes Over Bluefield Road.—The electric railway in Bluefield and Graham, W. Va., formerly owned and operated by the Appalachian Power Company, has been purchased by the Princeton Power Company, by which operation began on Dec. 1. There will be some rebuilding of track, etc., but the extent of this work had not been determined on Dec. 1.

Extension of Bonds Urged. — The Worcester (Mass.) Consolidated Street Railway, sponsor for the bonds of the Worcester & Clinton Street Railway, amounting to $115,000, has requested the Public Utilities Commission for authority to arrange with owners of the bonds whereby their date of maturity would be extended from January, 1921, to January, 1926. The interest rate would be increased from 5 to 7 per cent.

Twin City Common Dividend.—The Twin City Rapid Transit Company, Minneapolis, Minn., has declared a dividend of $3 a share on the common stock. The dividend is a disbursement out of the current year's earnings. A dividend of $2.50 was paid last February on the common, which it was stated was a disbursement out of 1919 earnings. The regular preferred dividend of 1¾ per cent was declared. Both dividends are payable on Jan. 3.

Franchise Modification Permits Service Resumption.—The Council of Lockport, N. Y., has granted the International Railway, Buffalo, a franchise permitting the resumption of service on Grand and Gooding Streets. Service on these two lines was suspended in August, 1919. Provisions of the franchise, which is effective for ten years, release the company from paying any part of the cost of paving the streets until 1924. Freight cars may be operated on Grand Street on the Olcott division between 11 p.m. and 6 a.m. only.

Arkansas Valley Issue Sold.—A new issue of $600,000 bond secured 8 per cent gold notes of the Arkansas Valley Railway, Light & Power Company, Pueblo, Col., purchased by H. M. Byllesby & Company recently has been practically all sold. The issue was brought out in connection with the recent financing of the Arkansas Valley Company, proceeds of which will provide extensions and improvements to the properties and retire maturing obligations. The notes are dated Nov. 1, 1920, and are due Oct. 1, 1922. They are selling to yield 8.55 per cent.

Intercorporate Affairs a Private Matter.—In a decision handed down by the Superior Court, the Public Service Commission of Pennsylvania has been ordered to refrain from an investigation of the rentals paid by the Philadelphia Rapid Transit Company to the underlying companies. The city and two local business men's associations sought to have the commission investigate, regulate and if possible reduce the rentals of the underlying companies in an effort to clear the transit situation and bring about an equitable rate of fare.

Assessments at Memphis Protested.—The Memphis (Tenn.) Street Railway, through Receivers Elgin and Tutwiler; the Memphis Gas & Electric Company, through Receivers Elgin and Raimer; the Choctaw, Oklahoma & Gulf Railroad and the Memphis Terminal Railroad have filed petitions in the federal court seeking a temporary injunction preventing City Treasurer J. H. Hessen of Memphis from collecting taxes on public utility property at the present assessment. The application will be heard before Federal Judge A. M. J. Cochram, at Maysville, Ky. The appeal of the companies is based specifically on the Fourteenth Amendment to the Constitution. Attorney Miles has delivered a check for $137,750, or about 66 per cent of the total charged against the receivers of the Memphis company.

Service Discontinued By Franklin-Medway Line.—Service between Franklin and Medway, Mass., has been discontinued for an indefinite period by the Milford & Uxbridge Street Railway. The cost of operating this 4-mile stretch of track is prohibitive. Since the beginning of the year the company has paid out $400 a month more than the income to maintain service. The line runs through a hilly and sparsely settled country. For more than a year fourteen round trips were made a day, with an average of eight passengers per trip. Many mill operatives formerly used the line. Now they ride in cars of their own and carry their friends to and from work. Arrangements for increases in fares were considered and one-man cars were operated, but even this was found to be inadequate. Service was discontinued on Nov. 21 last by order of the directors. The Franklin-Medway line is one of the lines of the Medway & Dedham Street Railway. It has been operated by the Milford & Uxbridge Street Railway under lease since October, 1914.

Traffic and Transportation

Further Relief Sought

Washington Railway & Electric Company Asks Straight 8-Cent Fare—Earning Only 4.9 per Cent

A straight fare of 8 cents has been requested by the Washington Railway & Electric Company, Washington, D. C., in a formal petition filed with the Public Utilities Commission of the District of Columbia. The present fare is 8 cents cash with four tokens for 30 cents. In the petition, it is stated that a reduction in traffic would probably follow the proposed increase. The increase of fare early in 1920 is held partly to blame for a decrease of 8.5 per cent in the number of pay passengers, as compared with the similar period of the year preceding. The company asks permission to begin charging the straight 8-cent rate on Jan. 1.

PREDICTS DECREASE IN TRAFFIC

The company estimated that a straight 8-cent fare would yield $325,014 additional revenue if there should be no reduction in the volume of traffic. This increase in revenue would enable the company to earn $1,152,808, or 6.8 per cent. The petition refers to a probable falling-off in traffic in 1921 as follows:

> In our judgment, however, we must look forward to further reduction in the volume of traffic. During six months, ending Oct. 31 last, the number of pay passengers carried on our lines was 39,315,085, or 8.5 per cent less than during the same period of the previous year. It is true that this comparison is made with a period at which a lower rate of fare existed than this year. Nevertheless, there can be no question of the fact that the population of Washington has been reduced, and will be, temporarily, at least, further reduced.

The company estimates that a reduction of at least 2 per cent in traffic would follow the new rate of fare. Such a reduction would mean a falling off of $125,808 in revenue in a year, which would reduce the net amount available for return upon fair value to $1,027,000, equal to 6.1 per cent.

To show the burden placed on the company in the paving of the space between tracks, the company sets forth a list of jobs recently ordered or in contemplation by the commission, amounting to $537,784.

NOW EARNING 4.9 PER CENT

An exhibit filed with the application shows that the total revenue from the various lines of the Washington Railway & Electric system for the six months ended Oct. 31 was $3,125,387. Operating expenses, taxes and miscellaneous items amounted to $2,614,897.

This left $510,489 available for return upon investment. Further deductions amounting to $96,592 had to be made recently, however, to cover additional cost of coal and unforeseen maintenance charges, bringing the amount available for return down to $413,897, or 4.9 per cent upon fair value.

The company presents arguments in favor of a 7 or 8 per cent return. On the question of return the petition states:

> It is respectfully submitted that in fixing reasonable rates the money conditions existing at the present time should be considered in connection with the rate of return on the fair value of the properties which said rates will produce, and the commission should take into consideration the indisputable fact that securities free from risk may be bought where the return is 7 per cent or more. The operation of a street railway property is attended with risks that do not attach to such other securities. The greater the risk the greater the return that should be applied. The cost to the petitioner in obtaining necessary capital is a factor which must be considered in the public interest as well as in justice to the company. It is therefore submitted that the rates of fare yielding a return to the petitioner of not less than 8 per cent upon the fair value of the property as found by the commission would be fair and reasonable.
>
> It should likewise not be overlooked, in justice to the company, that during the period from September, 1918, when we first appeared before the commission for an increase in rates, and since which time we have been nearly continuously before the commission, the several rates fixed by the commission have been insufficient in the sum of approximately $1,275,000 of yielding a 5 per cent return upon fair value of the property as fixed by the commission.

Transfer Charge Favored in Indianapolis

Railway Officials and Members of Indiana Commission Consider It Unwise to Change Basic Fare

Hearings of the original and supplementary petition of the Indianapolis (Ind.) Street Railway for a 2-cent transfer charge and for an investigation into the compensation under contracts between the city company and the various interurban lines entering Indianapolis were held before the State Public Service Commission during the week of Nov. 29. Concluding arguments were given on Dec. 6.

UNDER orders of the commission the Indianapolis Street Railway had filed answers to thirteen questions concerning the use of its tracks by the various interurban lines and the compensation received by the company from concessions and rentals in the passenger terminal building in Indianapolis, which revenues the interurban companies claimed were a result of the joint use of the Indianapolis terminals by the various lines. It was shown that actual payments made by the interurban lines during the year 1919 under present contracts amounted to $244,123. The cost of passenger station service furnished at the Traction Terminal Station amounted to $104,841 in the year 1919. The interurban companies paid the city company for passenger station service $53,585. The company received from station privileges, including baggage and parcels check room, $46,782, which the interurban companies claimed was revenue derived indirectly from the use of the station by the interurban cars. Under the figures shown a deficit in 1919 on passenger station service amounted to $4,473. The total number of car miles on the city lines in Indianapolis for the year 1919 was 12,913,940. This comprised 11,895,824 car miles for the city cars and 1,018,116 car miles for the interurban cars.

The city of Indianapolis contends that the interurban lines have been granted increases in fares and that therefore additional track rentals should be paid the city company and that if additional revenue is derived from this source it will be unnecessary to grant a charge for transfers.

The representatives of the interurban lines stated, their contention being sustained by the commission, that there is no partnership between the city company and the interurbans and that there would be no relation whatever between the earnings of the interurban companies per car mile while operating over the tracks of the city company and the amount paid the street railway, and that the Indianapolis Street Railway was entitled only to a fair compensation for the service rendered the interurbans, including a fair return on property investment made on account of the interurbans. A great deal of evidence was introduced by officials of the Indianapolis Street Railway, the Union Traction Company of Indiana, the Indianapolis & Cincinnati Traction Company and the Interstate Public Service Company as to the question of additional maintenance charges which must be borne by the city company as well as increased kilowatt-hour per car in handling interurban cars weighing approximately forty tons, as against city cars weighing approximately twenty tons.

The commission also heard petitions of the Indianapolis & Cincinnati Traction Company and the T. H., I. & E. Traction Company on Dec. 4 for the right to charge a minimum fare of 10 cents within the city limits of Indianapolis. Under the present contracts with the city the interurban companies can charge only a 5-cent fare from the terminal or other points within the city to the city limits. The commission announced that these petitions would be considered in connection with the petitions of the Indianapolis Street Railway for increased rates.

In the closing arguments the Indianapolis Street Railway sought to show that the derived revenue from

the proposed 2-cent transfer charge will be approximately $300,000. This sum will be required to offset increased taxes and fuel for power during 1921, and if the anticipated increase in revenue is received it will make the estimated net operating revenue of the company $1,087,000 for the year, applicable to the payment of fixed charges and dividends, which is justified according to the railway by the fact that this amount is approximately 7 per cent on a valuation of $15,000,000, which was suggested by the city as a fair valuation when it proposed that the company should operate on a service-at-cost basis. Since that time the company has added $500,000 in improvements to the value of the system.

Immediate Relief Asked

The attorney for the city company suggested that the commission permit the railway to put into effect immediately a transfer charge and that the commission appoint some expert to make a survey of the situation relating to proper charges to the interurban companies for track, power and terminal facilities. It was pointed out that such an investigation would probably take six months.

Upon inquiry by the commission as to whether the company would prefer a 6-cent fare to the transfer charge it was stated that the company officials, as well as members of the commission, considered it unwise at this time to increase the basic fare beyond 5 cents.

As a further result of the hearing the Indianapolis Street Railway has requested the State Board of Tax Commissioners to reduce the valuation on its property from the amount of approximately $18,000,000 assessed to a value of approximately $15,000,000, which has been the figure assumed by the city as a fair physical value of the property in its arguments before the Public Service Commission on the fare increase question. The company contends that if such action is not taken by the board the valuation in the hearing before the commission should be raised to equal the tax assessment.

Ten Cents in Each Zone

The Cumberland & Westernport Electric Railway, Cumberland, Md., on Dec. 1 raised its fare in each zone from 7 cents to 10 cents. The increase was made under authority of the State Public Service Commission. The commission directed the railway to sell monthly commutation tickets, good for fifty-six rides, at the rate of 7½ cents a zone. The company must also transport miners, traveling in miners' cars, at the rate of 7 cents a zone, and must sell tickets to clergymen and school children at the rate of fifty tickets for $2.50. In its petition for an increase the management asserted that if a proper allowance for depreciation was made the granting of a 7-cent zone fare would fail to produce a fair return of 8 per cent on the valuation of $1,888,304 for the property.

Eight Cents in Des Moines

Court Directs Increases in Fares and Service—Points Out Fallacy of Proposal for Return to Five-Cent Charge

Judge Martin J. Wade of the federal court entered an order on Dec. 11 putting into effect an 8-cent fare in Des Moines as soon as the Des Moines City Railway puts into operation a 40 per cent increase in service which is ordered in the court's decree fixing the fare. Ten tickets will be sold for 75 cents and five for 38 cents. According to officials of the company it will be at least Dec. 20 before the necessary schedules can be worked out and full arrangements made for operating under the new plan. The court's order follows generally the recommendations made to Judge Wade by the three masters in chancery appointed to investigate the situation in Des Moines, although there are some minor changes such as continuing the present 2½-cent fare to school children and high school pupils.

JUDGE WADE'S order came after a turbulent week in the controversy between the city and the receivers for the railway. Early in the week the City Council had passed an ordinance making it a misdemeanor, subject to $100 fine, for the company to place in effect a fare higher than 5 cents. This is the fare provided in the franchise voted the Des Moines City Railway four years ago.

City Threatens Arrests

City attorneys announced that if after Friday morning the company attempted to collect a 6-cent fare, which has been in effect since last August, company officials and trainmen would be arrested as violators of the new ordinance. Judge Wade quashed this plan by means of an injunction issued late Thursday afternoon.

The early part of the week was given over to final hearings by the attorneys for the city and receivers on the recommendations of the masters. Statements by Corporation Counsel Byers that the masters were prejudiced and that the receivers had been partial to the interests of the company called forth a spirited refutation from Judge Wade.

In entering his order Judge Wade said:

> Counsel for the city, with apparent sincerity, urged a return to the 5-cent fare as a means of raising more money, and at the same time urged an enlarged service. The truth is that Des Moines had a 5-cent fare from 1916 until last August, when the new wage scale compelled the receivers to pay out several hundred thousand dollars a year in increased wages. The only solution was to reduce the service.

Labor Costs $562,689 More

> The city in its franchise ordinance fixed a 5-cent fare. This was regarded as binding until the Supreme Court of Iowa held otherwise. When the franchise was granted, wages of men were about 30 cents an hour; now they are 70 cents an hour. There has been added to the cost of operation, since the 5-cent fare was agreed upon as fair and just, for labor alone on the present reduced service $562,689. In other words, the receivers now pay out on the present schedule $562,689 more for labor each year than was paid out the first year of the franchise.
>
> If full service were restored under the present wage scale, the receivers would pay out for wages alone for 1921 $1,021,345 more than was paid out in the first year under the franchise. Still it is urged that return to a fare which the city established in 1916 would pay this $1,021,345 of increased wages. The receivers collect now about 35,000,000 fares a year. To pay the increase in the wages of the men alone, at a 5-cent fare and full service, would require practically 21,000,000 more rides a year.
>
> Increased expenditure for wages is only one item. The fuel cost in 1916 was $77,626. For 1921 it will approximate $218,912—an increase of $151,285. This, added to the wage increase, would require additional fares amounting to $1,172,631, upon normal service. Still many people have been made to believe that a 5-cent fare and full service would produce this money.
>
> These are only two items. Every other element that enters into maintenance and transportation has practically doubled over 1916 and still there are those who talk about a 5-cent fare.
>
> No one disputes that fares in the average city for the past two years have been much higher than the fares in Des Moines. There seems to be some notion abroad that Des Moines is exempt from ordinary economic rules and that in some way public service can be rendered for less in Des Moines than anywhere else.

Refutes City's Argument

Judge Wade then gave considerable attention to the financial condition of the company and called attention to the fact that at the time the franchise was voted this condition was known to the citizens of Des Moines. In continuing he said:

> The extra one cent allowed in the 6-cent fare was to pay the increased wages of the men. The representatives of the city of Des Moines have approved and insisted upon payment of every increase of the wages of the men. I thought the 6-cent fare might bring in enough money to pay the current increase, and gradually pay the back pay of the men, but experience has shown that it will not do so. In this emergency, I did not trust to my own judgment as to what should be done.
>
> Three men of high standing have recommended an 8-cent fare. The people of Des Moines are entitled to better service, but some one must pay for it, and there is no mystery about where the money must come from. It must come from the people who use the cars. I have asked for light. I ordered the masters to listen to suggestions from any body of citizens of Des Moines. The only definite suggestion for getting more money is to return to a 5-cent fare with increased service—the absurdity of which is so self-apparent that it is unworthy of discussion.

The decision in the Ottumwa City Railway case referred to by Judge Wade is expected during the present week.

Attorneys for the city have announced that they will appeal Judge Wade's ruling to the Supreme Court of the United States.

Officials of the Des Moines City Railway estimate that the service established by the terms of the order will require 175 additional trainmen, fifty additional shop men, three more trouble men and four more in the wrecking crews. One hundred and thirty-two cars will be put in service during the rush hours as against 103 at present; during the lean hours there will be seventy-eight as against forty-six.

The 6-cent fare was granted last summer to enable the company to meet the demands of its employees for higher wages. The men struck, but returned to work when the new wage scale was made retroactive.

Municipal Railway Considers Increase

Seattle City Lines Will Be $1,610,000 Behind at End of 1921 Under Present Fare—Ordinance for Higher Rate Before Council

At a meeting of the City Council of Seattle, Wash., as a whole on Dec. 2, the emergency ordinance, effective in thirty days, providing for an increase in fares on the Seattle Municipal Railway from 6¼ to 8⅓ cents, or 33⅓ per cent, was passed by a vote of six of the seven Councilmen present. On the following day, however, a majority of the Council attempted to run the blockade with the ordinance with an emergency clause attached, making the measure effective immediately. In this they failed. The ordinance has now been referred back to the city utilities committee where it will stay until some ambitious Councilman again blows the breath of life into its nostrils. In order to pass an emergency measure effective immediately the ordinance must have the votes of seven Councilmen and the approval of the Mayor. Mayor Caldwell had promised to approve the fare increase measure.

UNDER the terms of the ordinance transfer privileges were allowed only through payment of a 10-cent cash fare, the present cash rate, except in cases where the rides originate or terminate on the cable lines, when payment of the 8⅓-cent fare would entitle patrons to a transfer.

Railway $500,000 Behind

City officials were extremely anxious to have the order become effective at once, as the railway lines are now $500,000 behind and were to be placed on a warrant basis on Dec. 10. Mayor Caldwell pointed out that "it would be unreasonable to expect the railway employees to discount their wages 10 or 15 per cent in order to receive their pay and that the city could not be said to have done all in its power to fulfill its contract obligations if it left the fare at 6¼ cents." He pointed to the higher rates in other cities.

Mayor Caldwell further said that the railway lines were approximately $500,000 "in the red," and that the city treasurer had co-operated with the city officials to the extent of paying railway bills, although there was insufficient money in the railway fund for this purpose. He relied upon the legislative body, consisting of the Council and the Mayor, to protect him in making these payments. His bondsmen have insisted that further payments be not made in the absence of funds available for the specific purpose, and the lines would have been placed on a warrant basis if the emergency measure increasing fares were not passed.

The petition of a delegation of Seattle ministers asking that the new ordinance include a provision granting Sunday school children the 2½-cent fare the same as public school children was denied by the utilities committee.

Faces $1,610,452 Deficit

Estimates prepared show that it will take two years under the new fare to wipe out the present deficit of the railway lines. Estimates of revenues and expenditures of the Municipal Railway for 1921 based on the present 6¼-cent fare indicate there would be a deficit of $1,610,452 in addition to the present deficit of more than $500,000 at the end of the year. On the basis of a fare of 8⅓ cents it was set forth there would be a surplus of $230,844 at the end of a year to apply on the present deficit.

The ordinance provided for three cash fares for a quarter, instead of the present two fares for 15 cents; cash fares for school children, 3 cents; for two, 5 cents; ten tickets for 35 cents. No change was provided in children's fare. Token fares were to be 8⅓ cents, three for 25 cents; six for 50 cents, twelve for $1. It was proposed to charge an additional fare on the Highland Park and Lake Burien line from the city limits to points beyond. Last July the fare was raised from 5 to 6¼ cents.

According to estimates for 1921 the total receipts based on an 8⅓-cent fare would be $7,910,795, with total expenditures of $7,679,951, leaving a surplus of $230,844 at the end of the year. The revenue for 1921 based on the 6¼-cent fare is estimated at $6,069,498, with total expenditures of $7,679,951. This would leave a deficit of $1,610,452. No provision is made in the estimates for any possible reduction in the number of car riders due to proposed increase in fares.

Mayor Favors Increase

In discussing the proposed increase Mayor Hugh M. Caldwell stated that in view of the existing and imminent unemployment situation the increasing of fares at the present time was particularly unfortunate and would doubtless work some hardship. He called attention, however, to the fact that the ordinance under which the bonds were issued to pay for the railway obligated the city to charge a sufficient rate to meet the obligations of the principal, interest and operating expenses, if it is possible to do this, at least until matters should be changed by vote of the people or by court proceedings if it should develop that the latter are possible. The Mayor said:

> We have sold and are preparing to sell other utility bonds for the development of the light and power plant, including the Skagit project, and enlarging the water system. I have therefore concluded that it is the duty of the city toward its other utilities to endeavor to live up to the contract under which the public acquired bonds from the city. In other words, any change from that upon which we started or any relief from existing contracts should be had in some other manner than by refusing to charge a rate on the utility that will permit of our keeping our obligations in so far as it is possible for this to be done.
>
> If the charging of an 8⅓-cent fare so decreases the railway traffic as to make the estimates erroneous upon which we are acting, the problem will have to be faced in the light of such developments. If the estimates are correct, it would take us two years in which to wipe out the present deficit.
>
> I have already expressed myself as believing that the theory of this purchase at this price was fundamentally wrong, and that it cannot be entirely carried out on that basis. I still adhere to this view, but it does not relieve us of the necessity or duty of increasing the revenues, at least to the extent provided for in this ordinance.

Mayor Caldwell stated that his proposed investigations of the purchase of the railway lines, for which the Council made an appropriation to cover his expenses, has been delayed by matters "seemingly beyond control," but that he expects to conclude same and make a report on the matter to the Council within thirty days.

Poor Service Chief Ground for Complaint

An analysis of the complaints reported in the annual report of the California Railroad Commission for the fiscal year of 1919-1920, recently issued, shows that poor service by utilities was the source of more dissatisfaction among consumers than were increases in rates. The complaints based on rates aggregated only 487 out of a total of 2,663. The complaints on rates were distributed as follows:

108 against telephone and telegraph companies.
104 against electric light and power companies.
99 against water companies.
12 against gas companies.
38 against auto stage and truck lines.
16 against electric railway lines.
62 against steam railroads.

The complaints on the score of poor service were directed against every class of utility operating within the State, the totals on some of the utilities being as follows:

361 against telephone and telegraph companies.
256 against water companies.
170 against electric light and power companies.
97 against gas companies.
70 against auto stages and truck lines.
49 against steam railroads.
35 against electric railways.

Buses Versus Higher Fare in Flint

Application has been made by the Detroit (Mich.) United Railway to the Common Council of Flint, Mich., for a readjustment of fares in that city. Detailed figures have been presented to the Council showing that if jitney bus competition is to be permitted to continue as in the past a 2-cent increase in fare will be necessary, but that if the jitneys are eliminated the company believes that it will be able to operate, for the present at least, on the basis of a 6-cent cash fare. The fare on the city lines is now 5 cents.

Service in Flint has been operated at a loss for some time past, but it had been hoped that because of the rapid growth of the city and resultant increase in business, it might be possible to continue at the present rate. This hope, however, has not been realized and with the excessive cost of money, material and labor it has been found necessary to ask, temporarily at least, an increase in the rate. The company's investment in Flint is approximately $3,000,000 and a $500,000 extension program is under way.

During the first six months of this year 10,717,163 revenue passengers were carried at a cost of $744,908 or an average cost per passenger of 6.9506 cents. For the month of July, this year, 1,819,442 passengers were carried at a cost of $143,674.56, or 7.8966 cents per passenger. This is 2.9 cents in excess of what the company actually collected from each passenger.

A count recently made shows that Flint jitney buses in one day carried more than 8,000 passengers equivalent to $400 per day or $146,000 per annum taken from the car lines. This jitney service parallels the car tracks and picks up passengers that would otherwise help defray the expense of operation of the railway lines. Statistical data submitted to the Council show that the cost of service rendered in that city every year since 1911 has been greatly in excess of the amount collected from the passengers.

Way Opened for Increase

The Missouri Public Service Commission will in a few days take up the petition of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, for an increase in fare from 7 cents to 10 cents. Consideration of this petition, filed in July as request for a 9-cent fare and later amended to ask for a rate of 10 cents, was interrupted by injunction proceedings, and the resulting order of Federal Judge Arba S. Van Valkenburgh invalidating the commission's method of reaching valuations of public utilities. Judge Van Valkenburgh's decision was reviewed at length in the issue of Nov. 27, page 1122.

Under the decree of Judge Van Valkenburgh it seemed that the commission would be in contempt should it make any modification of its previous rate order without a revaluation of the company's property.

A modification of Judge Van Valkenburgh's decree has cleared the way for immediate action on the St. Joseph petition. Under his new order, the commission is protected in action regarding rates, and at the same time the position of the federal court respecting improper methods of valuation is maintained. His modification of the injunction decree follows:

It is ordered, adjudged and decreed that the decree for injunction entered in the case of the St. Joseph Railway, Light, Heat and Power Company vs. Public Service Commission of the State of Missouri, et al, on the 13th day of November, 1920, be and the same hereby is so modified as to permit the Public Service Commission to fix interim fares and steam heat rates for said St. Joseph Railway, Light Heat and Power Company upon such valuation as the commission itself may determine to be reasonable and proper. Such fares and rates to be effective during the pendency of an appeal to be prosecuted by said Public Service Commission from said judgment and decision of this court, or until otherwise ordered by the commission prior to the final determination of such appeal.

It is further ordered that any such action of the Public Service Commission shall not be considered to be in violation of the decree and injunction of this court, and that it shall not in any way prejudice the right of said Public Service Commission to prosecute its appeal from such judgment and decree, and shall not prejudice its rights on such appeal.

Christmas Duty in Baltimore—"Save a Life"

"Cutting down the high cost of Christmas" is the target at which is aimed a "No-Accident-Campaign" by the United Railways & Electric Company, Baltimore. In its presentation of the doctrine of safety to its employees and the public the company is directing attention to December's bad reputation in the matter of wasting life, and limb, and time. It ventures the incontrovertible assertion that the cost in fatalities and casualties is far greater than the community should have to pay for its holiday season. In order to reduce this needless waste, therefore, the company calls for the co-operation of its own forces and the people at large in a general safety crusade. Several new ideas are being employed to drive home with extraordinary force the points it is desired to fix indelibly in the minds of those who must apply themselves diligently to the campaign if the wished for results are to be obtained.

One of the pieces of literature that has been distributed to every employee of the company is a card, one side of which bears a December calendar, with the dates printed in very small type in large white spaces. Employees are asked to carry these calendars throughout the month, and to check off their "safe days"—the days in which they are free from accidents. It is believed the moral effect of this idea will be a big force in keeping the men alert to the interests of safety. The same card bears on its reverse side the portrait of a wide-eyed, intelligent little kiddie and a simply worded appeal from him in behalf of all children to the grown-ups to "make it a Merry Christmas; not a sorry Christmas."

Large posters have been placed in all the carhouses directing attention to the "No-Accident-Campaign," and the trainmen are being drilled daily in their responsibilities by representatives of the Safety Department. Car cards and leaflets in racks in the cars urge public co-operation in the campaign.

Trolley News, distributed to the public by the United Railways, has devoted a great deal of space in the current issue to safety. It says:

But with all the care taken by the company and its employees, there remains a responsibility with the public of co-operating in thoughtful endeavors to avoid and avert accidents.

Cities' Power Over Buses

A number of principles to be followed in the regulation of jitneys by municipalities in Massachusetts are laid down in an order issued recently by the State Department of Public Utilities. The department acted on the petitions from the Holyoke Street Railway and the Springfield Street Railway relative to the operation of buses in the town of Chicopee. The petitions asked for amendment or revocation of an ordinance passed some time ago by the Chicopee Board of Aldermen. The department held that the power under which the town authorities acted was very broad, adding:

We are disinclined to alter or amend rules adopted by the licensing authority of a city that seem on the whole reasonably to insure the safety of the public and to protect the interests of the petitioners.

A majority of the rules laid down by the Board of Aldermen were approved by the department. The bond to be filed by each operator was ordered increased to a minimum of $2,500. The regulations as approved by the department further provide that:

Motor vehicles shall not stop within fifty feet of the regular stopping places of street railway cars.

No change shall be made by the jitney owners in the rate of charges or in the schedule of operation except after seven days' notice filed with the city clerk.

Every jitney shall come to a full stop immediately before crossing the tracks of any railroad at grade.

Every jitney owner shall report immediately, fully, in writing, to the city treasurer, any injury to a passenger or other person and any accident resulting in substantial damage to property in which any motor vehicle which he is licensed to operate is involved.

The local authorities may suspend or revoke any jitney license for the violation of any state law for the operation of motor vehicles, or violation of the city traffic ordinances or the violation of rules prescribed by the board, or for any other cause deemed by the Aldermen to be sufficient.

May Raise Spokane Fares

The Washington Water Power Company and the Spokane & Eastern Railway & Power Company, operating the two electric railway systems of Spokane, Wash., on Dec. 7 sent to the State Public Service Commission notice of a 25 per cent proposed increase in fares. This will make the rate 8 cents instead of 6 as at present.

The increase is to be effective on Jan. 8, thirty days after its filing. No charge is proposed for transfers nor is the present 4-cent rate for school children to be changed. In connection with this application for increased rates, President D. L. Huntington of the Water Power company said:

We have tried for months to operate successfully on a 6-cent fare, but we find it impossible to earn a fair return on the money actually invested in the property. Consequently, we have filed the new tariff.

The company has endeavored to keep the public thoroughly posted in regard to the results of operations for many months past by giving each month complete financial and operating statistics to the city authorities and through them to the newspapers.

A study of these statistics will reveal how far the 6-cent fare falls below the cost of operation. Our men have asked for shorter hours, as they are now working longer hours than is common in cities in this part of the United States. To readjust these working hours without increasing the daily pay roll will put a considerable burden upon the operating expenses of the company. This cannot be done under present conditions.

Statistics obtained by us from 505 cities in the United States with an aggregate population of 33,300,000 show that in twenty-four of these cities with a population of 17,658, or 53.8 per cent of the total population, a higher fare than 6 cents is collected.

Early in 1919 the railways in Spokane asked for a 7-cent fare with a charge for transfers. The commission granted an increase of 1 cent, making the rate of 6 cents, with the understanding that if it did not prove sufficient the case could be reopened. Seattle and Tacoma have both since advanced their fares. Spokane is said to have one of the lowest fares in the Northwest.

Discrimination in Fares in Cleveland

The City Council of Cleveland, Ohio, has adopted a resolution authorizing the Cleveland Railway to establish a reduced rate of fare for school children, unless this lower rate imperils the general rate of fare for all car riders.

The directors of the Cleveland Railway are not expected to act favorably on any reduction in rate for school children. This has been presaged in a letter written by John J. Stanley, president of the Cleveland Railway, to Street Railway Commissioner Fielder Sanders, in which he says the plan should be rejected. Mr. Stanley said:

> Service-at-cost rests on one fare alike to all; that fare, the cost of transportation. The fixing of a rate of fare for a special class at less than the cost of service is a violation of those fundamentals and in conflict with the most important provisions of our Cleveland ordinance.
>
> I cannot believe that Council is ready to change so radically the arrangement under which Cleveland, for nearly eleven years, has enjoyed better transportation at lower rates of fare than any other city in the world.

The City Council now has in its street railroad committee another resolution in which the reduced rate of fare for school children is fixed at 3 cents a ride or forty tickets for a dollar.

New Jersey Increase Suspended

Orders suspending until April 1 next proposed increases in fares on the lines of the Public Service Railway, Newark, N. J., were issued on Dec. 11 by the Board of Public Utility Commissioners. The railway intended that its 10-cent fare should become effective Jan. 1. Accompanying the suspensions were announcements of public hearings to inquire into the reasonableness of the proposed rates. These hearings will be held by the board at its office in Newark beginning Jan. 13.

Transportation News Notes

Eight Cents Asked in Asheville.—The Asheville Power & Light Company, Asheville, N. C., has filed with the State Corporation Commission an application for authority to raise its cash fare on its Asheville city lines from 7 cents to 8 cents. The company proposes to sell four tickets for 30 cents. The present rate took effect about a year ago.

Would Charge 8 Cents.—The Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa., has filed with the State Public Service Commission notice of an advance of fare from 7 to 8 cents, effective Dec. 26, between Morrisville and Torresdale and intermediate stations. Special car rates are also advanced.

Asks Lower School Rates.—Randal J. Condon, superintendent of schools of Cincinnati, Ohio, has started a movement to have the fare for school children using the cars of the Cincinnati Traction Company reduced to 5 cents. Considerable pressure has been brought to bear in Cincinnati to further this plan. The matter was referred to City Solicitor Saul Zielonke, who held that to put the new plan into effect it would be necessary to amend the present franchise of the railway.

Early Commuters Favored. — The Galveston-Houston Electric Railway, Galveston, Tex., has inaugurated an early morning service for the benefit of those persons living along the line who desire to get into the cities of Galveston and Houston in time for early business duties. The first car now leaves Galveston and Houston terminal stations at 5 a.m. instead of at 6 a.m. as formerly. This service will enable persons to reach either city in time for business duties at 7 o'clock.

Seven Cents in Cairo.—The Cairo Railway & Light System, Cairo, Ill., has received permission from the State Public Utilities Commission to charge a 7-cent fare on its Cairo City lines. The company is directed to sell four tickets for 25 cents. The commission has issued an order directing the Springfield Consolidated Railway, Springfield, to install a cash rate of 3 cents for school children and to sell twenty-five school tickets for the sum of 75 cents.

Would Charge Ten Cents.—The Concord Electric Railways, Concord, N. H., has filed with the State Public Service Commission a new schedule of rates under which it proposes to increase the cash fare within the Concord city limits from 6 cents to 10 cents. The company seeks to sell ten-trip tickets, each good for a ride in a single zone, for 80 cents. On the interurban line no change is contemplated in the rate of 2 cents in each zone, but a minimum fare of 10 cents instead of 6 cents is proposed.

Grants Temporary Increase. — The Georgia Railway & Power Company, Atlanta, Ga., has received permission to collect a 7-cent fare on its line in College Park. The railway is required to give a rebate slip good for 2 cents to each person paying the new rate, and to post a bond of $250,000 pending determination by the courts of its right to charge the 7-cent fare. The fare has been 5 cents. Citizens of College Park have brought suit to restrain the company from charging the higher rate on the ground that the franchise granted to the company limits the fare to 5 cents.

Must Obey Road Rules.—Trolley cars in the State of Connecticut must obey the state regulations regarding the rules of the road, according to a recent ruling of Motor Vehicle Commissioner Robbins B. Stoeckel. The point was raised following an accident in which a state policeman was killed recently. The electric car kept on instead of waiting for an automobile to come in from the right. Commissioner Stoeckel will urge the General Assembly at its next sitting in January to make trolley cars conform to the regular highway rules that apply to all classes of motor-driven vehicles.

All Work for Safety.—Steam and electric lines, civic, church and school organizations, business houses and professional men of Indianapolis, Ind., co-operated last week in the observance of "safety week." Every accident, no matter how trivial, was reported to the police stations in order that the cause of each might be recorded. The week's observance began on Monday with the blowing of whistles and the ringing of bells. Speeches were made in the schools and at public meetings daily and the newspapers devoted much space to the publication of news relating to means for the prevention of accidents.

Further Increases in Service Impossible.—The Duluth (Minn.) Street Railway cannot on account of its limited facilities and financial condition grant any further increase in the service which it is now giving during the early morning and late evening hours, Herbert Warren, vice-president and general manager of the company, has announced. Mr. Warren was in conference with J. A. Farrell, city commissioner, on the question of a better service for Duluth. Commissioner Farrell will make his report and recommendations to the City Council at an early date so that final action can be taken by the city.

Transfer Points Increased in Fort Wayne.—The meaning in the phrase "Transfer Corner," which for a third of a century has been used to designate one of the principal corners in Fort Wayne, Ind., was entirely lost recently when the Indiana Service Corporation put into effect new transfer rules which change the transfer point from this corner to different points along the various lines. The change was put into effect for the purpose of relieving the growing congestion at this corner. The change was so radical that there was considerable confusion among passengers who had for many years been transferring from one line to another at this point, but the riders quickly accustomed themselves to the new conditions brought about by the change.

Additional Supervisors in Buffalo.—Herbert G. Tulley, president of the International Railway, Buffalo, N. Y., announces new plans for the supervision of traffic on the company's city lines. A special night superintendent has been placed in charge of traffic Saturday nights. The hours of the traffic supervisors have been rearranged so the largest number of men will be employed in the rush hours. Nine more supervisors will be employed during the evening rush hours than a year ago. Buffalo has an average of five supervisors at a carhouse. With the employment of additional supervisors in the rush hour periods, Mr. Tulley believes traffic can be quickened in the congested districts.

Personal Mention

Publicity Work Started

A. G. Whidden Begins Active Campaign for Arkansas Association—Will Use Space in Daily Newspapers

A. G. Whidden, advertising manager of the Arkansas Light & Power Company and the Pine Bluff Company, Pine Bluff, Ark., has entered actively upon his duties as manager of the Public Relations Section of the Arkansas Utilities Association. This section has been formed to place before the people of Arkansas the truth about the State's public utilities. C. J. Griffith, manager of the Little Rock Railway & Electric Company, is its chairman.

Under the direction of Mr. Whidden a campaign has been started to show the public what the utilities mean in every way. In addition to using space in the daily newspapers of Little Rock, Pine Bluff and other cities, the committee is issuing a series of bulletins and other public utility material. The committee has adopted the policy of using paid space in the newspapers for placing utility information before the public. It is Mr. Whidden's opinion that this is the best method of obtaining the good-will of the newspaper men and of showing them that the committee does not expect them to bear the burden of its campaign.

Mr. Whidden is a native of New Orleans. His experience has been in newspaper work rather than in the utility or steam railroad fields. He entered the newspaper business in Louisiana, where at various times he edited several weekly and afternoon daily papers. He also edited dailies in Arkansas, Texas and Mississippi. His last newspaper work was in Pine Bluff, Ark., where he served at one time or another as advertising manager, business manager and managing editor of the *Morning Graphic*.

During the war Mr. Whidden served with the Army Y. M. C. A., for which he handled the recruiting campaign in Louisiana. He also directed camp publicity work at Camp Pike, Ark., and acted as state publicity director of the United War Work Campaign in Louisiana. He joined the Arkansas Light & Power Company and the Pine Bluff Company as advertising manager in August of this year. He will continue his connection with these companies.

New Post for F. J. Stevens

F. J. Stevens has been appointed master mechanic of the New York & Queens County Railway, the Long Island Electric Railway and the New York & Long Island Traction Company, New York. N. Y. Mr. Stevens was formerly master mechanic of the Atlantic City & Shore Railroad, Atlantic City, N. J. Until about four years ago he was superintendent of equipment of the Fort Wayne & Northern Indiana Traction Company, now the Indiana Service Corporation, Fort Wayne, Ind.

A Christmas Message

"Dan" Fisher of Texas Surprises His Friends Again in His Inimitable Way —Passing Another Milestone

Everybody in Texas and the great Southwest knows Dan Fisher of Dallas —big-hearted bachelor, idolized "big brother" of newsboys, urchins and all kiddies generally, and discriminating connoisseur of oil paintings and good books.

DAN FISHER OF TEXAS

Dan Fisher has been an electrical utility man all his life. He is a past-president of the Southwestern Electrical & Gas Association, probably the biggest sectional utility body in the country. In Dallas they tell this story: One day the president of his company, knowing that Dan had started his career as a railroad stenographer, entered Dan's office and with eyes twinkling said: "Mr. Fisher, all the stenographers are away, but I have a very important letter to dictate. Would you mind taking it?" Then he dictated: "Mr. Daniel G. Fisher, You are hereby appointed assistant general manager of this company, effective at once!"

But after several years of "double-distilled hell" in the operating end, Dan determined to get back into general administrative work, and, besides taking charge of publicity, wisely decided that the only perfect existence is that of an editor. His cheerful magazine, *Texas Utility News*, brings a veritable Gulf breeze and a breath of magnolia into those offices which wait for it each month. Dan is a vice-president of the Association Advertising Clubs of the World and occasionally preaches a lay sermon from the pulpit. The newsboys of Dallas have crowned him king, and 150,000 kiddies attended the Children's Day events which he directed at the Dallas Fair this fall.

Every Christmas time this kindly Texas philosopher sends to those fortunates who are on his mailing list messages of Christmas greeting that are distinctive and full of heart-warming friendliness. This Christmas the message from Dan is in the form of the following verse:

HERE'S A CHEER FER YOU
CHRISTMAS MORNIN'

We're passin' another milestone,
To the rim uv the great divide.
You 'nd me's gettin' closer, ol' pardner,
As the long, hard trail we ride.

Where the hoof prints p'int just one way,
With no returnin' tracks.
Where the herds are driftin' onward,
But none are comin' back.

You an' me hain't nigh so coltish
An' gunhandy 's we uster be.
Old age is a creepin' slowly
But shorely 'pon you an' me.

My gun hand's gittin' wabbly
An' my temper's coolin' down.
The Prince uv Peace has shorely got me,
Fer I smile instid uv frown.

Here's a cheer fer you Christmas mornin'
An' a hope that the years to come
Deal kindly with you, my good friend,
Till your work in this range is done.

An' when God goes to cuttin' the cattle
May He herd you off to the right,
To a range uv eternal sunshine
In a land where there ain't no night.

Mr. Campbell Returns to York

Gordon Campbell, president of the York (Pa.) Railways, has returned to York and has resumed the active management of that property and of the Edison Light & Power Company, also of that city.

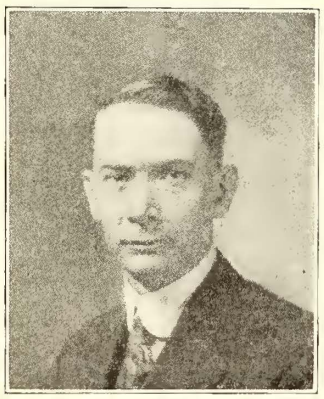
In the summer of 1919 Mr. Campbell was appointed vice-president of the Municipal Service Company, Philadelphia, Pa., which controls a number of traction and lighting companies, including the Citizens' Traction Company, Oil City, Pa., and the Youngstown & Suburban Railway, Youngstown, Ohio.

Mr. Campbell's return to York was made at the earnest solicitation of the board of directors of the York Railways in order that he might devote his entire attention to the local properties. Mr. Campbell became identified with these properties in 1908. Prior to that time he was associated with public utilities in Denver, Col.; Newark, N. J.; Providence, R. I., and Washington, D. C. He has long been active in the work of the associations in the utility fields and served two terms as president of the Pennsylvania Street Railway Association.

Mr. Earlywine Made C. E. R. A. Secretary

L. E. Earlywine, assistant secretary of the Central Electric Railway Association, since June, 1915, was elected secretary of the association at the Indianapolis meeting on Dec. 3. Mr. Earlywine succeeds the late A. L. Neereamer, who died last July.

Mr. Earlywine was born near Georgetown, Ind., on Oct. 13, 1887. Practically all of his business experience has been in the railway field. He began with the Big Four in 1910 as chief clerk to the general foreman of the Indianapolis shops. In 1911 he was made private secretary to the division superintendent of the Cincinnati, Hamilton & Dayton Railroad, and in 1913 took charge of the statistical work of that railroad. He continued as statistician of the company until he resigned to assist Mr. Neereamer with the various work of the C. E. R. A. Mr. Earlywine's election as secretary



L. E. EARLYWINE

of the association makes him also secretary of the Central Electric Railway Accountants' Association and chairman of the Central Electric Railway Traffic Association, which are subsidiaries. He will supervise the compilation of joint tariffs, the collection of data, the keeping of the member companies advised of the activities of the state commissions and the Interstate Commerce Commission and the numerous other activities of the association.

O. L. Flowers Steps Up

O. L. Flowers, who held the controller of the first electric car ever run through the streets of Clarksburg, W. Va., has been appointed general inspector of the Fairmont and Clarksburg Divisions of the Monongahela Valley Traction Company, Fairmont. The office is a new one, having been created as a part of the railway's program of promoting the welfare of its patrons. Mr. Flowers will make a general survey of conditions throughout the company's system, with particular reference to seeing that the patrons are accorded courteous treatment. Mr. Flowers has been freight agent of the company for several months. He is succeeded in that position by Foster Ash, who has been his assistant. Mr. Flowers has been in the service of the company for fourteen years, or since it was organized, having started in the service as a motorman.

Electrification Committee Named

A. S. Baldwin Heads Body Which Will Supervise Illinois Central Work—W. M. Vandersluis Engineer

President C. H. Markham of the Illinois Central Railroad has appointed an electrification commission to determine the system and general design and plans for the electrification of the Chicago terminal of that railroad.

The members of this commission are A. S. Baldwin, vice-president and formerly chief engineer of the Illinois Central, chairman; Daniel J. Brumley, chief engineer, Chicago Terminal Commission; Bion J. Arnold, consulting engineer, Chicago; George Gibbs, of Gibbs & Hill, consulting engineers, New York; Cary T. Hutchinson, consulting engineer, New York, and W. M. Vandersluis, signal engineer Illinois Central Railroad. Mr. Vandersluis will serve as engineer-secretary of the commission.

WORK TO START AT ONCE

Messrs. Arnold, Gibbs and Hutchinson have been prominently connected with other electrification projects. Colonel Arnold was a member of the commission which was responsible for the electrification plans of the New York Central terminal in New York City. He has also acted as consulting engineer for the electrification of the Port Huron-Sarnia section of the Grand Trunk, the Erie Railroad at Rochester and the Deadwood-Lead City line of the Burlington Railroad. The firm of which Mr. Gibbs is senior member had charge of the electrification of the Long Island Railroad, the Pennsylvania's suburban service in Philadelphia, and part of the Norfolk & Western work. Mr. Hutchinson planned the electrification of the Cascade Tunnel division of the Great Northern.

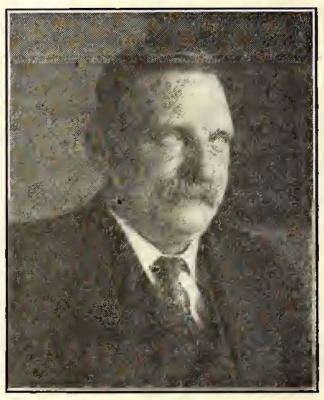
The commission is to begin work immediately, it is understood, with the probability that a report will be made within six months. The commission will determine what system of electrification should be used, taking all factors into consideration. After this important preliminary work is completed, it is probable that the commission will be retained as a permanent body to design and superintend the installation of the system adopted. Under the ordinance in which the electrification of the Illinois Central is provided for, the work must begin in 1922. All of the work done by the Illinois Central Railroad in the Chicago terminal area during the last year has been laid out with the future needs of the electrified system in mind. This includes yard layout and the steel cars purchased for present use in suburban service but suitable for later equipment with motors and control.

Present indications are that the suburban service will be handled entirely with multiple-unit cars, and that electric locomotives will come into use only when the electric operation is extended to the through trains.

Promotion for A. K. Plummer

A. K. Plummer is the newly appointed director of traffic of the Los Angeles (Cal.) Railway. Mr. Plummer succeeds F. E. Denison, who has resigned because of ill health. As director of traffic Mr. Plummer will oversee the activities of the traffic supervisors.

A street railway veteran of horse-car days, Mr. Plummer has grown up with the Los Angeles system. Before going to Los Angeles in 1903 he drove a horse-car in San Francisco. For three years he served as a motorman on one of the Los Angeles city lines. He was then promoted to inspector. Three years ago he was again advanced, this time to traveling instructor. He continued in this position until the time of his recent appointment to be director of traffic.



A. K. PLUMMER

Commission Consolidates Steam and Electric Divisions

The Public Service Commission for the Second District of New York has consolidated its divisions covering steam and electric railroads into the Division of Railroads with Charles R. Vanneman, since Oct. 1, 1914, chief of the Division of Steam Railroads, as chief of the Consolidated Divisions and Ray G. Winans, assistant inspector in the Division of Electric Railroads, as chief inspector of electric railroads.

Charles R. Barnes, the chief of the Division of Electric Railroads, resigned recently to become the head of the commission operating the railway in Rochester under a service-at-cost agreement between the city and the New York State Railways. Mr. Winans had been assistant to Mr. Barnes since Jan. 6, 1911.

Mr. Vanneman, the chief of the consolidated divisions, has been with the Public Service Commission, Second District, since March 3, 1910.

Colonel Kealy's Resignation Accepted

Retires as Operating Head of Kansas City Railways, but Will Probably Be Employed by Receivers as Consultant

Col. Philip J. Kealy, president of the Kansas City (Mo.) Railways, will retire from any direct participation in the operation of the property on Jan. 1. His resignation as operating head of the company was tendered the present receivers upon their appointment on Oct. 21. Since that time Colonel Kealy has remained, assisting the receivers in getting started on their new work. The receivers have endeavored to have Colonel Kealy reconsider his resignation and remain with them in the operation of the property. Failing in having Colonel Kealy remain and devote all his time to the operation, there is every likelihood that he will be used in a consultant and advisory capacity as it is his present intention to remain in Kansas City and make it his home.

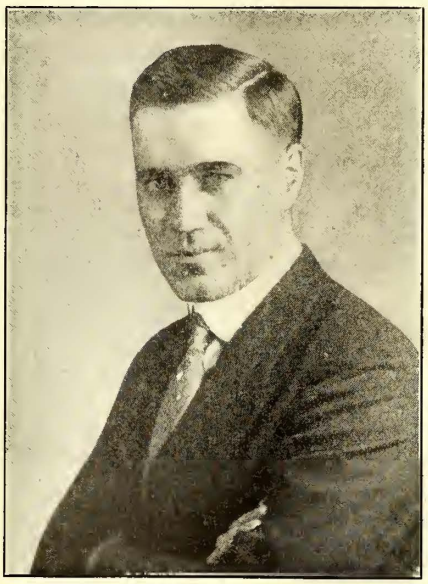
ALTHOUGH he has resigned as an operating official, Colonel Kealy still remains president of the corporation, which will continue its existence as at present during the receivership. By appointment by the company he is also company member of the Board of Control. The status of the Board of Control is still an open question which will probably be settled soon. Under the franchise there is a member appointed by the city, which position is now filled by Col. E. M. Stayton, and a company member appointed by the company directors. This board has jurisdiction over service, purchases, capital improvements, etc., and in the past has done much of the engineering work for the company organization.

Board's Status Unsettled

The court, while not ruling definitely upon the board, took the position, when the question was raised upon appointment of the receivers, that there should be no division of authority, and that as far as any authoritative action is concerned the board would be directly under the control of the receivers. Regardless of what will be done with the board, all the present records and system of keeping capital accounts will be continued under the receivership by various departments of the company's organization. The board may still continue technically so that the city's and company's interests may be watched by their representatives during the receivership, and such assistance as may be called for rendered to the receivers.

A sketch of Colonel Kealy appeared in the ELECTRIC RAILWAY JOURNAL, Feb. 12, 1916, page 337, upon his appointment as president. He came to Kansas City as assistant to Bion J. Arnold on the valuation of the property of the Metropolitan Street Railway, taken in 1912 under the direction of the United States Federal Court. Upon its completion he was retained as engineering adviser to Fred J. Harvey and R. J. Dunham, receivers. In the franchise negotiations that followed, he, with L. R. Ash, City Engineer, was author of the Kealy-Ash plan of settlement, which was adopted as a basis for the present franchise. He was named in the new grant as the company's representative on the Board of Control. In February, 1916, he was elected president of the company and company member of the Board of Control, succeeding John M. Egan. Colonel Kealy is first vice-president of the American Electric Railway Association.

Colonel Kealy turns over to the receivers the best operating organization the company ever had in its history, with service at the highest point ever given in Kansas City. Following a strike which began Dec. 11 two years ago, practically all of the company's equipment has been rehabilitated and



COL. P. J. KEALY

Colonel Kealy, with his associates, has built up since that time an entirely new operating organization. There is no union at present on the property. All matters affecting the welfare of the employees are settled collectively under the shop committee system. Although no interest has been paid since June, 1919, on the company's bonded indebtedness maintenance work has not been deferred nor has service been allowed to suffer. The receivers, therefore, took over a property in almost perfect operating condition.

The Kansas City Railways, in order to secure fare increases, has had to appear before the commissions in two states, Kansas and Missouri, and has successfully conducted three fare cases before these bodies. Even when a receivership was deemed necessary because of disagreements arising in the bondholders' committee the property was rapidly getting on its feet financially. Despite extraordinary increases in the price of coal in the past six months the six months' operation ending Dec. 31, 1920, will show a net of approximately $500,000 as against one of $90,000 for the six months ended Dec. 31, 1919.

F. G. Buffe, general manager of the company, will be retained by the receivers as general manager for the receivers, in which position he will succeed Colonel Kealy as chief executive officer of the company for the receivers. There will probably be no other important change in the present operating organization.

W. E. Rolston, superintendent of power for the company, has resigned, effective Jan. 1, to enter the employ of the Sioux City (Ia.) Service Company. Mr. Rolston entered the employ of the Kansas City Railways on Nov. 12, 1919. He has been in charge of the extensive reconstruction program at the company's power plant. Mr. Rolston becomes superintendent of power for the Sioux City Service Company.

The department now headed by Mr. Rolston will be combined with the electrical distribution department, and all power matters, both generation and distribution, will be handled directly under the supervision of R. W. Bailey, assistant general manager for the Kansas properties, who has direct jurisdiction over electrical distribution.

Receiver Praises Colonel Kealy

"Colonel Kealy has made a splendid record with the property," said Col. F. Fleming, one of the receivers. "He has accomplished much in building the service, and the organization he has developed is strongly loyal to the company. He has accomplished these results under adverse conditions and overcome serious handicaps."

Colonel Fleming spoke with deep appreciation, and even with admiration, of the ability with which Colonel Kealy had developed the equipment, personnel and service of the Kansas City Railways and of his comprehensive and accurate knowledge of the many details of electric railway property, operation and financing.

John E. Kurtz Appointed to Missouri Commission

Governor Gardner of Missouri on Dec. 9, on recommendation of Governor-elect Arthur M. Hyde, appointed John E. Kurtz, Republican, of Kansas City a member of the State Public Service Commission, to fill the vacancy caused by resignation of Judge John Kennish.

When Judge Kennish resigned late in November to become chief counsel for the receivers of the Kansas City Railways he advised Mr. Hyde that he would leave the appointment to him. The Governor said he would appoint any one suggested by Mr. Hyde or would leave the place vacant until the change of administration.

Mr. Kurtz is a lawyer. He will serve under the present appointment until April 15. He will be reappointed by Governor Hyde if he desires to remain on the commission for a full term of six years.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

New Corporation to Broaden Export Field

Potential Capacity of One Billion Dollars Behind Organization to Supply Credit for Foreign Buying

A corporation to be known as the Foreign Trade Financing Corporation will be launched immediately, it is announced, as the result of a conference of representatives of agriculture, finance and business from all parts of the United States called by the president of the American Bankers' Association in Chicago on Dec. 10 and 11. To quote from the resolutions passed at that meeting: "The operation of this organization will result in the broadening of the export market, thus relieving this country of surplus stocks of all kinds, with the result of stabilizing prices and benefiting all lines of trade, agriculture and manufacturing, and will have an especial tendency to encourage production."

A capital of $100,000,000 was authorized, giving a potential capacity of one billion dollars under the Edge act, under which the corporation will be organized. Among the committee of thirty named to supervise the formation of the corporation are found the names of Herbert Hoover and E. M. Herr, president the Westinghouse Electric & Manufacturing Company. It is the intention to get this organization to a functioning point at a very early date, and the entry of such a force in the export finance field should go a long way toward brightening up conditions in all lines of manufacturing.

Easier Market on Cement

Manufacturers' Price Drops Slightly Under Light Demand and Decreased Production

Within the past two months the general slackening of business that has affected many items, combined with the normal seasonal lessening of demand at this time, has served to relieve the previous tight condition of the cement market. In the Oct. 16 issue of the ELECTRIC RAILWAY JOURNAL it was stated that stocks of cement were practically nil, demand far in excess of supply and orders accepted for delivery not much before Dec. 1.

Since that time conditions have changed, as at present the volume of new orders coming to virtually all manufacturers can be said to be very low. Electric traction companies are giving no indication that construction programs next spring will call for any large ordering of cement on their part. Nevertheless producers remain optimistic as to prospects for general demand for their product coming back strong in 1921.

Manufacturers' stocks, on the whole, are still either at a low level or depleted, but in spite of the fact that production is being materially curtailed at present supplies are expected to build up in good shape during the present winter. Deliveries are now made in good time, in some instances from stock and in others within a few days. Cancellations, except where standing orders for shipment of a certain number of barrels per week have been cut, have apparently not been received in large volume; rather the new orders have ceased coming in. Prices within the last two weeks have eased off slightly. Manufacturers generally reduced the price 20 cents per barrel, while the cut with dealers has been even larger, as cement is now quoted at $4.80 per barrel, delivered in truck lots at New York, compared with $5.10 recently.

Quiet Market for Special Trackwork

Prospects for 1921 Business Uncertain, with Electric Railways Displaying Little Interest—Brisk Inquiries from Steam Roads, but Producers Are Keeping Rail Stocks at Low Level

Although a good volume of rail orders for 1921 is being received at present, the market for special trackwork, on the other hand, remains even quieter than is usual at this period. Producers generally are conservative in expressing an opinion regarding prospects for next year's business in frogs, switches, crossings and the more complicated layouts. Steam railroads are entering the market for this material and the number of inquiries reported from that source indicates a good volume of orders through next year. On the other hand, electric traction companies as yet have displayed little or no interest in covering their requirements and the orders placed in that quarter are not expected to be extra heavy.

One of the large makers of special trackwork still has orders on the books from both steam and electric lines sufficient to carry through the winter season. This condition is not general, however, as the fall season just passed fell considerably below the standard of other years in the amount of track laying that was done. Consequently mills are pretty well caught up on their old orders now and deliveries can be accomplished in good time. Foreign buying is light, though the need for this material abroad is known to be large.

Although some producers who do not roll their own rails, particularly those who specialize on girder-rail layouts, are waiting for actual orders before buying rails, this cannot be said to be a general policy. In spite of the fact that a leading maker of this class reports having covered his full rail requirements for 1921 many of the other mills that do not do their own rolling are endeavoring to keep rail stocks as low as possible. These efforts are meeting with success as the result of hand-to-mouth buying. Consequently, it is pointed out, traction companies that place late orders for spring delivery may very possibly run up against long shipments, especially on girder-rail trackwork. This is not only because girder rail stocks are small but the mills rolling this type will not roll for the small tonnages that are often placed under the many different existing specifications. To overcome this factor of orders being held up until a sufficient tonnage of each specification accumulates to make it worth while for mills to roll, traction companies, it is stated, are more and more standardizing on the A.E.R.A. standard rail.

Production conditions with respect to raw material, labor and transportation are fairly favorable and continue to improve. Prices hold steady and the consensus of opinion is that no reduction on special trackwork may be expected until labor costs have undergone a material downward revision.

Twenty American Street Cars for Finland

Helsingfors, Finland, has received twenty American street cars which were ordered by the local tramways company for service in the city there, according to Consul Leslie A. Davis. It is expected, he says, that the sale of these cars in Finland will lead to further sales, not only in that country but also in Norway, Sweden, Denmark and other countries of northern Europe.

There is a demand there also for street-car rails, maintenance equipment, machinery for repair shops, snow plows and sweepers, street sprinklers, steel-wire brooms with ice chisel on end of handle and similar articles. Owing, however, to the present unfavorable rate of exchange there would probably be difficulty in obtaining the necessary currency license for their importation at this time.

Senate Committee Recommends Regulation of Coal Industry

Repudiation of Coal Contracts, High Prices and Irregularities of Deliveries Sharply Criticised in Report Made Before United States Senate This Week

A severe arraignment of the coal industry was made before the United States Senate this week in a preliminary report of the Senate committee on production and reconstruction, headed by Senator Calder of New York. This committee, which has been investigating the coal situation for some time, recommends regulation of the coal industry to cure existing evils. The repudiation of coal contracts, high prices and irregularity of deliveries were sharply criticised.

The text of the coal section of the report is as follows:

"The nation is dependent upon coal as its chief source of heat and power, yet the production and distribution of coal are badly organized and subject to manipulation at the expense of the people.

"Coal profiteering, especially as it has followed the priority orders issued by the Interstate Commerce Commission, has continued unchecked by the Department of Justice and is a national disgrace. Coal speculation has been permitted to monopolize the transportation facilities of the country, retarding necessary construction and increasing the basic cost of manufacture and distribution of commodities in general. It has bled the home owners, public utilities, and the industries.

Evils of Contract Repudiation

"The imperative necessity of continuity of supply of fuel demands the fulfillment of contractual relations in this industry more than in any other, and yet one of the primary causes for the disgraceful and disastrous conditions during the past six months has been the repudiation of contracts. An exceptional demand not only brings about reckless and unwarranted repudiation of contracts made for delivery of coal but the substitution of inferior quality at higher prices. Indeed, coal contracts are so drawn as to be breakable in delivery, in quality and in price.

"Our investigation into the coal situation has convinced us that the private interests now in control of the production and distribution of coal, in spite of efforts by some, are actually unable to prevent a continuance or a repetition of the present deplorable situation, and that it is the duty of the government to take such reasonable and practicable steps as it may to remedy the evil.

"An inherent responsibility of the government is the protection of its people. To assure the mining, transportation and distribution of coal at fair prices is a public duty from which the government cannot escape. But your committee believes that governmental administration of the production and distribution of coal should be a last resort, as governmental activities should always be directed toward encouragement of private initiative and enterprise.

"While the fulfillment of contractual relations is of first importance to the stabilization of the industry in the interest of the consumer, the producer, and labor as well, your committee believes that the government should at all times be informed as to coal distribution and at this time recommends:

"That all coal operators, wholesalers, jobbers and retailers be compelled by statute to file at regular and frequent periods with some federal agency reports on the total tonnage produced or handled, the size and quality thereof, the amount of tonnage contracted for, the amount sold on contract and at spot sale, to whom, together with the prices made or received under such contracts or sales, and producers and distributers to make regular reports sufficient to determine their costs and profits and the corporate inter-relations or the communities of interest, if any, between companies producing and distributing coal.

"With this and collateral information in the hands of federal authorities for possible use by the Department of Justice and other government agencies, prevailing evils as to irregularity in deliveries, inferiority of quality, profiteering in prices and undue monopoly of transportation facilities should to a great extent be eliminated. But if no other remedy can be devised it may be necessary to enact some form of federal licensing to meet the situation.

"Fuel thrift by the small user and fuel thrift by the large user through storage, scientific combustion and transmission should be strongly encouraged by the federal government."

Armature and Field-Coil Market Firm

Large Roads Buying Pretty Well on Shipping Schedules of One Month —Armatures Two Months

Buying of armature and field coils is progressing at a rate only sufficient to cover expected demands for the near future. Shipments from the winding mills can be made from one month up, and although many of the larger roads are ordering a good many sets of armature coils for delivery, so many each month for the next few months, the same cannot be said of the smaller lines. If a heavy winter comes on unexpectedly there may be some difficulty in securing delivery of even a small number of coils to take care of the burnouts occasioned by such weather. Repair parts and replacements for safety cars are coming to be virtually stock items, and armature coils, field coils and complete armatures can be had on almost immediate shipment. Complete armatures for cars larger than safety cars are being quoted on sixty-day shipment.

There has been no change in prices of these parts and with labor prices at their present scale manufacturers see no chance for a downward revision in the very near future.

Specifications Out for Fifty Motor Cars for Chicago

The Chicago Surface Lines is sending out specifications for new motor cars of which fifty are to be purchased immediately, together with trucks and other equipment for fifty trailers now under construction in the company's West Side shops. The new cars are to be of the plain arch-roof, double-end type with bulkheads, closed vestibules and pneumatically operated doors. They are to be equipped with four motors with capacity to haul trailers in continuous service all day and through the tunnels involving 9 to 11 per cent grades. The following table gives the general dimensions:

Length of body over corner posts	32 ft. 9 in.
Length of car over bumpers	48 ft. 11 in.
Width over all at drip rails	8 ft. 6 in.
Width over posts at belt rail	8 ft. 3⅞ in.
Height from rail to top of trolley board	11 ft. 7½ in.
Height from rail to first step	15½ in.
Height from first step to platform floor	13½ in.
Height from platform floor to car body floor	10 in.
Truck centers	20 ft. 3½ in.
Wheel base of trucks	4 ft. 11 in.
Diameter of wheels	31 in.
Seating capacity, including five on platforms	49
Estimated weight	46,000 lb.

The bodies are to be of all-steel construction up to the window rail with a wood superstructure. They will be ventilated with draft-type ventilators and a compensating air intake at each end. This will conform to the standard practice now used on Chicago cars except that they will be the first arch-roof cars to be supplied to this system. The seats are to have spring cushions and form-shape backs, weighing approximately 56 lb. per seat. The rails and stanchions are to be of aluminum and aluminum conduit will be used for the heaters and wherever it can be substituted for other metal. The motor circuits and all other wiring will be run in Duraduct or equivalent material. The windows will be fitted with storm sash covering only the lower sash. The window rails are to be made of bronze tubing in sections fitting in between the side posts. This is a weight-saving plan, which also stiffens the car body, that was worked out in connection with the new trailer design described in detail in ELECTRIC RAILWAY JOURNAL for July 17, 1920, page 110.

The car equipment will include automatic couplers, including the air and electrical connections, and K-type con-

trol. In addition to the equipment necessary for the motor cars bids will be requested on fifty pairs of trucks for the trailers and for seats, couplers, curtains, door engines, heaters, headlining, etc., for the trailers. The dimensions of the trailers under construction in the company's shops are such as to match up with the new motor cars. These dimensions are the same as listed above for the motor cars except for the following:

Length of bumpers	47 ft. 6 in.
Height from rail to top of trolley board	10 ft. 9½ in.
Height from rail to well	15¾ in.
Height from well to top of cross-sill	10¾ in.
Ramp in floor from center well to bolster	5⅜ in.
Truck centers	25 ft.
Wheel base of trucks	4 ft. 4 in.
Diameter of wheels	22 in.

The best delivery possible is requested on both motor cars and trailer equipment.

Rolling Stock

The New York, New Haven & Hartford Railroad, New Haven, Conn., is in the market for eight multiple-unit control cars and fourteen trailers.

Brockton & Plymouth Street Railway Company, Plymouth, Mass., has placed a contract with the Wason Manufacturing Co. for one safety car at a cost of $7,550.

Franchises

Wheeling (W. Va.) Traction Company.—At a meeting of the Bellaire (Ohio) City Council held on Dec. 3 the Wheeling Traction Company controversy, which has been hanging fire for three years, during which time the company has been operating without a franchise in Bellaire, was brought up again. Council President McFarland was authorized to invite General Manager C. P. Billings, of the traction company, to confer with Council shortly when the franchise matter will be taken up again.

Frontier Electric Railway, Buffalo, N. Y.—The municipal authorities of North Tonawanda, N. Y., are arranging to revise the franchise of the Frontier Electric Railway, Buffalo, to make the provisions of the North Tonawanda franchise, regarding the time of starting and completing the line, conform to similar clauses in the Tonawanda franchise. The changes were requested by the railway. The company desires an extension of time before starting construction of the Buffalo-Niagara Falls electric line, pleading it now would be impossible to finance the project because of the unsettled market in building materials.

Corpus Christi Railway & Light Company, Corpus Christi, Tex.—A controversy seems likely involving the status of the franchise of the Corpus Christi Railway & Light Company. The City Council some time ago granted a special franchise to the company conditioned on the expenditure of $100,000 to $200,000 in improvements and betterments during the six months immediately following May 26, 1920. These improvements have not been made and the general opinion seems to be that the special franchise has automatically ceased. The company, however, asserts that its franchise has not expired and is disposed to resist by legal action any steps looking to declaring the franchise forfeited.

Track and Roadway

Cincinnati & Dayton Traction Company, Hamilton, Ohio.—In order to cooperate with paving improvements which the city authorities will undertake in Hamilton the Cincinnati & Dayton Traction Company will move the tracks on Mt. Pleasant from the side of the roadway to the center.

Hydro-Electric Power Commission, Ontario, Canada—The Hydro-Electric Power Commission of Ontario is preparing reports and estimates regarding the cost of an electric railway from St. Thomas to Simcoe.

Hydro-Electric Power Commission, Ontario, Canada.—The railway committee of the Hamilton (Ont.) City Council has indorsed the suggestion of Engineer Agate of the Hydro Commission requesting the Grand Trunk Railway to construct the supports of four bridges which would conserve the right-of-way along the Grand Trunk Railway through Hamilton for proposed radial lines. The committee further authorized the city solicitor to apply to the Dominion Railway Board for an order conserving the right-of-way of the Grand Trunk for the radial trackage. The proposed bridges are to be located at Macnab, John, Catharine and Mary Streets in the city of Hamilton.

International Railway, Buffalo, N. Y.—The International Railway, Buffalo, has made an investigation of the cost of replacing certain tracks of the old Niagara Falls line in the city of North Tonawanda and found it would cost approximately $18,000. The company has informed the municipal authorities that it could not make the improvements at this time as requested by the city.

Power Houses, Shops and Buildings

Austin (Tex.) Street Railway.—The Austin Street Railway will install new machinery and electric generating equipment in its power plant with a view to improving the service maintained in the city of Austin.

Southern Pacific Company, Portland, Ore.—Work has been started on the rebuilding of the Lyric Theater building in Portland as a depot for the electric lines of the Southern Pacific Company. Contractors have sublet the work to local firms and the alteration is under way. The estimated cost of rebuilding is placed at $60,000.

Trade Notes

The National Safety Car and Equipment Company, St. Louis, Mo., announces its removal to the National Building, 200-214 South Theresa Avenue.

The Star Brass Works, 3114-23 Carroll Avenue, Chicago, manufacturer of spray cooling systems, has established a Pacific Coast office in the Rialto Building, San Francisco, Cal., in charge of L. M. Page.

The Illinois Stoker Company, Alton, Ill., announces the appointment of the Ernest E. Lee Company, 115 South Dearborn Street, Chicago, as district representative for Iowa, Wisconsin, Michigan, northern Indiana and northern Illinois.

J. W. Murphy, former sales manager of the Esterline Company, has established a manufacturers' agency under the name of the J. W. Murphy Company at 108 South La Salle Street, Chicago. The company will handle Esterline and Duncan meters as well as some other parallel lines.

J. C. Kopf, formerly manager of the engineering department of the Duff Manufacturing Company, has been appointed research engineer and placed in charge of a newly established research department. F. W. Schwerin has been appointed manager of engineering.

The Economy Electric Devices Company, Chicago, Ill., has pending a contract with the Cincinnati (Ohio) Traction Company for the sale of 550 Sangamo Economy watt-hour meters. The traction company has asked the street railway director to approve the contract.

The American Car & Foundry Company's Helmbacher Rolling Mills plant at Madison, Ill., was destroyed by fire on Dec. 15. Officials estimate the damage at $1,000,000. The buildings destroyed were a group constructed of wood and steel, a two-story office building, air reduction plant and thirty-five freight cars.

Bleachery for Insulation Making.—The bleachery which the Irvington Varnish & Insulator Company installed in its Irvington (N. J.) works about a year ago has a capacity of about 1,500,000 sq.yd. of cloth per month. It is equipped with machinery for obtaining the special finishes required on cotton fabric to be used for insulation.

New Advertising Literature

Valves.—The Scott Valve Manufacturing Company, Detroit, Mich., has issued catalog No. 12, containing 185 pages, in which it describes and illustrates its different types of valves.